The effect of Brexit on bilateral trade in services between the United Kingdom and the European Union

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Abstract

The UK's vote to leave the European Union prompted questions about the economic future of the UK, particularly international trade. We apply the gravity model to estimate the short-term effects of Brexit on bilateral trade flows in services over 2000-2012 between the UK and its main trading partners, with the focus on members of the EU. Based on the model, we found that the size of the economy, the EU membership, trade barriers and economic openness significantly affect bilateral trade in services. Furthermore, there is an unrealized trade potential between the UK and some of its EU partners, as well as the BRIC economies. There are also large negative short-term effects of Brexit on the forecasted bilateral trade in services. Finally, the Switzerland and the Norwegian models are the least detrimental exit scenarios for the UK.

List of Figures:

List of Abbreviations

AFMP: Agreement on the Free Movement of Person

ASEAN: Association of South-East Asian Nations

BRICS: Brazil, Russia, India, China and South Afrika

CETA: Comprehensive Economic Trade Agreement

EC: European Community

EEA: European Economic Area

EEC: European Economic Community

EFTA: European Free Trade Association

EFW: Economic Freedom of the World

EU: European Union

FDI: Foreign Direct Investment

FTA: Free Trade Agreement

GATS: General Agreement on Trade in Services

GBP: Great Britain Pound

GDE: General Equilibrium Model

GDP: Gross Domestic Product

GNP: Gross National Product

GVA: Gross Value Added

LSE: London School of Economics

MFN: Most Favoured Nation

MLG: Multi-Level Governance

NB8: Nordic Baltic 8

NIESR: National Institute of Economic and Social Research

OECD: Organization for Economic Co-operation and Development

ONS: Office for National Statistics

UCITS: Undertakings for Collective Investments in Transferable Securities

UK: United Kingdom

WTO: World Trade Organization

STRI: Services Trade Restrictiveness Index

EUSFTA: European Union-Singapore Free Trade Agreement

APC: Australian Productivity Commission

Table of contents

1. Introduction

On the 23rd of June 2016, the British citizens voted in a referendum to withdraw the UK's membership in the EU. This has triggered a series of negative effects on the economy with the British pound reaching a record low since the 1980s, the FTSE 100 experiencing a post-referendum dip and service and manufacturing sectors suffering significantly causing the UK economy to shrink at a quarterly rate of 0.4%. These events have raised questions about the effect of British exit from the EU on international trade, both short-term and long-term, creating a level of uncertainty in the economy.

The European Union is currently UK's main trading partner, with UK's exports to the EU accounting for $16.4 billion and UK's imports from the EU accounting for $26.5 billion (Eurostat, 2017). Considering that UK's main exports are in services and since UK's service industry accounts for 79% of the GDP (with the financial sector realizing 40% of all services market value), the exit from the EU's membership is likely to significantly affect British trade in services.

Given the close trading relationship between the UK and the EU, the effect of UK's exit from the EU is expected to be significant with the magnitude of this effect being dependant on the exit scenario negotiated following the triggering of the Article 50 of the Lisbon Treaty. Furthermore, considering the importance of the services industry for the British economy and the relative lack of empirical studies of bilateral trade in services, we have chosen to analyse the effects on trade in services only.

Given the recentness of these events, there has only been a limited amount of literature addressing the economic effects of UK's departure from the EU. The existing studies, by PWC, the UK's Treasury and London School of Economics amongst others, use a variation of gravity model, computable general equilibrium and qualitative studies, showing the negative effects of Brexit on UK's GDP, FDI, immigration and trade. However, the studies do not show the exact methodology or discuss the computation of the specific variables considered. We attempt to address the shortcomings of these studies by estimating the short-term effects of Brexit on the bilateral trade in services between the UK and the EU using different empirical methods.

In this paper, the approach is a combination of positivist and constructivist paradigms, to analyse both quantitative and qualitative data. Starting by analysing the classical theories of trade including the comparative advantage of nations as proposed by the Ricardian Model, the theoretical framework is built to support our investigation. Later, using the constructivist approach, the research's hypotheses on the magnitude of the Brexit effect based on different exit scenarios were defined following the existing literature. The research lies on the following statement: the larger the barriers to trade in services the larger the effect of UK's exit from the EU on the bilateral trade in services. The various countries included act as proxies for measuring barriers to trade in services.

To estimate the quantitative effects of UK withdrawing its EU membership, we created a database using data from the OECD website. The Service Trade Restrictiveness Index and the Economic Freedom of the World Index have also been included in the database. The purpose of the it is to analyse UK's service trade from 2000 to 2012 applying the gravity model in a panel-data framework. The results of the gravity model show the size of the economy, membership in the EU, trade barriers and the openness of the economy all affect the value of bilateral trade. Using the model, it was also possible to estimate the unrealized trade potential between the UK and its main trading partners.

Lastly, we estimate the short-term effects (in years 2017-2021) of Brexit on the bilateral trade in services using different exit scenarios. The results of this analysis indicate that following the Norwegian and Switzerland Model would be the least detrimental exit scenario for the bilateral trade in services between the UK and the EU.

This empirical research has been limited by the poor availability of data on trade in services, the application of the gravity model to the trade in services and unaccounted variables such as the political influences on the Brexit effects (e.g. the Scottish Independence vote). This study also does not predict the potential gains from negotiating trading deals with countries outside the EU, which could offset the negative effects of Brexit. Nonetheless, the study does contribute to the current research by analysing the bilateral trade of the UK and its biggest trading partners, as well as proposes a different approach to investigate the effects of withdrawing from the EU.

This paper is structured as follows. Section 1 (above) introduces the topic and states briefly the methods and results of the study. Section 2 builds a theoretical framework based on the classical theories of trade as well as theories on regional integration. Section 3 focuses on the methodology of the paper, beginning with the gravity model, its creation, modifications and application in trade in services, followed by the description of data and the model equation. Section 5 presents the results of the regression and analysis of the data, the potential trade analysis as well as the effects of different exit scenarios on trade. Section 6 discusses the results, as well as explains the limitations of the study and gaps to be filled in future research. Finally, section 7 concludes and presents practical implications of the study. The appendix section contains description of data, regression results and a summary of the UK and EU trade relations.

2. Literature Review

2.1. Current research/studies on Brexit

The current research on Brexit is limited, with only a few significant studies based on econometric analysis. In this section, the attention goes to the results proposed in Brexit studies as well as on the methods of data analysis.

In March 2016, PWC was commissioned to supply TheCityUK with analysis of the potential economic impacts of Brexit on the financial sector. The report examined two alternative scenarios to the current situation, free trade agreement (FTA) and WTO scenario. The former would be based on tariff-free trade in goods, but not services and UK would still be required to implement EU standards on goods sold in the EU. The government would be able to secure a greater flexibility over immigration policy and regulatory policy. The UK would retrieve the FTAs made with third-countries pre-joining the EU and would no longer need to make contributions to the EU budget. The latter scenario means the UK would trade under the most-favored nation rule (MFN) of the WTO and therefore would not have the ability to trade tariff-free in goods with the EU. The current FTAs between the EU and third-countries would not apply to the UK until new arrangements are made. The UK would not contribute to the EU budget and have total control over the its regulatory and immigration policies.

PWC used a computable general equilibrium model (GDE) of the UK economy to analyze the different exit scenarios. The model looks at the supply chain interactions of different industries and enables to account for the impact of trade relationships. The main findings showed that whatever the exist scenario, the UK financial sector would grow more slowly than if UK stayed in the EU. The economic output overall would slow down as a result of an increase in non-tariff barriers (NTBs) in financial trade as well as an impact from the decrease in migration into the UK. PWC bases the total impact on financial sector gross value added by looking at the impact of uncertainty, trade, migration, regulations and fiscal impacts and estimated that under the FTA scenario the impact in real gross value added (GVA) in 2020, 2025 and 2030 would be -5.7%, -1.9% and -1.8% respectively. Under the WTO scenario the impact for 2020, 2025 and 2030 would be -9.5%, -5.7% and -4% respectively. Under the FTA scenario the impact for UK GDP in 2020, 2025 and 2030 would be -3.1%, -1.1% and -1.2% respectively. While under the WTO scenario the impact for the UK GDP for

2020, 2025 and 2030 would be -5.5%, -4.1% and -3.5% respectively. Therefore, the conclusion is that the financial sector has a larger sensitivity to Brexit than does the economy of the UK.

The report also mentions the potential economic impacts of a relocation of the banking activity. Given the current benefit of the EU membership, namely ability to access the single market via passporting regime, the UK may lose its rights to such regime, which would affect the ability of banks authorized in the UK to offer products and services in most areas to EU clients. The passporting regime covers banking, insurance, reinsurance, investment services, management and offerings of UCITS (Undertakings for Collective Investments in Transferable Securities), alternative investment funds, payment services and electronic money. Over the longer term, businesses may make decisions to relocate some of the activities to other EU financial hubs. Relocation of banking activity was estimated to have a negative impact on the UK's GDP of -0.42% in 2030. However, the study had some significant limitations. It does not consider the government policy responses to the potential relocation of banking possibility and only takes into account the potential responses of a sub-set of the UK banks (non-EU banks).

Another study on the economic impacts of Brexit have been conducted by Ruparel et al (2016) for Open Europe and states that the advantages of leaving the EU for the UK, such as more freedom over policies, can offset the costs and have a 'positive outcome' after all. The authors argue that the key is 'free trade, opening up to low cost competition and maintaining relatively high immigration, pushing through deregulation and economic reforms' (Ruparel et al, 2016). The report states that the key priorities for the British Government post Brexit should be focused on three aspects, trade, immigration and regulation and competitiveness. In terms of trade, UK should negotiate a Free Trade Agreement with the EU, 'build FTAs with other states to try to offset Brexit effect' such as with the Asian economies (China, Japan, India and ASEAN), which according to the report would boost the UK economy by an increase of 0.6% in GDP. Furthermore, a unilateral free trade approach could lead to a GDP boost by 0.75% in the long run. The third step to trade would be updating older agreements. In terms of immigration, the report argues that while the political pressure on immigration may continue, immigration could 'help smoothen the path to fiscal sustainability'. UK could, however, look for a policy that would attract a more skilled migration into the country. The report also recommends starting a points-based system, similar to the ones in Canada and

Australia. However, this may prove more difficult the deeper the agreement between the UK and the EU. Finally, the third aspect presented in the report is regulation and competitiveness. The authors argue that a deregulation agenda could lead to a boost of 0.7% in GDP, stemming from savings in social employment law, environment and climate change and financial services. The report concludes by adding that pursuing the above would lead to a relatively high degree of flexibility from the EU. Therefore, while the Norwegian and Switzerland models would not be able to bring such gains politically and economically, a comprehensive bilateral trade agreement could be the most advantageous solution for the UK.

Beck (2016) examined the potential effects of Brexit on foreign direct investment as well as on immigration in the Oxford Economic Outlook. Having established that FDI is generally a positive phenomenon for the growth of the economy, the author states that what makes United Kingdom attractive for foreign firms is the use of English language and a relatively business friendly environment characterized by a deregulated labor market. The first reason is arguably less important given that most the EU FDI to UK comes from Germany, Netherlands and France. The second aspect plays a much bigger role. In 2015, the World Bank named UK the 6th easiest place in the world to do business, 2nd in Europe after Denmark. The authors also cite OECD ranking for the lowest level of barriers to firing and hiring, in which UK scored the top (the lowest) among the European countries. Furthermore, UK is the 10th best country in terms of competitiveness. Arguably, UK will still have such advantages even if Brexit goes forward. Nonetheless, the barriers to trade, which are essentially the main impediment to trade, will for some sectors increase no matter what exit scenario the UK will follow.

Beck (2016) further looks at which sectors will be the most influenced by Brexit. The author looks at two metrics which examine the risks to FDI following Brexit, the size of the existing stock in of FDI (in each given sector) and the importance of that sector to the EU market. Based on the Office for National Statistics, the inward investment into the UK is mostly directed towards satisfying the demand domestically (as in the UK). The financial services is the sector receiving the largest amount of inward investment but the demand for UK financial services from EU countries is less than 10%. The author suggests that FDI in financial services sector is therefore not predominantly exposed to Brexit. However, the possibility of losing the passporting rights increases the risks associated with Brexit. Some corporations have already stated that they will move their European headquarters out of the UK and into

mainland Europe. The second most important sector by inward FDI is retail and wholesale sector, but only 7% of the demand came from the EU countries. Finally, the third most relevant area discussed in the paper is mining and quarrying and almost 30% of the output is sold to EU countries, which may therefore bare a higher risk of negative effects post Brexit.

Beck (2016) conclusion on Brexit and FDI is that if the UK exits the EU, does not negotiate tariff free access to the EU market and does not change domestic policies (e. g. reduce regulation, stop tax cutting and increase spending of the fiscal savings on the public) the UK's stock of FDI will result in being 7% lower than otherwise.

Goodwin (2016), from Oxford Economic Outlook, analyzed Brexit and immigration, providing evidence on how the high levels of immigration since the last major EU enlargement (2004) have ensured to off-set the negative effects of an ageing population. Moreover, the research indicates that, since tighter border control over immigration was one of the key motivations for those in favor of the leave vote, the UK is more inclined to limit the policy of free movement of labor and adopt the points-based system, which is currently in use for all non-EU citizens. Lastly, Goodwin (2016) findings indicates that lowering the migration by 60,000 a year through the adoption of a populist immigration policy would reduce the level of GDP by over 1% by 2030.

Wadsworth et al (2016) as part of the Centre for Economic Performance of London School of Economics and Political Science have also published a paper on Brexit and the impact of immigration on the UK. The research concentrates on the concern that immigration has a negative influence over salaries and job opportunities for UK' citizens. However, Wadsworth et al. (2016) prove that immigrants with consumption of goods and services are leading to an increase in demand, thus job creation. Furthermore, EU immigrants are in general more educated, younger and less likely to claim benefits than the UK born counterparts.

Kierzenkowski et al (2016) published for the OECD 'The Economic Consequences of Brexit: A Taxing Decision', which examines the potential effects from Brexit on the UK economy as well as the spillover on other OECD countries. The authors begin the research discussing the multiple benefits UK experienced since becoming a member of the EU, as the improvement of living standards. In fact, GDP per capita has doubled since joining in 1973 and 2014 and has outperformed other non-EU English speaking countries such as Australia, United States

and Canada. The authors claim that in some respects Brexit can be compared to a tax, as it will impose a rising cost on the economy over time. The paper first discusses the likely negative effect of Brexit before the official departure from EU, the 'near term' time. Among others factors presented the heightened economic uncertainly, which will reduce investors' confidence, would be revealed by people's decisions to hold back spending and lifting risk premium, leading to an increase in the cost of finance and decrease in the availability of finance. Reduction in capital inflows and large capital outflows could lead to a current account deficit of up to 7% of the GDP. Leaving the single market would mean the UK would have to stand by World Trade Organization rules, substantially increasing the costs to trade (tariff and non-tariff barriers), unless a more preferential agreement would be reached. Furthermore, the UK will have to negotiate new trade treaties with all third-country markets, which above all takes time. Moreover, immigration – one of the main arguments in the leave campaign – would result in being a cost to the economy, as immigration accounts for one-half of the GDP growth since 2005. Brexit would essentially reduce the incentives for economic migration to the UK as it would prove to be a curb to free movement of labor and eventually would be a cost to the economy. Brexit would also create a financial shock that would have its spillover effect beyond the UK (this could have already been observed on the day referendum results were announced). Kierzenkowski et al (2016) add that all the above effects may lead to a cost of GBP 2200 per household and over 3% decrease in the UK GDP, while only 1% decrease in the GDP of the EU.

Secondly, apart from the near-term effects, the paper also discusses long-term effect on the UK economy, such as lower openness and innovation, smaller pool of skills caused by lower immigration and reduced FDI, decline in capital stock over time, the lack of the ability to use EU budget savings to relax fiscal policy, reduction in the real stock of net assets and finally in the central scenario (neither optimistic nor pessimistic) UK GDP will be 5% smaller in 2030. The paper also mentions that the UK has more economic power through the EU and not alone, since, in case of willingness to trade with the EU, UK will still have to abide by many of its rules, however it will not be part of the development of those (Kierzenkowski et al, 2016).

The Institute for Fiscal Studies released a report on the effects of Brexit on UK's public finances by Emmerson et al (2016). The two main effects discussed are mechanical effect and the national income effect. The former means that given no more contributions made to the

EU, Brexit would essentially lead to stronger public financing. However, the result will depend on the bilateral agreement between UK and the EU. If UK would trade under the European Economic Area rules (like Norway), it would still be required to make contributions to the EU, potentially in the amount of GBP 4 billion. If UK would negotiate a deal more similar to CETA, the current deal between EU and Canada, it could avoid paying into the EU budget but would have less access to the EU's markets, which would particularly influence trade in services.

The net contributions of the UK to the EU are currently around GBP 8 billion per year (0.4% of GDP or 150 million per week), which can be otherwise be used on other spending, cutting taxes or reduction of the deficit, if the government would decide to spend less on agriculture, rural development, regional support and university research (the current contributions of the EU to the UK) (Emmerson et al, 2016).

The latter effect, namely the effect on the national income, relates to the fact that UK leaving the EU will have an impact on national income, which if it rises it would strengthen the public finances, while if it falls it would weaken them. Unfortunately, the precise effect of Brexit on national income is uncertain, as it depends largely on the trade deal UK will negotiate. In terms of the short-term effect on national income, the Bank of England estimates it to have a negative impact, which would be caused by an increase in uncertainty driving a reduction in consumption and investment, fall in the value of the British pound, increase in inflation, increase in the cost of borrowing and trade. The report also cites a study by the National Institute of Economic and Social Research (NIESR), which estimates the short-run effects on GDP based on an economic modelling exercise. In NIESR's optimistic scenario, the UK signs up to the EEA and suffers a loss of 2.1% in GDP in 2019 relative to what is expected if it stayed within the EU. In the pessimistic scenario, UK would trade under WTO rules and would suffer a 3.5% GDP loss in 2019. The Treasury also modelled the pessimistic scenario and suggested a 6% decrease in the GDP two years' post Brexit vote. Based on the NIESR study, the Institute for Fiscal Studies estimated a budget deficit of GBP 20-40 billion (depending on the scenario) in 2019-20. The government would therefore need to raise taxes or cut spending to reach a budget surplus. In terms of long-run effects, the institute states that the uncertainty and the trade effects will dominate. Most models show a negative effect from lower access to EU goods and services markets and a decrease in GDP (Emmerson et al, 2016).

Dhingra et al (2016) as part of the Centre for Economic Performance (LSE) published a commentary on the UK Treasury's analysis of the long-term economic impact of EU membership and the alternatives reported that as earlier mentioned, the central estimate in the fall in GDP is at 6.2% (GBP 4300 per household). The report focuses on three scenarios, the Norwegian model under which GDP would fall by 3.8%, the Canadian model under which GDP would fall by 6.2% and trade under WTO rules under which GDP would fall by 7.5%. The Treasury used the gravity model to estimate the Brexit effect on UK's trade and FDI, which relates data on the flows of trade between pairs of countries to the characteristics of these countries, controlling for variables such as culture and distance. In the Canadian scenario, Brexit would reduce UK's trade by 19% and FDI inflows would fall by 20%. The Treasury also estimates how Brexit would affect productivity by using estimates from Feyrere (2011), where a 10% of fall in trade reduces productivity by 2-3%. Finally, using the NIESR's macroeconomic model NIGEM, the Treasury forecasts the overall effects of Brexit on UK's GDP. The study has been largely criticized for deliberately generating large negative effects, however in the Center for Economic Performance commentary, the authors state that the Treasury has in fact been too conservative in some assumptions and the effects should have been larger.

The proposed research, as the UK Treasury, will use the gravity model in the attempt to provide further material in the existing literature presented in this section. However, the paper's focus will narrower on solely the bilateral trade in services between the UK and the EU.

3. Theoretical Framework

3.1. Theories of International Trade

Classical theories of international trade find their beginnings at the end of the mercantilism period, during which the goal was to enrich the nations within its borders. Some of the mercantilist policies included high tariffs on manufactured goods, a ban for colonies to trade with other nations, ban on export of gold and silver and restriction of domestic consumption through non-tariff barriers to trade (Rankin, 2011). The eclipse of mercantilism begun with Adam Smith's publication of 'Wealth of Nations' in 1776 (The Economist, 2013). Smith presented an economic theory far from the mercantilist doctrine, advocating for free markets and less government intervention. Classical trade theories propose for countries to trade by taking advantage of their differences (Amiti, 2014). Adam Smith developed the concept of absolute advantage[1], which is 'determined by a simple comparison of labor productivity across countries' (International Encyclopedia of The Social Sciences). According to Smith's (1776) theory a country should specialize in producing the goods that it can produce at a cheaper cost than other nations and export such goods. Such nation should also import the goods that can be produced cheaper abroad. The concept also assumes that there is a possibility for a country not to have an absolute advantage.

This was later developed by David Ricardo (1817) who proposed the idea of comparative advantage arising from differences in technologies across countries. Ricardo argued that each country has a 'comparative advantage in producing different goods – some goods can be produces more cheaply in different countries – and this gives rise to profitable opportunities for trade' (Amiti, 2014). The Ricardian model shows how each country can specialize in certain goods and export them, while import the other goods more cheaply from other countries. Ricardo's theory assumes that the comparative costs transform into absolute price advantages, which create the conditions for international trade (Anishchenko, 2013). The major difference of this theory to Adam Smith's absolute advantage theory is that the comparative advantage measures efficiency in terms of relative magnitudes (Kilic, 2002).

[1] Absolute and Comparative Advantage". International Encyclopedia of the Social Sciences, 2nd Edition. pp. 1-2. Retrieved 2009-05-04.

The Ricardian model on comparative advantage was further developed by two academics from Stockholm School of Economics to create a harmonious theory on international trade (Anishchenko, 2013). The Heckscher-Ohlin Model is a general equilibrium mathematical model of international trade and builds on the idea of comparative advantage of nations by using factor endowments (such as labor and capital) of a trading region to predict patterns of commerce and production (Mark, 1992).

The key assumptions of the model are following[2]:

1) production functions exhibit constant returns, good X is labor-intensive, good Y is capital- intensive in production
2) technology is the same across countries
3) labor and capital are fixed in supply, and are perfectly mobile between industries within a country, but perfectly immobile between countries
4) no market distortions
5) countries have identical and homogeneous preferences
6) countries differ in their relative factor endowments

The model predicts that given the above 'a country will posses a comparative advantage in good X if the country is relatively well endowed with factors that are used intensively in the production of good X' (Leamer, 1995). The model results in a Heckscher-Ohlin theorem, which states that a capital abundant country will export to capital intensive countries, while labor abundant countries will import the goods that require intensive labor in production. Trade between countries leads to the adjustment of prices on goods and to specialization in certain goods. This has been questioned in 1953 by Leontief, who based on a study of the US, a predominantly capital intensive economy, concluded that the country exported labor intensive goods and imported capital intensive goods contradicting the Heckscher-Ohlin theory. The results of the study are known as the Leontief Paradox (1953) and those encouraged an expansion of the original theory. Leontief pointed out that the endowment factors do not need to be only physically available, but also be of quality (skilled versus unskilled labor force) (Leamer, 1995).

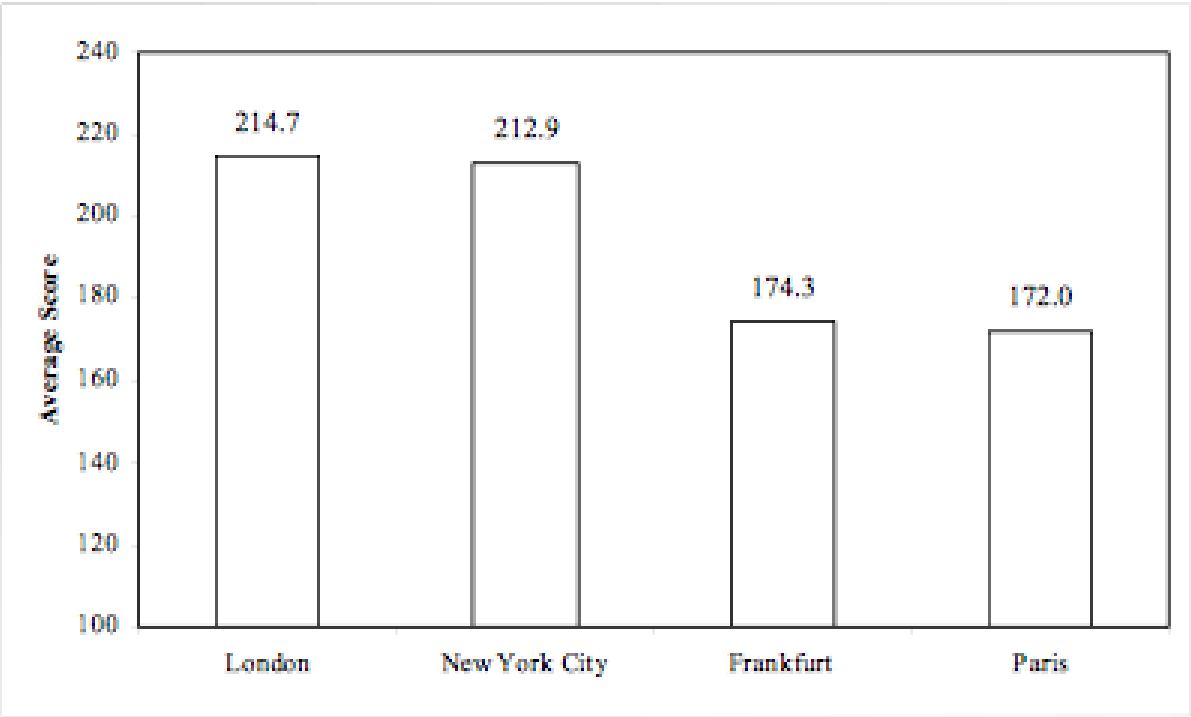
[2] https://aede.osu.edu/sites/aede/files/imce/images/HOS1.pdf

The purpose of the analysis of the classical theories of international trade is to put them in the context of UK's trade with the EU. UK's comparative advantage in terms of trade in services are financial services, a predominantly labor intensive industry. The City of London together with New York are considered the only two genuinely global financial services ahead of Paris and Frankfurt (Z/Yen Limited, 2005). The two most important reasons for making these cities so competitive are the availability of skilled workforce as well as the regulatory environment of the cities. Z/Yen Limited (2005) published a report on the key factors that make financial centers competitive. Figure 1 show that the positions of the highest ranked cities in 2003 and 2005 have changed over time. It is particularly important how much London and New York have extended their lead over Frankfurt and Paris. This also proves that comparative advantage may change if the key factors change.

Figure 1. Comparative Positions of the Financial Centres in 2003.

**Source: Centre for the Study of Financial Innovation, Sizing up the City – London's Ranking as a Financial Centre, Corporation of London (June 2003).*

Figure 2. Comparative Positions of the Financial Centres in 2005



**Source: Z/Yen Limited, The Competitive Position of London as a Global Financial Centre, Corporation of London (November 2005)*

The study by the Corporation of London states that, partially, the reason why London is an attractive financial capital is due to the increasingly international economy, where foreigners can trade with each other. Furthermore, it is considered an entry point to the European market, where an English language forms a considerable advantage. However, London also presents some downsides as a financial center such as relatively large costs to operate from, expensive and time consuming transport infrastructure and a growing threat of terrorism (Z/Yen Limited, 2005).

In the context of Brexit, there may be a shift of the comparative advantage of London to another city within the EU, such as Frankfurt or Paris. First of all, if the comparative advantage lies in the importance of the availability of skilled personnel, a stricter immigration laws may impede educated and high skilled EU citizens from coming to London and instead encourage them to choose a different EU city. The Corporation of London report (2003) states that the growing EU labor regulation has been seen as a key threat to London's position

as a global financial center. This argument could indicate that following the exit from the EU, the UK may lower the labor regulations attracting foreign investors. However, lower labor regulations would not necessarily lead to the attraction of more skilled labor. Second of all, if the regulatory environment is another important factor for comparative advantage of London, a change in regulations could also drive businesses away from the island into mainland Europe. The Corporation of London report (2003), moreover, states that the concerns about the regulatory environment usually concern the regulatory bodies and the philosophy of the regulations. Other factors, which ensure London continues to be highly ranked as a business center is the access to International Financial Markets, availability of business infrastructure, access to customers, fair and just business environment, government responsiveness, corporate tax regimes, operational costs, access to suppliers of professional services, quality of life factors, culture and language, quality and quantity of commercial property and personal tax regime. All of these factors could be influenced by the EU regulations in order for other cities to compete with London for the title of the next European global financial center.

Ricardo argued that the theory of comparative advantage will fully function in an economy without customs and other trade barriers, where there is a perfect competition and prices gradually become equal (Nenovski and Makrevska, 2012). At present the EU is not a model of perfect competition due to mainly non-tarrif barriers, uneven prices and different customer tastes. The slow convergence of the EU countries is the reason why the economic growth is not even. However, the recent data on the trade value added illustrate that the international integration of the EU has increased (Cheptea et al, 2013). We argue that while UK's comparative advantage currently lays in the factors, which ensure London's competitiveness as a global financial center, the welfare gains from economic integration of the European Union members is what gives the entire region an advantage over other non-member states.

There are many theories on European integration, which approach the topic differently. The main theories that we attempt to explain in this section are neofunctionalism, intergovernmentalism, liberal intergovernmentalism, new institutionalism and multi-level governance. The most prominent theory, which analyzed the integration of European countries has been created by Ernst B. Haas and named neofunctionalism (1958). Haas described the process of regional integration in terms of increasing interdependence between countries particularly in terms of economics, building international legal regimes and solving

disputes through international courts and finally supranational market rules and regulations that exceed national regulations (Haas, 1961). Sweet and Sandholtz (1997) argue that the process of integration is triggered by transnational exchange, supranational organization and EC (now EU) rule making. The authors argue that the demand for cross-border transactions and communication lead to a demand for EC regulations, which are supplied by the supranational organizations. Furthermore, the process of institutionalization takes place after the regulations are established, which leads to an increase in regional integration. This can easily be observed by going through the EU history (see appendix 9.1 and 9.2).

Intergovernmentalism, a theory advocated by Alan Milward, argues that nations states are not becoming obsolete and that they are primary actors in the European integration becoming stronger in the process. This theory was further developed by Andrew Moravcsik in 1998, who incorporated the liberal model of preference formation, where nations have strong preferences and agendas and they pursue them in bargaining with other member nations. In contrast with the neofunctionalist theory, advocates of liberal intergovernmentalism state that supranational institutions have only a limited importance in the process of European integration. New Institutionalism on the other hand, focuses on the importance of institutions in the process of integration. The newest theory on economic integration of Europe, multi-level governance (MLG), has been written about by Liesbet Hooghe and Gary Marks, who argue that while the authority and sovereignty has moved away from national governments, it has not only given power to supranational authorities but also regional assemblies and local authorities (Hatton, 2011).

This paper lies on the argument that European integration leads to welfare gains, which shape a comparative advantage of the nations within the EU. Welfare gains are formed by a number of factors such as trade liberalization through lower trade barriers, free movement of capital, goods, services and people, technological spillovers as well as more uniform regulations (Levchenko and Zhang, 2012). In the medium-term, as barriers to trade are reduced, relocation of economic activities has occurred based on industrial and regional characteristics on a factor endowments basis (Crafts, 2016). In the long-term, the endogenous models argue that economic integration should lead to a rise in growth rate. Levchenko et al (2012) report that welfare gains from economic integration in the Western Europe stem mainly from decrease in trade costs by 45% since the establishment of the European Coal and Steel Community. They also report that the United Kingdom has experienced 3.3% in welfare

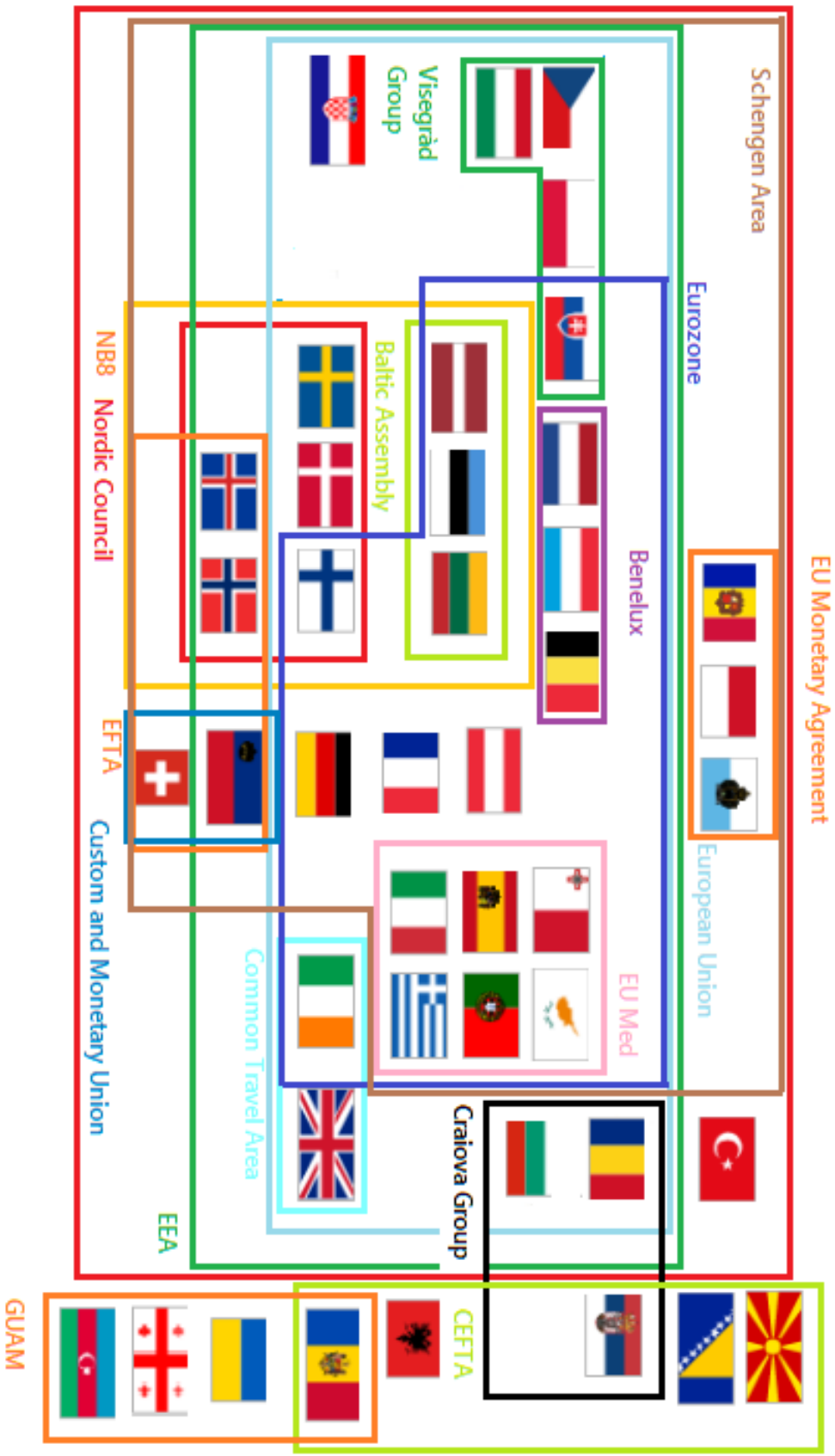
gains from trade within the EU (relative to autarky) and 1.1% welfare gains from European integration (reducing trade barriers between European countries from 1960s to 2000s). Levchenko et al (2012) shows that the welfare gains have been higher for all other Western European countries, such as Belgium, Denmark, France, Germany amongst others, indicating that a higher integration is correlated with higher gains. Since the UK joined the European Coal and Steel Community in 1973, its growth performance vis-à-vis other major European countries has improved (Crafts, 2016). Badinger (2005), using growth regressions, found that the real GDP in 2000 for the EU15 is 26.1% higher than if there was no economic integration after 1950. Baier et al (2008) used the gravity model and found that EU membership raised the UK's trade by 21.1%. The major implication of this study has been that the EFTA and EEA have been less effective in increasing trade (Crafts, 2016). Moreover, the increased competition in product markets led to an increase in real income of 8-10% (Crafts, 2016). The accession to the EU also had a strong positive effect on foreign direct investment as argued by Slaughter (2003) and Barrel and Pain (1998). Pain and Young (2004) also illustrated that accession to the EU increased the GDP of the UK by 2.25% through FDI alone.

Immigration policies have been one of the key messages of the leave campaign. Scholars, however, argue that the free movement of people within the EEA (and the EU) has led to an increase of labor productivity in the UK by 0.27-0.4% (Rolfe at al, 2013). Dustmann and Fratinni (2014) also found that EU migrants have made fiscal contributions to the UK of 28.7 billion pounds between 2001 and 2011. A cost benefit analysis by Crafts (2016) suggests that the accession to the EU has been highly beneficial despite the continuous membership fee.

Another argument of this research is that UK's comparative advantage may shift to the European Union. EU products increasingly comprise services and therefore the competitiveness of the service industry is an important determinant of the future of European economy (Cheptea et al, 2013). The EU has exploited the diversity of comparative advantages of the nations within the union, such as low cost producing locations and natural resources, as well as the advantage of top quality products (Cheptea el al, 2013). Therefore, to some extent the comparative advantage of the EU is the combination of exploitation of comparative advantages of countries within the EU as well as the integration between the countries, which facilitate trade.

The lower welfare gains of the UK stemming from EU integration may be caused by the fact that the UK has never fully integrated with the EU. This is why we expect the effects of Brexit to not be as substantial for the UK as initially thought and not as substantial as they could be for other countries, which may in the future opt out of the EU membership. For the purpose of a deeper understanding of the various level of integration within Europe in Figure 3 there is Euler diagram.

Figure 3. The Euler Diagram describing different levels of EU integration



The UK is currently part of the EU, the EEA and EU customs union. It is not part of the Schengen area, which means EU citizens need to show their passport at the border with the UK, although it is part of the Common Travel Area agreement together with the Republic of Ireland. Furthermore, it is not part of the Eurozone, as it opted to continue using the pound instead of adopting a common currency, the Euro. However, Baldwin et al. (2008) found that the currency union only increased the trade values by 2%. On the other hand, Straathof et al (2008) as well as Berger and Nitsch (2008) found no effect of the currency union on trade at all, suggesting that the UK's decision not to join the common currency union, did not carry significant trade losses (Crafts, 2016). The UK is also a member of the European Defence Agency and the Energy Committee. Considering the above, the UK exit process will involve complex disintegration steps, which we expect to have a negative effect on the UK's economy and bilateral trade in services with the EU. However, given the lower integration of the economy with the EU may produce negative results of smaller magnitude.

In the next section there is the description of the theory on gravity model and hypothesis for the research of the magnitude of the Brexit effect by analyzing the different exit scenarios.

3.2 Gravity Model

For testing our hypothesis, the chosen model is the gravity model of international trade, first used by Jan Tinbergen in 1962. The model has been inspired by the Isaac Newton's gravity theory in physics and has since been adopted as an econometric approach and applied to concepts of international trade (Antonucci and Manzocchi, 2005). It has been extensively used as an empirical method for different fields of social sciences (Sen and Smith, 1995). The metaphor to physical gravity is lent due to elements of mass and distance in the social science models. In the context of international trade, the exporting and importing countries are physical entities; the sizes of the economies are the masses, which is why the distance between the countries matters. The main idea of the model is that the size economy of the country (measured by GDP) is proportional to trade, while geographical distance is inversely proportional to trade.

4.1.1 Original Model

The gravity model in its raw form is as follows:

$$F_{\text{ij}} = G\frac{M_i M_j}{D_{ij}^2} \qquad (1)$$

Where:
F is the gravitational attraction
M is the mass of the object
D is the distance
G is the gravitational constant
i is origin country
j is the destination country

Tinbergen set out a method to measure what the international trade volumes would be in a non-trade barrier scenario. The model creator believed that there are only 4 cases where protecting the domestic tariff and non-tariff barriers is sensible, otherwise the countries should operate in the principles of free trade to maximize the volumes. The four cases are (Weckström, 2013):

1) Income inequality between countries can cause underdeveloped countries to yield better outcomes if tariffs are adopted
2) Supporting the growth of new industries is difficult and therefore before the industries become competitive, the country sets out to protect such industries using trade barriers
3) Supporting the industries that are essential for a country is difficult (e.g. agriculture)
4) It is difficult to cultivate mobility of capital and labor

In the model by Tinbergen, bilateral trade between countries is supplied based on the economy size measured by the gross national product (GNP) in US dollars of the two countries and the geographical distance between two countries measured in 1000 nautical miles. The equation is expressed in the log-log form in order to preserve the elasticity of trade as a constant. Tinbergen found that the results varied very little whether imports or exports were used. The equation also incorporated the adjacency, which is whether countries share a

border and political/economic factors, such as the countries belonging to British Common wealth system of preferences.

$$lnX_{ij} = lnG + a_1 lnM_i + a_2 lnM_j + a_3 \emptyset_{ij} + a_4 N_{ij} + a_5 V_{ij} + \varepsilon_{ij} \qquad (2)$$

Where:

X is the trade measured by imports or exports

lnG is a constant (a_0)

M is the economy size measured by GNP

ϕ is the geographical distance between the countries

N is the adjacency (whether the countries share a border)

V is the political or semi-economic factor, a dummy variable for a specific policy

ε is the error term

i is the origin country

j is the destination country

The model has later been augmented for researchers in numerous ways. In most gravity model equations, the size of the economy is now measured by GDP (instead of GNP), while the political and semi-economic factors include free trade agreements and other determinants of barriers to trade. Empirically, the model has proven to be successful, with evidence for its use in international trade being strong (Chaney, 2013). Krugman (1980) has shown that trade flows are proportional to economy size (GDP) and inversely related to distance, which acts as a proxy for trade barriers. However, this creates problems when measuring trade in services rather than trade in merchandise goods. That is because, intuitively, services should not be affected by distance to the same extent as goods, given that the export and import of services is often done through the internet (e.g. banking – the most significant UK service sector affected by Brexit). Furthermore, with no or less transportation, the trade barriers are also different. Chaney (2013) argues that none of the gravity models of international trade consider the changes in means of transport, technology, nature of goods sold and other factors which should affect the distance factor in the model. Arguably, therefore, the

development of technology and the progress of the economies should mean that the distance is becoming less, rather than more relevant. However, Chaney (2013) shows that 'even if political, economic and technological changes affect the particular shape of firm level exports, in the aggregate, the gravity equation remains essentially unaffected' due to the emergence of a stable network of importers and exporters. Chaney (2013) proves also that a firm's export will vary in accordance with the direct cost of creating contacts, which is affected by distance. We started building our model based on the following Krugman and Obsfeld (2005) gravity model for trade activities:

$$T_{ij} = A\frac{Y_i Y_j}{D_{ij}^2} \quad (3)$$

Where:
T is the total trade flow
Y is the economic size of a country measured by either GDP or GNP
D is the distance between the origin country to the destination country
A is constant term
i is the original country
j is the destination country

The model is used to estimate how leaving the EU would affect bilateral trade for the UK and the remaining countries of the European Union. Since the focus is specifically on trade in services, the analysis requires the application of the gravity model in trade in services in order to adapt the above models accordingly.

4.1.2 Application of the model for bilateral trade and trade agreement analysis

The gravity model has been used extensively to analyze the effects of different policies on trade between countries. Particularly, many scholars are interested in the effects of free trade agreements on bilateral trade.

In a research published in the Journal of International Economics, Rose (2004) sets out to analyze whether the WTO members enjoy a higher liberalization in trade in comparison to

non-members. For this study, Rose (2004) used the standard gravity equation, where he included a WTO dummy variable, which indicates whether both or only one country in the pair is holding membership. The analysis was conducted over 175 countries and 50 years of international trade flows. Another variable included in the analysis is the Generalized System of Preferences (GSP), which is a dispensation of the Most Favored Nation (MFN) Treatment, which is part of the WTO. The MFN imposes a non-discrimination rule on trade between the member states to reduce the barriers during the negotiation, improve competitive practices and to provide benefits to developing countries in the form of favorable agreements. To control for other effects, Rose (2004) used the distance, market sizes, culture, colonial linkages, geographical features and country fixed effects. Through his analysis, Rose (2004) finds that WTO membership does not have a significant positive effect. On the other hand, the GSP coefficient significantly increased trade.

Other scholars have also looked at the significance of including the trade agreement variable in the gravity model regression in order to have a more reliable model and provide more realistic results. An example of such study is a 2007 study by Shujiro and Misa, where the authors provide insights on the relevance of the free trade agreements as dummy variable in the gravity model and their effect in the bilateral trade. Their analysis shows that FTAs bring trade creation and that trade diversion is limited. Thus, the use of the EU dummy variable in our study could provide insights on the increase in trade activity among member countries.

Dascal (2002) also proposed a gravity model using FTAs as a variable in a study on EU trade in wine. The result showed that trade was positively influenced by an increase in GDP per capita and that the EU integration enhanced trade among members. Other studies using FTAs include Sami and Dehejia (2008) with the analysis on labour standards and many others.

The model has shown to be adaptive to different countries and techniques. Kristjiansdottir (2005) presented an analysis using the gravity model of the level of the export of Iceland, which showed the relevance of the international trade over a small economy. Sohn (2005), in his paper, has provided an analysis of the possible effects of a FTA between North and South Korea showing that the participation of North Korea in the Asia-Pacific Economic Cooperation APEC will boost the trade outcomes, due to the presence of unrealized trade between Korea, China and Japan. In this study, they combined the use of a dummy variable,

in this case the APEC, and an index. The authors used a trade conformity index in order to have a more reliable picture of the impact of FTA on the overall Korea, North and South.

As seen based on the above analysis, the use of FTA helps in analyzing the different effects on trade. A gravity model can be significantly enhanced if it contains the right variables, on top of the standard model equation. In the next section, we discuss the adaptation of the gravity model specifically towards the trade in services. The different studies and presented relevant models are the basis on which it has been built the specific gravity model equation which would fit the purpose of this research.

4.1.3 Gravity Model of International Trade in Services

Services are a growing sector of the world economy. The 2015 Eurostat data on trade in services shows that UK is the EU member state with the highest value of exports of services to both member and non-member countries. UK exports 23% of EU 28 total service exports (to non-member countries) and 12% of service trade of the EU28 to member states. Since the 1970s, the trade in services has tripled in the EU and almost doubled in the UK[3]. With the growing importance of trade in services to the economy, analyzing and gathering the data on services has never been as important. This research attempts to discuss the gravity model of international trade in terms of services primarily due to UK's high dependence on service export to the EU. Before going more specifically into the model and its results, and the contribution of the existing empirical literature on international trade in services, it is relevant to explain the four modes of supply and information needs developed in the General Agreement on Trade in Services (GATS). GATS distinguishes the following modes of service supply:

1) Mode 1: Cross-border supply: Occurs when the service is ordered by a resident of one country from an economic territory of another country (service crosses border) [4]
2) Mode 2: Consumption abroad: The service is consumed outside the home country territory (consumer crosses border)

[3] Worldbank
[4] https://unstats.un.org/Unsd/tradeserv/TFSITS/DraftChapterV_29August.pdf

3) Mode 3: Commercial Presence: foreign direct investment of a company to establish presence (e.g. open a branch) abroad
4) Mode 4: Presence of natural people: service provider moves temporarily to the country of the consumer

The above definitions are important mainly due to the data collection difficulties. Most major databases which measure bilateral trade flow of services focus on mode 1 and 2 and these are the modes of supply that we will be examining in this paper.

As presented by Kimura and Lee (2004), there a number of important characteristics of services that distinguish trade in services and in goods. First of all, services are heterogeneous in nature, which means there is a variation in the same service, from day to day or customer to customer. Second of all, they are intangible and non-storable (Lennon, 2006). Furthermore, services are specialized and differentiated. While in principle, every theory on international trade should be applied to both goods and services (Kimura and Lee, 2004), most empirical studies including the gravity model of trade focus solely on goods. There are a few reasons for it apart from the characteristics of services. Most importantly, the Standard International Trade Classification maintained by United Nations, which is used to compare the imports and exports between countries, only applies to goods. Until 2002, there has been no comparable data for the trade in services until OECD released the EBOPS (Extended Balance of Payments Services) 2002 file, which contained data on bilateral trade in services for the 26 OECD member countries. Since then the website has been updated in 2010, containing more detailed information, yet still without breaking it down into specific services, but rather presenting the aggregated data. World Bank attempted to fill this gap by developing a T&C (trade and competitiveness) with Francois et al (2013) by consolidating multiple sources such as UN, Eurostat and OECD. This database however is far from being comparable to trade data for merchandise goods and the quality of data in the database depends on the quality of data collected in the statistics government departments of the respective countries. Given the intangible and non-storable nature of services, at-the-border-duties cannot be applied which results in much lower accuracy of such data. To this day, the only comprehensive data on the trade barriers on services is the Services Trade Restrictiveness Index (STRI), which helps identify which policy measures restrict trade. STRI indices take value from 0 to 1, where 0 is completely open while 1 completely closed (to trade). Unfortunately, it provides information only for some services. For example, the

STRI index for financial services only takes into account insurance and commercial banking, while it excludes investment banking, due to the poor quality of data that is currently available.

Nonetheless, there are researchers and academics who used the gravity model of international trade to explain the bilateral trade in services. The study by Kimura and Lee (2004) uses the gravity model to compare the determinants of goods trade with determinants of services trade. The authors run a regression on 10 OECD member economies to other economies (both OECD members and non-OECD members) for the years 1999 and 2000. The results of their regression showed that the gravity equation for trade in services is as robust as for trade in goods. The differences exist in the elasticities (measured using the log form) of the explanatory variables, such as the distance, which the authors claim is more important for trade in services than for trade in goods. Although they offer some explanation to this finding, particularly that the cost of transport is higher for services than for goods, the authors urge for more detailed investigation into the disaggregated data on services, to measure which services contribute to higher cost of transport. Furthermore, Kimura and Lee (2004) find that membership in regional trade agreements has a significant impact on trade on both goods and services, even though many such agreements do not include service trade explicitly.

This research focuses over this model specifically, as it will be one of the two models on which the study is based on. As mentioned earlier, the authors use the gravity model to compare the model's use for trade in services and for trade in goods. The equation used for their regression can be seen below:

$$Trade_{ijt} = \beta_1 GDP_{it} + \beta_2 GDP_{jt} + \beta_3 Distance_{ij} + \beta_4 Remoteness_{it} + \beta_5 Remoteness_{jt} + \beta_6 Adjacency_{ij} + \beta_7 RTA_{ij} + \beta_8 EFW_{it} + \beta_9 EFW_{jt} + \beta_{10} Language_{ij} + \alpha + \delta_t + \varepsilon_{ijt} \quad (4)$$

Where:

Adjacency is a dummy for the country pairs which share a land border

RTA is the dummy for the countries which are members of the same RTA

EFW is the Economic Freedom of the World Index

Language is the dummy for the country pairs which use the same language

α is a constant

δ is the time dummy

ε is the random disturbance term (error term)

i is the country of origin

j is the destination country

The study uses summed bilateral imports and exports as the dependent variable, using the data from the OECD EBOPS 2002 database. The data is based on the balance of payments basis, which means it covers most of mode 1 and 2 transactions, while only reflect on a fraction of mode 3 and 4 transactions.

As explanatory variables, Kimura and Lee use adjacency, distance, language, remoteness, regional trade agreement and economic freedom of the world. To measure the restrictiveness to trade in services, they use the economic freedom of the world index, which 'measures the consistency of a nation's policies and institutions with economic freedom. This is a composite index which measures the degree of economic freedom present in five major areas: (1) size of government, (2) legal structure and security of property rights, (3) access to sound money, (4) freedom to trade internationally, (5) regulation of credit, labor, and business' (Kimura and Lee, 2004). The authors hypothesize that the coefficients of all of the independent variables, except for distance, should be positive.

Another study of trade in services using the gravity model by Keith Walsh (2006) found wealth of countries and common language to be the most important determinants of services trade, while the distance to be insignificant. Walsh (2006) introduces non-tariff barriers variable, which aims to measure the barriers to trade in services and found it to be only weakly significant.

The most influential paper on the gravity model of trade in services, possibly because it was the first of its kind, has been by Francois et al (2001 and 2003), who developed the earlier mentioned methodology and database. He chooses the import of services as the dependent

variable, while the GDP per capita and population as independent variables. The result is later compared to the actual trade flows to calculate the tariffs using the elasticity of import as demand function. Park (2002) develops this model further by including price indices to measure the differences in prices between the country pairs.

The second model, which will be the base for forming the model for the current research, is the gravity model equation by Grunfield and Moxnes (2003). The authors adapt the original gravity model using the bilateral export of services and FDI flows as a function of the level of GDP and GDP per capita, distance between the countries and a dummy variable for whether the countries are members of a free trade agreement. The authors use service trade restrictiveness index, based on the research by the Australian Productivity Commission, to measure the barriers to trade in services. The results of the study show that bilateral trade is in fact positively related to the size of the economy and negatively related to distance and barriers between the country pairs. Lejour and de Paiva Verheijden (2004) and Kox and Lejour (2005) contribute to the research further by adding the OECD's product market regulation (PMR) indicator to measure the non-tariff barriers to trade. In their study, they find that it has a significant negative impact on trade in services. Their main argument is that one of the most important determinants of trade flows are the differences between the regulations of the country pairs. Grunfield and Moxnes estimated the following model:

$$t_{ij} = \alpha + \beta_2 y_i + \beta_3 y_j + \beta_4 cpi_j + \beta_5 FTA_{ij} + \beta_6 tri_j + \varepsilon_{ij} \quad (5)$$

$$fdi_{ij} = \alpha + \beta_2 y_i + \beta_3 y_j + \beta_4 cpi_j + \beta_5 FTA_{ij} + \beta_6 tri_j + \varepsilon_{ij} \quad (6)$$

Where

t is the bilateral service exports

fdi_{ij} are the outgoing foreign direct investment stocks from country i to country j in a specific year

d is the distance between the country pairs

y represents the GDP

cpi is a measure of corruption in the partner country

FTA is a dummy variable looking at whether the countries are in a free trade agreement with each other

tri measures the trade restrictiveness of the partner country

When building the model used for the research the focus is over the studies by Kimura and Lee (2004) and Grunfield and Moxnes (2003), as these studies focused mainly on trade in services, as well as included a variable for measuring trade restrictiveness, which acts as a proxy to trade barriers to services.

In the analysis of the literature on gravity model of trade in services, the study by Giovanni Del'Arricia (1999) has also been considered, which focused on analyzing the effects of exchange rate volatility on bilateral trade flows. The authors found the exchange rate to have a negative effect on international trade.

Based on the above analysis of the empirical literature on the use of gravity model in services trade, one can see that there is no consensus on key findings of the studies. The academics particularly disagree on whether distance plays a role in determining services trade and what should the determinants for services trade barriers be. This paper will aim to improve the current research in the area on top of examining the effects of Brexit.

4.1.4. Barriers to trade in services

The 2000 OECD report on the service economy shows that even though services are heavily transforming the OECD countries, the regulations and policies still impede innovation and competition. In some economies, such as UK, services account for 70% of GDP, while trade in goods slipping to 20% (Eurostat, 2017). Services encompass a large selection of different sectors within. The functioning of health services is very different to the functioning of financial or communications sectors. That is precisely why the trade barriers vary so substantially across different services and are so difficult to fully report.

As earlier discussed, the GATS classification of services identifies 4 different supply modes, cross-border supply, consumption abroad, commercial presence and the presence of natural people. The major barriers to trade have been summarized by Hoekman and Braga (1997) into 4 different categories:

1) Quantity based restrictions → quotas and other quantity limitations, which usually are imposed on service providers and not actual flows
2) Price based restrictions → government-appointed industry regulators differentiate between firms based on their origin, by imposing restrictions on prices (e.g. entry visa charges to travellers or airport landing fees)
3) Legal requirement to hold a licence or other qualification from a particular institution in order to sell the service (e.g. the EU banking passport)
4) Restricted access to secondary services to importers of services (such discrimination can occur in sectors such as transport and communications services)

The above classification has been challenged by Findlay and Warren (2000), who opposite to Hoekman and Braga (1997), also showed the importance of non-discriminatory barriers, which are the barriers that restrict the supply of services by domestic and foreign firms equally (and not based on the origin).

In the recent years, the number of free trade agreements and customs unions have increased. Those have facilitated the trade in goods significantly, yet done very little to promote trade in services. The EU has liberalized the trade in services most effectively in comparison to other trade agreements. In 2002, the European Committee surveyed the barriers to trade in services that are currently in place in the EU countries and have suggested the following barriers that are common across fifteen member countries:

- barriers to establishment (qualification requirements)
- restrictions on use of inputs (employment of workers and use of equipment)
- barriers to the promotion of the services (control on commercial communications varies across member states)
- sales restrictions (legal requirements and price controls)
- differences in legislation governing after-sale requirements (differing post-sale liabilities for example).

The EC concluded the survey stating that there is a large bias towards foreign firms within the EU.

Tariff Equivalents for Services

Measuring the trade barriers to goods is considered much simpler because of the specific tariffs on certain goods. Estimating non-tariff barriers, like the ones imposed on services is much more difficult. Generally such tariffs can be categorized into frequency indexed, price-based measures and quantity-based measures.

Frequency indexes are like the earlier described service trade restrictiveness index, which is essentially a list of barriers to import for a given country, which is then used to proxy the policy stance on barriers in that country. The tariff equivalents are then assigned by indexing the countries based on their policies. Hoekman (1995) was the first researcher to create such index. The main issue with his technique is that the index is based on GATS specifications of barriers to trade and not on actual policies in those countries. However, there have been attempts to improve the index. The Australian Productivity Commission (APC) developed a series of enhanced indexes using the actual data on barriers to trade (e.g. STRI).

The second type of non-tariff trade barriers category was price-based measures, which assume that the trade barriers will be reflected in different prices across countries. The fundamental issue with this technique is that it does not take into account the fact that domestic policies focused on regulating firm activities may be affecting the prices and the costs. Furthermore, the prices may vary due to the variation in quality across countries.

The third type of non-tariff trade barriers category is the quantity-based measures. This technique focuses on comparing actual level of trade flows with potential levels of trade flows. This can be performed using the gravity model of trade, which can predict the potential trade flows based on the physical and economic characteristics of the country and its partner countries. This method also has limitations such as poor data availability on trade in services (the only comprehensive source is the OECD database, but it only includes data on some countries). Furthermore, factors other than non-tariff barriers may affect the difference between actual trade flows and the potential trade flows. This is exactly why gravity models usually include non-tariff barriers as an explanatory variable, in the form of frequency indexes and price-based measures.

3.3. Brexit Scenarios

In our quantitative analysis we take the positivist approach putting emphasis on gathering and systematizing the data. The collection and organization of the dataset ensured the possibility to use the data analysis and to reach an objective of the study (Alvesson and Sköldberg, 2009), whose goal is to show that Brexit will have an effect on bilateral trade. However, the study uses also a constructivist approach, during the analysis of qualitative data with the purpose of building the research's hypotheses on the magnitude of this effect. Our research lies on the possible exit scenarios, which are based on real country models. Such scenarios have been discussed thoroughly in literature both by academics and journalists. We acknowledge that the below possibilities are not a prediction and that the UK will negotiate its own FTA with the EU, which may differ to the options presented. However, in order to recognize the magnitude of the effects based on different levels of integration with the EU, we present the model countries as proxies for potential deals the UK could negotiate.

The current research on Brexit looks at the economic impacts of the exit from European Union, as well as the different scenarios that Britain could negotiate following the triggering of Article 50 of the Lisbon Treaty. An interesting take on how the situation will unfold has been presented in the British newspaper the Financial Times.

McHugh (2016) suggested four scenarios for how the Brexit process could potentially unfold and titled them as 'hostile divorce, clean break, amicable transition and change of heart'. The hostile divorce scenario predicts a collapse in talks with Britain leaving the EU with minimal transitional arrangements, losing most if not all preferential access to the EU single market' (Barker, 2016). Following the exit, UK would aim at becoming a low-tax and low regulation hub for international businesses at the same time 'aggressively undercutting the EU' (Barker, 2016). Although it is not a favorable solution, some experts claim it may likely happen in the course of the coming 2 years. The second scenario, clean break, predicts a tariff transition and trade terms somewhat satisfying both parties. However, due to the 'issues related to sovereignty or immigration' (Baker, 2016) a deep UK-EU association is unlikely. Experts argue that British financial services would lose their EU passports and while services sector could suffer overall, a tariff free trade is likely under this scenario (Arnold and Noonan,

2016). Amicable transition scenario suggests Britain remaining part of the EU single market but on adjusted terms. The assumptions of this scenario are that UK would have more control over policies in some sectors such as agriculture as well as the possibility of restricting immigrant workers in overloaded job sectors. Furthermore, UK would not have the ability to influence EU rules, and while the financial services passports would remain, their value would erode overtime. UK would still be required to contribute to the EU budget, but less than currently. Finally, the last scenario presented by McHugh is called the change of heart, which 'rests on a counter-revolution in British politics' (Baker, 2016). It may occur due to several reasons such as the Scottish Independence Vote, a General Election as well as another referendum. The result would be UK staying in the EU after all.

Other journals have focused on different scenarios and analyzed the possible deals the UK can negotiate based on economic models of existing nations. This section presents the scenarios from a literature standpoint and later in the analysis section, the effects on bilateral trade of these scenarios.

3.3.1. Scenario 1: UK remains in the EU

This is the baseline scenario, which serves as a comparison tool for estimating the effects. Under this scenario, the UK remains in the EU even after the formal triggering of the Article 50 of the Lisbon Treaty. Some experts argue that this option has been already abandoned following the June 2016 referendum (Kavrakova and Pont, 2017), while others (Baker, 2016) argue that it may still happen. This option would ensure that the citizens of the UK and EU would continue to enjoy the current benefits of the membership. This scenario means UK would remain part of the single market, which is based on four freedoms, the free movement of goods, people, services and capital.

Figure 4. The Four freedoms of European Union

**Source: 'Brexit essentials: Alternatives to the EU membership' by Slaughter and May, January 2016*

Under the EU membership, the citizens have a vast amount of rights. First, the citizens have the right of entry as well as the right to reside in an EU Member State, with some conditions for stays over three months (such as sufficient resources and sickness insurance). The citizens have the right of permanent residence following a five-year period of uninterrupted legal residence. Furthermore, all citizens have the right to work in an EU Member State, have social security rights and the right to do business and to provide cross-border services. EU laws also ensure that the citizens have consumer and passenger rights, the rights to non-discrimination, as well as voting and political rights in the European Parliament elections (with some exceptions and limitations such as voting for only one country). Finally, citizens have the right to access EU institutions (European Policy Centre, 2017).

Kavrakova et al (2017) in the European Citizen Action Service report also mentions the New Settlement for the UK, which was an option prior to the referendum. It was presented as an option to renegotiate some of the terms of membership and include amendments to rules on free movement and other changes of a constitutional nature. UK would remain part of the single market but there would be some discrimination between UK and EU citizens in terms of the work benefits. However, this option has been abandoned following the result of the June 2016 referendum. The New Settlement for the UK would have amended the rights of

residence, the rights to work, social security rights and the rights to non-discrimination (Kavrakova and Pont, 2016).

3.3.2. Scenario 2: The Norwegian Model → EEA membership of the Single Market

The European Economic Area is comprised of all the EU member States (28) and three European Free Trade Association (Iceland, Liechtenstein and Norway)[5]. The current member countries would have to vote on the UK joining ('Norway has previously vetoed Slovakia's membership',Slaughter and May 2016). Under the EEA Agreement, UK would be able to participate in the EU's single market under the EU legal framework, but would also be required to agree to the free movement of capital, goods, people, services, freedom of establishments, social policy and consumer protection[6]. The difference to holding the EU memberships is that UK would not be able to have a formal vote on making the EU rules. Unlike Norway, the UK is not currently a member of the Schengen area, which is a pact on the abolition of internal border controls. Therefore, if the UK were to keep its access to the EU single market under the Norway model, it would be obliged to accept the rules on the free movement of people from all EEA member countries. The direct benefits under this scenario, over the full membership in the EU, are the allowance for safeguard measures on some economic, social and environmental aspects (Slaughter and May, 2016). UK would no longer have to abide by the EU rules on agriculture, fishing, customs union, common trade policy, common foreign and security policies etc. However, this also means that the UK would not be able to benefit from for example EU agriculture subsidies (Slaughter and May, 2016). It would nonetheless be required to retain a wide range of EU legislation particularly in terms of the four freedoms. Furthermore, given that the progress on incorporating the EU legislation on financial services in the EEA is slow, it is likely that the UK financial sector will be largely (negatively) affected. Since the financial services are a key sector accounting for 8% if the UK output the 3.5% of employment, it is certainly an important factor to be considered (Slaughter and May, 2016). Additionally, the UK would still be required to make significant contributions to the EU budget (although smaller than currently), which has been

[5] "The European Free Trade Association". efta.int. efta.int. Retrieved 29 March 2017.
[6] "The European Free Trade Association". efta.int. efta.int. Retrieved 29 March 2017.

one of the main arguments for the leave campaign (including the migration laws). Finally, the UK would need to negotiate trade agreements with third parties or it could join the existing EFTA trade agreements (Booth et al, 2015).

3.3.3. Scenario 3: The Switzerland Model → Bilateral Treaties

Switzerland is not part of the EEA; however, the relationship with the EU is based on a series of bilateral agreements[7]. The country is currently part of the single market based on the 1972 FTA and a series of other bilateral agreements with the EU (1999 and 2004). These are 20 principal agreements and over 100 supplementary accords. Under this model, the UK would join the EFTA (not EEA). Switzerland is required to contribute to the EU budget and the EFTA budget. However, the estimates of the budget contribution by the UK under this model are that it would fall by as much as 59% (Dhingra and Sampson, 2016). Under the Switzerland model the EU and Swiss citizens have the right to entry, work and social security, have no voting and political rights and have special arrangements in terms of the right of residence, rights to do business and provide services, consumer protection and passenger rights, the rights to non-discrimination, as well as the access to the EU institutions (Kavrakova and Pont, 2016). Switzerland is a member of the Schengen area, which means UK could be required to abandon the border controls. As in the UK, migration has similarly become a sensitive political issue in Switzerland, however since the free movement of people constitutes a fundamental pillar of the EU policy, it is likely that Switzerland amendments to the EU-Swiss Agreement on the Free Movement of People with the EU (AFMP) will be minimal[8]. The significant differences of this model over the EU membership is that while the UK would still be bound by the free movement of people, it would be able to introduce some changes to for example the consumer rights and rights to residence. Switzerland currently has its independence in terms of social and employment policy, energy and climate policy, consumer rights, agricultural and fisheries policy, regional policy, external trade policy and

[7] http://ec.europa.eu/trade/policy/countries-and-regions/countries/switzerland/. Retrieved 30 March 2017.
[8] Swiss Constitution, *op,.cit.*, Article 197(11) (Transitional Measures relating to Article 121a).

foreign policy (Slaughter and May 2016). The most significant disadvantage of this option is that the free movement agreement only establishes the right to provide cross-border services up to 90 days in a single calendar year. Switzerland has full access to the single market for most of its industries except for the banking sector and other parts of the services sector, which make up for 80% of the UK economy (Monaghan, 2016). Therefore, as in the Norway Model, UK would still need to contribute to the budget, would not be able to alter the migration laws (Switzerland currently accepts more EU migrants per Swiss citizen than the UK), would need to continue to comply with the regulatory requirements of the EU and its financial services sector may be severely affected by such choice. Furthermore, Switzerland does not have the voting power and therefore has no control over the laws set within the EU[9]. UK would gain its independence in terms of negotiating free trade agreements with non-EU countries. This means UK may be able to strike deeper and quicker deals (Booth et al, 2015) with countries such as China, which the EU is not currently negotiating a new deal with.

3.3.4. Scenario 4: The Canadian Model → Free Trade Agreement

Comprehensive Economic Trade Agreement (CETA) is an FTA that currently operates between Canada and the EU (it was signed in October 2016 and at the time of writing this study it is not yet in force). It gives Canada preferential access to the EU single market, eliminating most tariffs, excluding some items such as eggs and chicken (Kavrakova and Pont, 2016). Canadian exporters currently must prove that the goods are made entirely in Canada and the services sector is only partially covered[10]. Furthermore, like Norway and Switzerland, Canadian exporters also need to comply with the EU rules that regulate the single market[11]. CETA does not provide for Canada to join the single market, which is why they do not need to accept the four freedoms of EU, essentially the free movement of people and services and the freedom of establishment (Kavrakova and Pont, 2016). Unlike in the previous scenarios, Canada is not required to contribute to the EU budget (Kavrakova and Pont, 2016). Under the Canadian Model, there is no right of entry, which means EU citizens

[9] http://www.europarl.europa.eu/atyourservice/en/displayFtu.html?ftuId=FTU_6.5.3.html. Retrieved 30 March 2017.
[10] http://ec.europa.eu/trade/policy/in-focus/ceta/. Retrieved 30 March, 2017.
[11] http://ec.europa.eu/trade/policy/in-focus/ceta/. Retrieved 30 March, 2017.

are subject to Canadian immigration laws upon entry (and vice versa). Canadian citizens also have no right for social security or voting and political rights in the EU (same rules apply to EU citizens in Canada). CETA does allow for the right of residence, which is subject to the country's national immigration legislation and allows for a special arrangement such as temporary transfers of key personnel for companies (Kavrakova and Pont, 2016). There are also special arrangements in terms of the right to work and do business and provide services, consumer protection and passenger rights, as well as access to EU institutions (Kavrakova and Pont, 2016). Under this scenario, UK would still lose its passporting rights for financial services companies, unless a special amendment is negotiated. An FTA like CETA offers UK the right to have a more separated relationship with the EU but also a more limited access to the single market. It is, however, important to remember that the negotiations over CETA took 5 years and the ratification is expected to take another 2 years[12].

3.3.5. Scenario 5: The Turkey Model → Customs Union

Under this model, UK would be part of the customs union with the EU, which means that there would be no tariffs and quotas on industrial goods exported to the EU and imported to the UK[13]. Turkey, like Andorra and San Marino are not part of the EEA or the EFTA but operate under a customs union with the EU (Kavrakova and Pont, 2016). With the Customs Union, in 1995, all custom duties and quota restrictions in the commerce of industrial products between Turkey and the EU were removed[14]. Moreover, Turkey adopted the tariff that the EU imposes on imports from third countries. However, agricultural goods were considered special products for both parties, thus they are not part of the Customs Union agreement (Tekce, 2015).

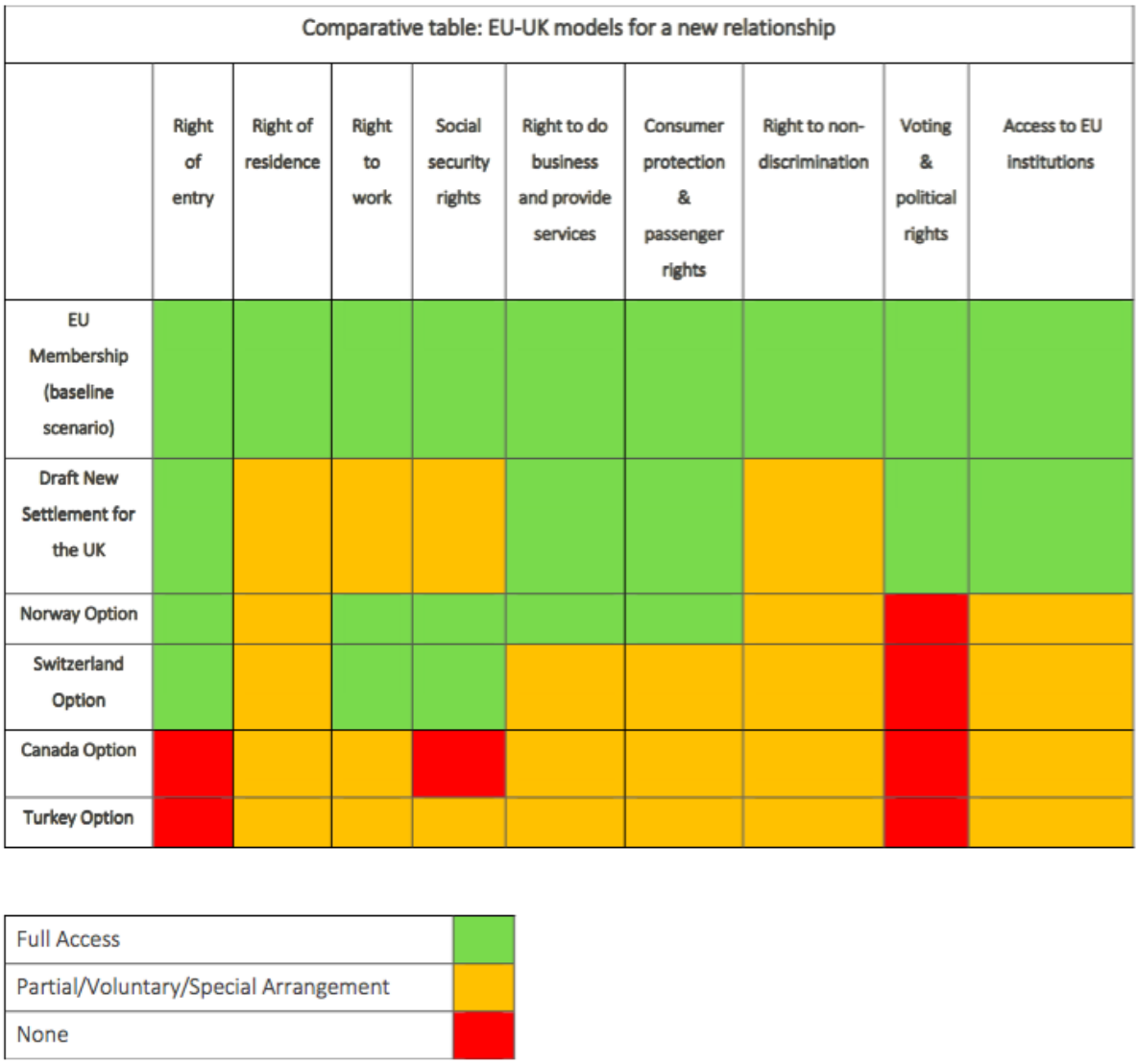
The agreement between EU and Turkey does not provide for free movement of people, but citizens can benefit from some work-related migration rights. Therefore, the right of entry and right of residence is governed by country's national immigration laws. The Association

[12] http://ec.europa.eu/trade/policy/in-focus/ceta/. Retrieved 30 March 2017.
[13] http://ec.europa.eu/trade/policy/countries-and-regions/countries/turkey/. Retrieved 30 March 2017.
[14] http://www.avrupa.info.tr/sites/default/files/2016-09/Custom_Union_des_ENG_0.pdf. Retrieved 30 March 2017.

Agreement does however include special arrangements in terms of the right of residence, right to work, right to social security, right to do business and provide services, consumer protection and passenger rights, the rights to non-discrimination and access to some EU institutions. However, the there are no voting and political rights or rights of entry (Kavrakova and Pont, 2016). As the other exit scenarios, UK would have no influence over EU single market regulations, trade arrangements and the trade deals EU pursues.

All the above scenarios have been summarized in a table by European Citizen Action Service in 2016, which shows the specific rights of citizens based on the scenarios.

Figure 5. UK exit from the EU scenarios comparative table



Comparative table: EU-UK models for a new relationship									
	Right of entry	Right of residence	Right to work	Social security rights	Right to do business and provide services	Consumer protection & passenger rights	Right to non-discrimination	Voting & political rights	Access to EU institutions
EU Membership (baseline scenario)									
Draft New Settlement for the UK									
Norway Option									
Switzerland Option									
Canada Option									
Turkey Option									

Full Access	
Partial/Voluntary/Special Arrangement	
None	

**Source: '5 Takeways on Brexit: Outlining Possible Scenarios for a New UK-EU Relationship and their Impact on Citizens', European Citizen Action Service 2016*

3.3.6. Scenario 6: WTO Most Favored Nation Model

If all negotiations of an FTA would fail, UK would have to seek the access to the EU market under the World Trade Organization rules (they apply to all WTO members)[15]. The rules follow the principle of non-discrimination, which means that unless UK has a FTA with a specific country, it may not treat other partners less advantageously (BBC, 2016). This means that UK and EU would be obliged to apply the rules (tariffs and other trade restrictions) of trade between each other as between any other country, which is not covered by a FTA with UK or EU (BBC, 2016).

UK businesses would be subject to the EU Common External Tariff, making them less competitive than the EU or other FTA covered competitors. Tariffs would be imposed on about 90% of the UK's goods exports to the EU and elsewhere[16]. This also means that the financial services would not be covered (Slaughter and May, 2016). Furthermore, EU would also impose non-tariff barriers to trade (Slaughter and May, 2016). UK businesses would still be required to comply with the standards of the EU to be able to sell their products and services, but would have no vote on their setting (Slaughter and May, 2016). UK would also not be required to contribute to the EU budget and be free to negotiate bilateral agreements with third countries. It is important to remember, however, that the free trade agreements between the EU and third countries (over 50) such as Korea, Mexico and South Africa would not apply to the UK (Slaughter and May, 2016). Furthermore, the United States, which is currently negotiating a trade deal with the EU, ruled out the possibility of a separate deal with UK following its exit from the EU (Booth et al, 2015). However, New Zealand states its interest in replicating EU trade deals with UK (Booth et al, 2015). The strong advantage of this scenario is that UK would have a total control over its borders, as the free movement of people would no longer bind it. It would also have independence over its cross-border financial services, social and employment policy, energy and climate policy, consumer rights, agricultural and fisheries policy, regional policy, external trade policy and foreign policy

[15] http://www.bbc.com/news/uk-politics-eu-referendum-36639261#share-tools. Retrieved 25 February 2017.
[16] House of Commons Library (2013), "Leaving the EU", page 27.

(Booth et al, 2015). Finally, UK would have no say over the decisions made in the EU over governing trade in the single market.

3.3.7. Scenario 7: City States, Singapore and Hong Kong approach for London

Another option discussed by BBC (2016) amongst other sources is a city state approach currently exercised by Singapore and Hong Kong. Some advocates argue that this model should be pursued by London. Under this scenario, London would take on a unilateral free trade approach, which essentially means not imposing any tariff on imports and exports. However, this could have a strong negative effect on some sectors such as manufacturing and agriculture, as it could make importing some goods cheaper than producing them in the UK (BBC, 2016). Under the Hong Kong scenario, the license agreements for trade are minimal and free movement of people is achievable through working visas (must be supported by a local employer sponsor)[17]. Singapore is currently part of the Association of Southeast Asian Nations' (ASEAN). There is no free movement of people between Singapore and EU under the EUSFTA (European Union-Singapore Free Trade Agreement)[18].

Given the referendum results (citizens of London voted to stay) discussed in appendix 9.1 and 9.2, there have been speculations on whether the London would become a city state and trade under similar rules to those of Singapore and Hong Kong.

[17] https://eeas.europa.eu/headquarters/headquarters-homepage/519/hong-kong-and-eu_en. Retrieved 1 April 2017.
[18] http://ec.europa.eu/trade/policy/countries-and-regions/countries/singapore/. Retrieved 1 April 2017.

4. Methodology

4.2 Data

The data used has been manly obtained from the OECD website. The empirical part of this thesis focuses on the study of 40 countries, which include all OECD countries as well as BRICS, and remaining EU countries (excluding Romania, Croatia, Malta, Cyprus and Bulgaria due to lack of data on bilateral trade in services with the United Kingdom). Given that the only data on bilateral trade in services exists on the OECD website under EBOPS (extended balance of payments services) 2002, we chose the data span that was available. We therefore look at the data through 12 years duration, from 2000 to 2012. The total bilateral trade is calculated by adding imports and exports of UK with the partner country. For the purpose of this research the countries have been grouped as follows:

Group 1: all OECD countries
Group 2: EU countries (excl Romania, Croatia, Malta, Cyprus and Bulgaria)
Group 3: BRICS

Figure 6. Bilateral Trade Flow between UK and groups of countries from 2000 to 2012

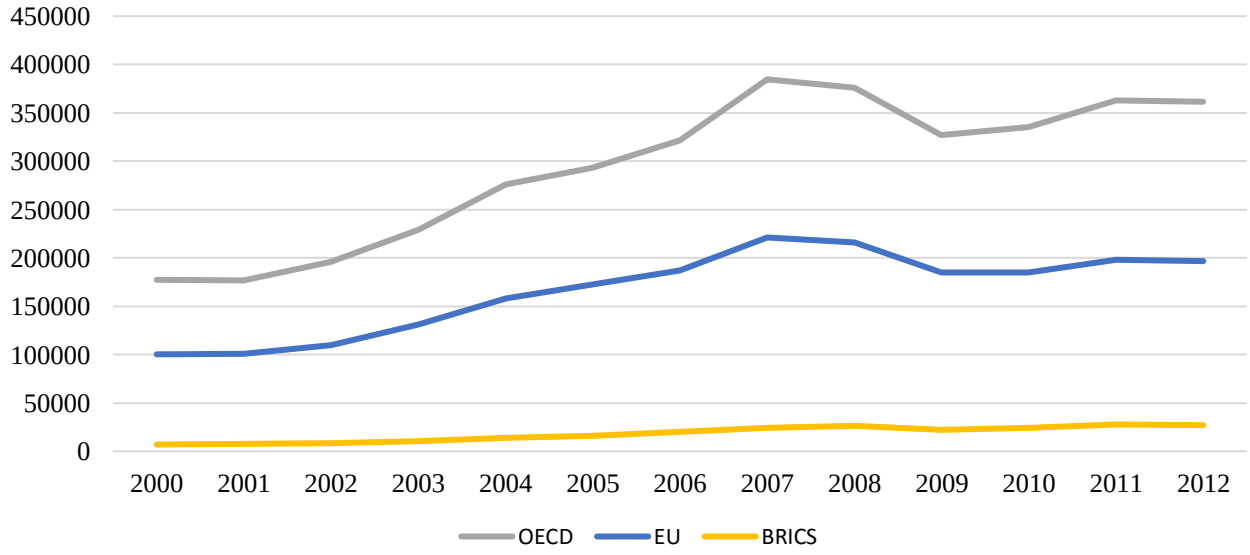


Figure 6 depicts the trade values between the UK and groups of countries above from 2000 to 2012. Most of the EU countries are also part of the OECD group, which explains why the

lines move in the same direction. Trade values fell in 2009, which was caused by a major economic crisis, but have since recovered.

Figure 7 illustrates top 20 countries, which have the highest value of services trade with United Kingdom in years 2000, 2006 and 2012. Most countries at the top are either OECD countries or both OECD and EU countries. With time, one can observe BRICS becoming more important for UK's trade. We can particularly observe China's rise in bilateral trade flows in services with the UK, as well as USA remaining the main services trading partner country throughout the years.

Figure 7. Country list per group and trade value 2000, 2006, 2012

2000			2006			2012		
Country	Group	Trade Value	Country	Group	Trade Value	Country		Trade Value
USA	I	48,371	USA	I	79,731	USA	I	95,020
France	I and II	19,309	Germany	I and II	30,439	France	I and II	29,709
Germany	I and II	16,554	France	I and II	30,026	Germany	I and II	29,048
Spain	I and II	13,144	Spain	I and II	26,039	Spain	I and II	24,057
Netherlands	I and II	11,096	Netherlands	I and II	19,666	Ireland	I and II	21,630
Italy	I and II	8,201	Ireland	I and II	17,835	Netherlands	I and II	21,562
Ireland	I and II	7,483	Italy	I and II	14,151	Switzerland	I	17,909
Japan	I and II	7,217	Switzerland	I	13,840	Italy	I and II	15,534
Switzerland	I	6,143	Japan	I	12,024	Australia	I	12,963
Belgium	I and II	5,249	Sweden	I and II	10,365	Sweden	I and II	11,877
Sweden	I and II	4,583	Australia	I	8,412	Japan	I	11,424
Australia	I and II	4,194	Belgium	I and II	7,726	Canada	I	8,287
Canada	I	3,825	Denmark	I and II	5,980	Belgium	I and II	8,112
Greece	I and II	3,677	Canada	I	5,976	India	III	7,085
Denmark	I and II	2,751	India	III	5,866	China	III	6,999
Norway	I	2,326	Norway	I	5,284	Norway	I and II	6,409
South Africa	III	2,263	Greece	I and II	4,935	Denmark	I and II	6,118
Portugal	I and II	2,176	South Africa	III	4,344	Luxembourg	I and II	5,807
Finland	I and II	2,035	China	III	4,250	South Africa	III	5,360
India	III	1,834	Russia	III	4,217	Greece	I and II	4,891

In the data description, we also wanted to show the differences between countries according to the indexes. As earlier mentioned, STRI measures the trade policies that restrict trade. The higher the STRI number the more trade barriers in services the country has (0 means completely open, while 1 means completely closed).

As seen in Figure 8 STRI is the lowest for UK, which is most likely due to the low trade barriers in services under the EU laws. The EU average is also the lowest of country group averages. Switzerland is estimated to have the highest barriers to trade in services out of the possible exit model scenarios for the UK. BRICS, which currently trade with most nations under the WTO Most Favored Nation rule, have the highest barriers to service trade out of the country groups in our dataset. This can be attributed to the slowly liberalizing markets through lessening the restrictions on foreign entry, barriers to competition and other policies.

Figure 8. Service Trade Restrictiveness Index by Country

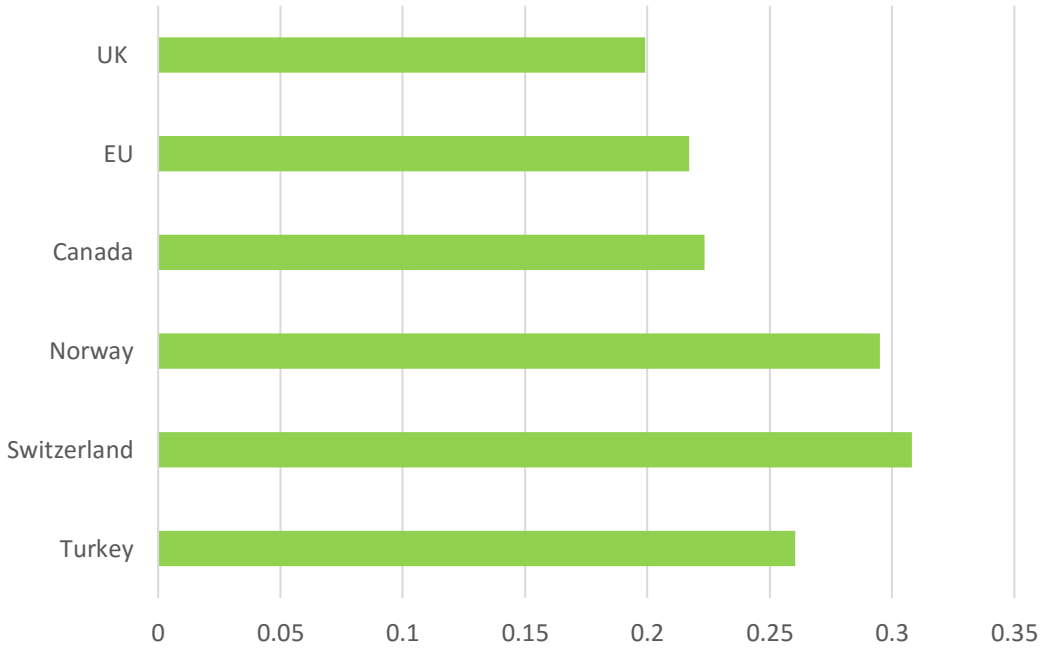
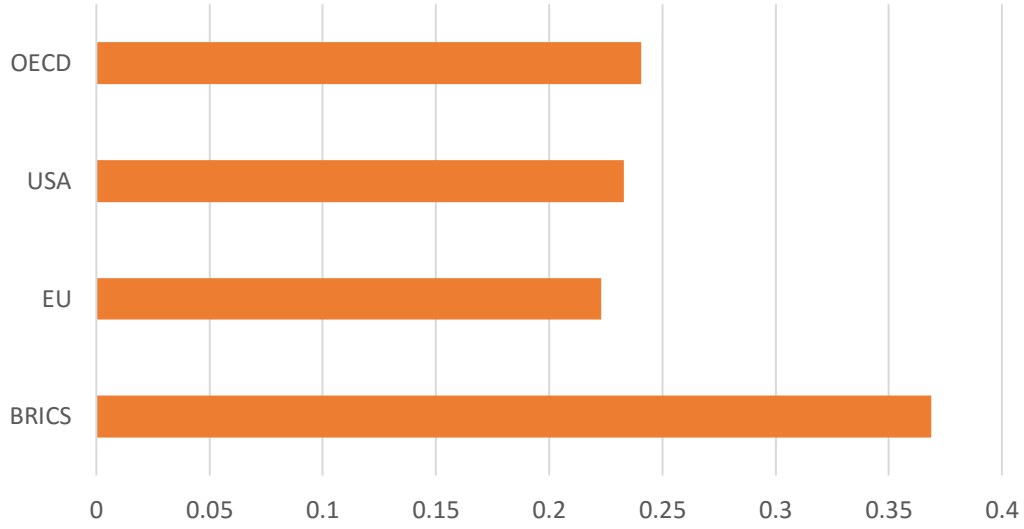


Figure 9. Service Trade Restrictiveness Index by Country Groups



The Economic Freedom of the World Index, on the other hand, measures the overall economic openness of the country (not just trade). The higher the index number, the more economically open a country is (with 0 being completely closed and 10 being completely open). As seen in Figure 10, USA and Switzerland are currently the most economically open nations, which is most likely due to their regulatory efficiency and market openness. BRICS nations are the least economically open nations from our dataset, which may be caused by lower government integrity, less judicial effectiveness and weaker property rights. We can also observe that the EFW index for EU and OECD has been converging, which is due to the fact that most EU countries are in the OECD.

Figure 10. Economic Freedom of the World Index by Country

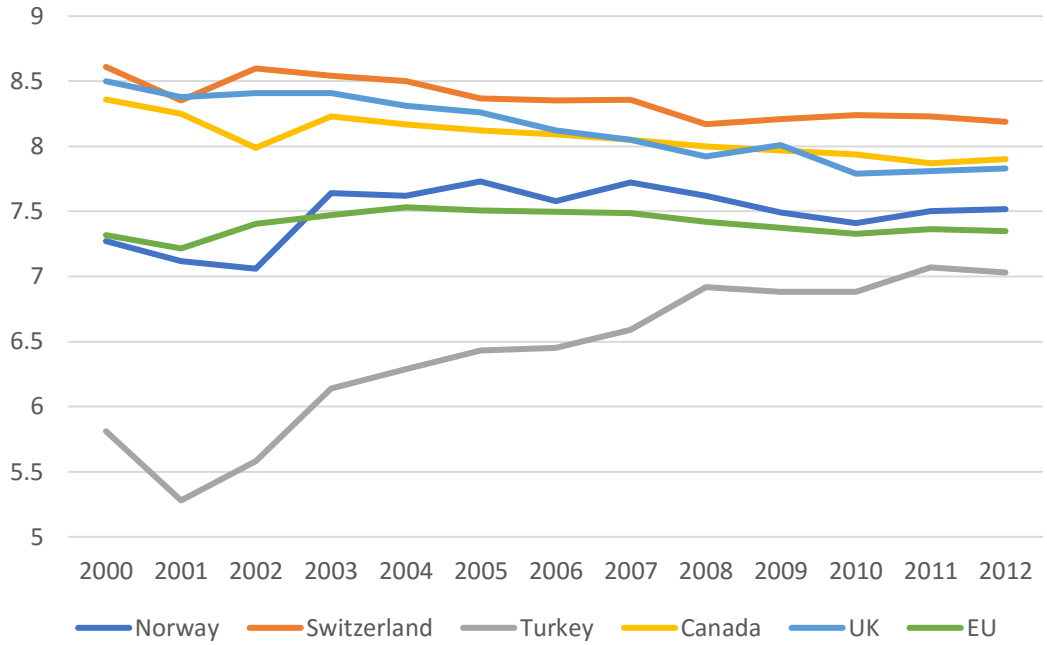


Figure 11. Economic Freedom of the World Index by Country Group

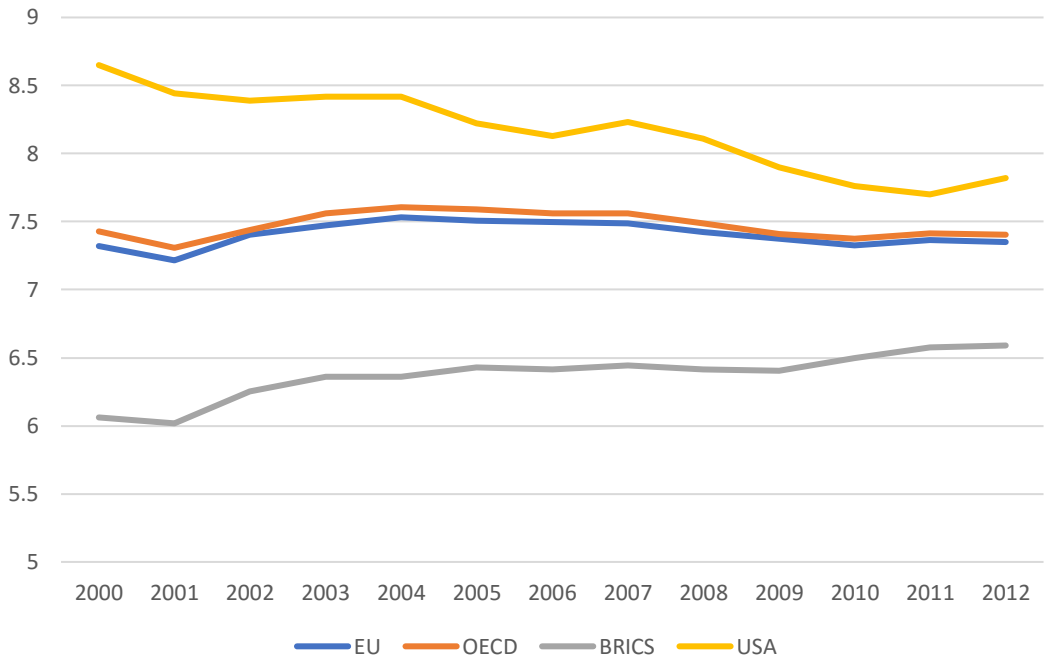
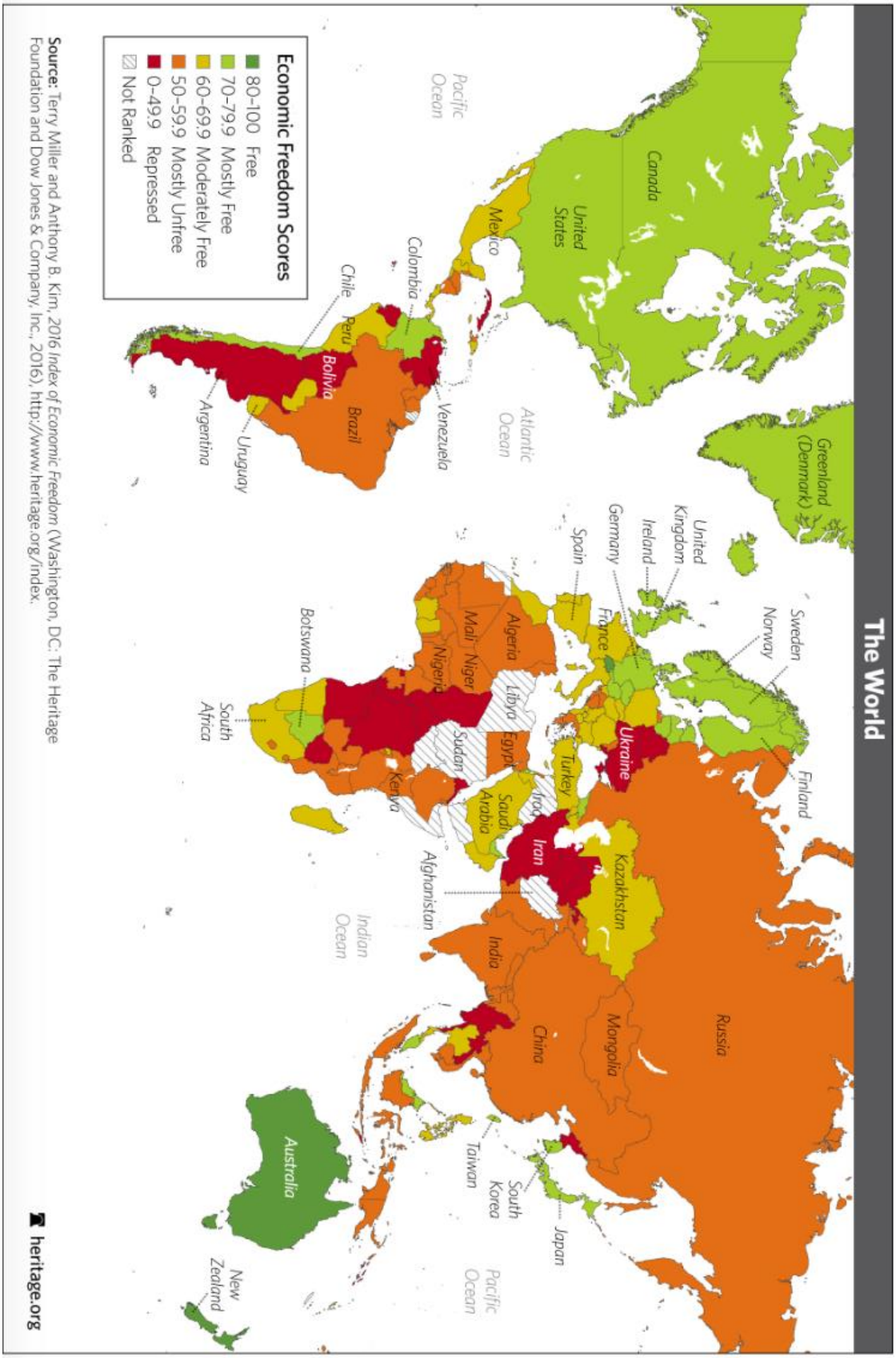


Figure 12 is a map that shows the EFW index in the world. UK is among the most economically open nations in the world, together with the USA, Sweden, Denmark, Norway and Canada. Australia, New Zealand and Switzerland, according to the index, are the top economically free nations.

Figure 12. Economic Freedom of the World Map



**source: www.heritage.org*

The next two sections describe the variables and its sources, as well as the expectations on the model results. All the monetary variables were taken in US dollars, controlling for exchange rates, in order to make the countries more easily comparable.

4.3. Construction of Variables

4.3.1. Dependent Variables

Bilateral trade Flow

As the dependent variable we use the bilateral service imports and exports extracted from the OECD EBOPS 2002 and 2010 database on international trade in services. The data are taken for United Kingdom and all European Union countries, for years 2000-2013. The data are based on the balance of payments information, they therefore cover mainly cross-border trade (mode 1) and consumption abroad (mode 2) transactions, while only mirror a small part of commercial presence (mode 3) and movement of natural people (mode 4) transactions. We consider the country of origin for this as well as for other variables in the model to be United Kingdom, while destination country to be the rest of the EU countries.

4.3.2. Independent Variables

GDP

Annual GDP data was found on the OECD website from aggregate national accounts. GDP measures the size of the economy and in the gravity model, the assumption is that GDP is proportional to trade, therefore the larger the economy, the more it trades. We take the sum of UK's and partner country's GDP, as we are interested in the overall effect of economy size on bilateral trade in services.

Distance

One of our independent variables is geographic distance, a standard variable in any gravity model of trade. We estimate the geographic distance in km using the distance between London and major economic cities/capitals in the respective destination countries. It is expected to have a negative impact on the bilateral trade flows, as transportation costs are anticipated to be proportional to the distance between two countries. However, given the

studies on bilateral trade flows in services, we also foresee the possibility of distance not being a significant determinant of bilateral trade flows in services and therefore not necessarily carrying a negative sign.

Figure 13 below shows the distance between London and the Capital or Main Economic Center of the partner country.

Figure 13. Distance in Km from London

Country	Capital/Main Economic Centre	Distance in km
Austria	Vienna	1237
Belgium	Brussels	321
Czech Republic	Prague	1036
Denmark	Copenhagen	953
Finland	Helsinki	1823
France	Paris	343
Germany	Berlin	929
Greece	Athens	2391
Hungary	Budapest	1470
Ireland	Dublin	469
Italy	Rome	1444
Luxembourg	Luxembourg City	494
Netherlands	Amsterdam	356
Poland	Warsaw	1454
Portugal	Lisbon	1585
Slovakia	Bratislava	1291
Spain	Madrid	1261
Sweden	Stockholm	1436

Estonia	Tallinn	1788
Slovenia	Ljubljana	1231
Latvia	Riga	1681
Lithuania	Vilnius	1730
Canada	Toronto	5728
Chile	Santiago	11649
Iceland	Reykjavik	1894
Israel	Tel Aviv	3572
Japan	Tokyo	9585
South Korea	Seoul	8882
Mexico	Mexico City	8941
New Zealand	Auckland	18331
Norway	Oslo	1155
Switzerland	Zurich	777
Turkey	Istanbul	2505
USA	New York	5585
Brazil	Sao Paulo	9474
Russia	Moscow	2508
India	Mumbai	7205
China	Beijing	8161
South Africa	Cape Town	9623
Australia	Sydney	16991

**source: http://www.indo.com*

Adjacency

As in many other empirical studies using the gravity model, we include a dummy for whether UK shares a border with the country. We consider border to also be a sea border.

Exchange Rate Volatility

The UK is not currently part of the Euro Zone. It has entered the ERM (Exchange Rate Mechanism) in October 1990, but was forced to leave the program in 1992 due to a strong currency speculation action against the pound sterling. The participation in the ERM program was one of the required steps in order to join the currency union. It was introduced to reduce exchange rate variability and achieve monetary stability in Europe. UK currently operates within a floating exchange rate regime, which means the currency is allowed to fluctuate in response to foreign exchange market mechanisms. We use the exchange rate volatility in the model in order to capture the impact of exchange rate fluctuations on trading activity (in services). In a study by Bergstand (1985) and Dell'Arricia, addition of the exchange rate volatility to the gravity model has helped explain the trade variation among partner countries. Devaluation of a national currency generally leads to an anticipation of an increase in the total value of trade flows. Therefore a devaluation of the British pound or the partner country's currency should have a positive impact on the total trade value of the bilateral flows. The data used for the exchange rate are collected from the OECD website and the World Bank for the countries that were not available in the system.

Service Trade Restrictiveness Index (STRI)

STRI is an index created by OECD to help identify the policies that restrict trade in services. STRI indices take value from 0 to 1, where 0 is completely open while 1 completely closed (to trade). The database contains information on trade restrictions and regulations in the following sectors: computer services, construction, professional services, telecommunications, distribution, audiovisual services, transport, courier, financial services and logistics. STRI is based on five policy areas, restrictions on foreign ownership and other marker entry conditions, restrictions on the movement of people, other discriminatory measures and international standards, barriers to competition and public ownership,

regulatory transparency and administrative requirements[19]. STRI is not a tariff equivalent, as it does not provide information on impacts on costs, prices and rates of return, as well as the impact of anti-competitive practices. It is rather a pseudo-frequency measure (Grunfeld and Moxnes, 2003), as tariff equivalents for services are difficult to obtain. It is possible, therefore, that a higher score in the index is simply reflected by greater availability of information in that country, rather than its specific restrictive regime (Nguyen-Hong, 2000).

Economic Freedom of the World Index (EFW)

Economic Freedom of the World is an indicator proposed by the Frasier Institute in Canada, which aims to measure the economic freedom of all the countries in the world. The index measures the degree to which the institutions and policies within the country impact the economic freedom of the nation. The index is based on five major areas:

- size of government: expenditures, taxes, and enterprises;
- legal structure and security of property rights;
- access to sound money;
- freedom to trade internationally; and
- regulation of credit, labor, and business.

The index takes values from 0 to 10, with higher values representing more economic freedom. Ambassador Terry Miller and Anthony B. Kim on the EFW website[20] explain that while some factors (such as a country's openness to trade) are evaluated based on the interactions of a country with the world, most factors focus on the policies in that country. The index covers 159 countries and territories, with data available for most countries even back to 1970s. The EFW index allows academics to analyze the impact of the differences of economic freedom and changes in that freedom across different countries and time.

[19] http://qdd.oecd.org/subject.aspx?Subject=063bee63-475f-427c-8b50-c19bffa7392d
[20] www.heritage.org

EU

Another dummy variable used in the model is called EU and it captures the effects of the European Union membership on the trade flows of services. Although the trade in services in the EU is not completely liberalized, the agreement does facilitate trade in services in comparison to other agreements such as EFTA, which provides free trade agreement only on goods (Walsh, 2006). The dummy for EU is a binary variable, with 0 representing the value for countries, which are not a member of the European Union, and 1 representing countries that are members of the European Union. EU variable is expected to show a positive sign.

Other variables

The variables above are important as they seek to explain the trade between UK and its partner nations, but there are also some other variables, which although important, have been omitted in our study.

Similar studies, which use gravity equation to estimate the influence on bilateral trade, have also used other variables such as colonial ties, language religion and adjacency. We have excluded colonial ties, as even though UK has been one of the biggest colonizers controlling an empire, the set of countries that we look at contains only the US, UK, Australia and New Zealand, and we believe this relationship could also be captured by using the common language dummy. These countries share a common language because they are former British colonies and therefore adding colonial ties as a variable would lead to the variables being collinear. However, we chose not to include the English language dummy either, considering that English is the most common spoken language in the world. Although only a few countries use English as the mother tongue and the legal and administrative language, most countries in our dataset are developed economies with a relatively high level of education and use of English as the business language. We therefore assume that language is not a barrier to trade in services, thus should not be included in our study.

We have also excluded religion as a dummy variable, due to the fact that it is believed to have a limited effect when it comes to estimating trade between developed economies. Given that most of the countries in our data set are OECD countries, we decided not to include religion.

Some studies also incorporate GDP per capita and population in the gravity models. We opted not to include both of those as GDP per capita is almost completely correlated with the GDP, while population is not most representative variable in terms of the wealth of the economy and does not necessarily reflect on trade numbers. We have also excluded Euro (a common currency for some countries in the EU) as the UK operates using sterling and is not part of a common currency union.

According to The and Permartini (2005), a simple gravity model equation is able to explain even up to 80% of trade and since it is often a matter of researchers' own judgment and the focus of the study, we believe that the above variables will explain bilateral trade in services sufficiently to estimate the effects of Brexit. Given the nature and limitations of the data, we used the partial equilibrium model approach, considering only a certain part of the market.

4.4. Model

The empirical gravity equation applied in this thesis is seen in equation 7 and it is an adaptation of the gravity models given by Lee and Kimura (2004) and Grunfield and Moxness (2003). In the original gravity model by Tinbergen (1962) there are only two independent variables, namely GDP and distance. We expand the model by adding exchange rates volatility, Service Trade Restrictiveness Index (STRI), Economic Freedom of the World (EFW) and two binary variables, EU and adjacency. We take the natural logarithms of the continuous variables to be able to interpret the coefficients as elasticities. The dummy variables are binary variables, taking the value of either 0 or 1 and are interpreted as the % change in bilateral trade due to a change from 0 to 1. The gravity model is estimated as follows:

$$\ln(Y_{ijt}) = \alpha_1 + \alpha_2 \ln(X_{ijt}) + \alpha_3 ln(D_{ij}) + \alpha_4(\sigma_{ijt}) + \alpha_5(\mathrm{EU_{ijt}}) + \alpha_6 \ln(A_{jt}) + \alpha_7(STRI_{jt}) + \alpha_8(EFW_{ij}) + \epsilon_{ijt} \qquad (7)$$

Where:

Y= bilateral trade (export + import)

X = GDP sum (UK and partner country)

D= Distance in km between London and the economic centers in the partner countries

σ = Exchange rate volatility

EU = European Union membership

A= adjacency (border with the UK)

STRI = Service Trade Restrictiveness Index

EFW = Economic Freedom of the World Index

i= United Kingdom

j= partner countries

t= 2000, 2001, …, 2012

e= error term

The equation differs to some extend to the gravity models presented by Kimura and Lee (2004) and Grunfield and Moxnes (2004). The most significant difference is the inclusion of exchange rate volatility into the equation. We decided to include it in the model as previous studies (e.g. Bergstand 1985) have argued that it helps explain the variation in trade among the participating countries.

The model also differs in capturing GDP. We decided to use the sum of GDP of UK and partner country, as we are not looking at imports and exports separately, but rather as total bilateral trade in services. Some studies look at GDP's separately in order to estimate which economy size is more significant. However, since we are studying the overall impact of the economy size on total trade, we chose to combine it into one variable.

Gravity models typically use cross-section data to estimate trade patterns in a specific year or on data that has been averaged. However, we chose panel-data, a type of longitudinal data, which is collected at different points in time. We used the panel data because we are interested in describing changes over time and measure the impact of barriers to trade and economic policies. It is also characterized by more than one observation; in our case we have 520 observations. Panel data allows to control for unobservable individual effects (α), variables that cannot be controlled or measured like for language or variables that change over time but not across entities (e.g. national policies, international agreements). This helps control for heterogeneous trading relationships. The descriptive statistics of the variables used in this study can be seen in Figure 14.

Figure 14. Descriptive statistics of the variables used in the study

Variable	Description	Observations	Mean	Std. Dev.	Min	Max
Y_{ijt}	Bilateral Trade	520	7.944102	1.578275	3.555348	11.47069
X_{iJt}	GDP Sum	520	14.88751	0.514286	14.24814	16.84454
D_{ij}	Distance	520	7.700635	1.095637	5.771441	9.816349
σ_{ijt}	Exchange Rate Volatility	520	0.009683	0.086808	-0.62331	0.265078
EU_{ijt}	EU	520	0.488462	0.500348	0	1
EFW_{jt}	EFW UK + EFW Partner	520	15.48375	0.659927	13.52	17.15
$STRI_{jt}$	STRI UK + STRI Partner	520	0.4522063	0.068921	0.338973	0.6631385
A_{ij}	Adjacency	520	0.15	0.357415	0	1

Panel-data can be regressed using the fixed-effects model (FEM) and random effects model (REM). Fixed effects model should be used when analyzing the impact of variables that vary over time, as we assume that there is something in the country that may impact or bias the bilateral trade and that should be controlled for. Fixed-effects model removes the effect of time-invariant variables to assess the effect of the predictors on the outcome variable. The model also assumes that time-invariant variables are unique to the entity and should not be correlated with other variables. If error terms are correlated then FE is not suitable and random-effects model should be chosen. REM assumes that the variation across entities is random and uncorrelated with the independent variables. Generally, one should use random effects model if there is a reason to believe that the differences across the entities have some influence over the dependent variable. In REM it is possible to use time-invariant variables, which is not possible in the fixed effects model, as these variables are absorbed by the intercept. On the other hand, FEM is a better choice when the interest is in estimating trade flows between a predetermined selection of countries (Egger, 2000). Given the above, we decided to run a Hausman test (see Section 5.2), to estimate whether we should use FEM or REM. The null hypothesis of the test is that the preferred model is REM, while the alternative hypothesis is that the preferred model is FEM. The test analyses whether the unique errors are correlated with the regressors. We also run the Breush and Pagan Lagrarian multiplier test (LM) which helps to decide between random effects model and a simple OLS regression (see Figure 18). The null hypothesis in the LM test is that variances across entities are zero, which means that there is no significant difference across units (i.e. no panel effect). Ordinary Least Squares regression is a linear modelling technique that is best used for models that include one dependent variable and multiple explanatory variables (including categorical explanatory variables, which have been correctly coded).

5. Results

5.1 Correlation and dependence

We start the results analysis by looking at the correlation and dependence between our variables.

Figure 15. Correlation and dependence between the main variables

	Bilateral Trade in Services	GDP Sum	Distance	Exchange Rate Volatility	EU	EFW	STRI	Adjacency
Bilateral Trade in Services	1.0000							
GDP Sum	0.5301	1.0000						
Distance	-0.1612	-0.3388	1.0000					
Exchange Rate Volatility	0.0572	0.0196	-0.0894	1.0000				
EU	0.1757	0.2600	-0.6943	0.1347	1.0000			
EFW	0.1401	-0.2994	-0.1210	0.0789	0.1272	1.0000		
STRI	-0.0297	0.3782	0.1997	-0.0939	-0.4155	-0.4754	1.0000	
Adjacency	0.4190	-0.0145	-0.5677	0.0317	0.4299	0.1808	-0.2805	1.0000

Based on the table above we can observe that bilateral trade in services is positively correlated with the GDP sum, exchange rate volatility, EU membership, Economic Freedom of the World Index and Adjacency. This means that as bilateral trade in services increases these variables increase as well. The relationship with GDP sum and Adjacency is moderate,

while the relationship with exchange rate volatility, the EU and EFW is small. Thus, those three variables have a relatively small impact on bilateral trade. This could indicate that since the UK is not fully integrated with the EU, as it does not enjoy the advantages such as the common currency, the EU membership of a partner country does not increase bilateral trade in a substantial manner. The majority of the countries in the EU are in the Eurozone, which may also be the reason why exchange rate volatility has only a small impact on bilateral trade with the UK. Bilateral trade is also negatively correlated to distance and STRI, which means that when those variables increase, bilateral trade in services decreases. However, the relationships are small.

5.2 Choosing the correct model

After introducing all the variables in the model, we conducted a Hausman test to indicate whether the preferred model is the fixed or random effects model. As shown in the figure below, the probability is not under <0.05 and null hypothesis should be rejected. Therefore, the Hausman test indicates that REM is preferable.

Figure 16. Hausman test

Coefficients

	(b)	(B)	(b-B)
	fe	re	Difference
GDP Sum	0.923244	0.923244	-9.12e-11 .
Exchange Rate Volatility	-0.0938	-0.0938	2.50e-16 .
EU	0.541436	0.541436	-6.46e-12 .
EFWadded	0.1619232	0.1619232	1.33e-11 .

Test: Ho: difference in coefficients not systematic
*chi2(**16**) = (b-B)'[(V_b-V_B)^(-1)](b-B) = **-0.00** chi2<0*
→ model fitted on these data fails to meet the asymptotic assumptions of the Hausman test;

Given the result of the Hausman test, we performed the Random Effect regression, which can be seen in Figure 17.

Figure 17. Random Effect

Bilateral Trade	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
GDP sum	0.920759	0.142753	6.45	0	0.64097	1.200549
Distance in Km	0.212948	0.209071	1.02	0.308	-0.19682	0.622719
Exchange Rate Volatility	-0.09437	0.124874	-0.76	0.45	-0.33912	0.150375
EU	0.537805	0.048218	11.15	0	0.443301	0.63231
EFW	0.161923	0.041011	3.95	0	0.081542	0.242304
STRI	-7.22567	1.526453	-4.73	0	-10.2175	-4.23388
Border	1.024273	0.804743	1.27	0.203	-0.553	2.601541
Austria	-0.56615	0.446358	-1.27	0.205	-1.441	0.308697
Belgium	0.074363	0.171719	0.43	0.665	-0.2622	0.410926
Czech Republic	-1.33404	0.546688	-2.44	0.015	-2.40553	-0.26255
Denmark	-1.29878	0.236787	-5.49	0	-1.76287	-0.83468
Finland	-0.70197	0.386699	-1.82	0.069	-1.45989	0.055944
France	0.457799	0.077632	5.9	0	0.305644	0.609955
Germany	-0.33324	0.189837	-1.76	0.079	-0.70531	0.038838
Greece	0.139159	0.317375	0.44	0.661	-0.48288	0.761202
Hungary	-1.07722	0.41235	-2.61	0.009	-1.88541	-0.26903
Ireland	-0.02689	0.108093	-0.25	0.804	-0.23875	0.184968
Italy	0.50352	0.489155	1.03	0.303	-0.45521	1.462246
Luxembourg	-0.33773	0.649481	-0.52	0.603	-1.61069	0.935228
Netherland	0	(omitted)				
Poland	-0.37355	0.415702	-0.9	0.369	-1.18831	0.44121
Portugal	-0.41573	0.439055	-0.95	0.344	-1.27626	0.444806
Slovakia	-2.57592	0.471488	-5.46	0	-3.50002	-1.65182
Spain	1.239739	0.491	2.52	0.012	0.277397	2.202081
Sweden	0.53038	0.448775	1.18	0.237	-0.3492	1.409962
Estonia	-3.40125	0.399193	-8.52	0	-4.18365	-2.61885
Slovenia	-3.15919	0.478707	-6.6	0	-4.09744	-2.22094
Latvia	-3.52594	0.508269	-6.94	0	-4.52213	-2.52975
Lithuania	-3.02806	0.435544	-6.95	0	-3.88171	-2.17441
Canada	-0.03142	0.19855	-0.16	0.874	-0.42057	0.35773
Chile	-2.88215	0.076924	-37.47	0	-3.03292	-2.73139
Island	-0.93047	0.302979	-3.07	0.002	-1.5243	-0.33665
Israel	-0.28896	0.20546	-1.41	0.16	-0.69165	0.113735

Japan	-0.32781	0.217398	-1.51	0.132	-0.7539	0.098282
South Korea	-0.87279	0.07778	-11.22	0	-1.02524	-0.72035
Mexico	-0.96347	0.072744	-13.24	0	-1.10604	-0.82089
New Zealand	-1.73253	0.087236	-19.86	0	-1.90351	-1.56155
Norway	1.004601	0.431978	2.33	0.02	0.157939	1.851262
Switzerland	1.991435	0.514195	3.87	0	0.983631	2.999238
Turkey	-0.02594	0.313903	-0.08	0.934	-0.64118	0.589295
USA	1.105289	0.358058	3.09	0.002	0.403509	1.807069
Brazil	-0.87765	0.066391	-13.22	0	-1.00777	-0.74752
Russia	0.850016	0.214829	3.96	0	0.428959	1.271074
India	0.448424	0.10577	4.24	0	0.24112	0.655728
China	0	(omitted)				
South Africa	0	(omitted)				
Australia	0	(omitted)				
2000	-0.51681	0.09738	-5.31	0	-0.70767	-0.32595
2001	-0.49501	0.086472	-5.72	0	-0.6645	-0.32553
2002	-0.48336	0.084859	-5.7	0	-0.64968	-0.31704
2003	-0.38782	0.081853	-4.74	0	-0.54825	-0.22739
2004	-0.27964	0.070217	-3.98	0	-0.41726	-0.14202
2005	-0.14433	0.065289	-2.21	0.027	-0.2723	-0.01637
2006	-0.07166	0.054726	-1.31	0.19	-0.17892	0.035601
2007	0.07487	0.050105	1.49	0.135	-0.02333	0.173074
2008	0.089971	0.049328	1.82	0.068	-0.00671	0.186653
2009	-0.02887	0.049352	-0.59	0.558	-0.1256	0.067853
2010	-0.01155	0.04381	-0.26	0.792	-0.09742	0.074314
2011	0.094804	0.042845	2.21	0.027	0.01083	0.178779
2012	0	(omitted)				
_cons	-6.32394	1.805558	-3.5	0	-9.86277	-2.78512
sigma_u	0					
sigma_e	0.187823					
rho	0	(fraction of variance due to u_i)				

Most countries produced a significant result. As expected, the GDP sum, EU, EFW and border showed a positive coefficient, while exchange rate volatility and STRI showed a

negative coefficient. Distance produced a positive coefficient, which contradicts the gravity model theory. However, border, exchange rate volatility and distance were not significant at the <0.05 level. Before analyzing the result in more depth, we decided to run the Breush and Pagan Lagrarian multiplier test for random effects, in order to select the appropriate model between random effects and an OLS regression.

Figure 18. Breusch and Pagan Lagrangian multiplier test for random effects

Test: Var(u) = 0
Chibar2(01) = **0.00**
Prob > Chibar2 = **1.0000**

The results show that we have failed to reject the null hypothesis and therefore conclude that random effects model is not appropriate. This shows that there are no significant differences across years and countries, and therefore we can run a simple OLS regression. The results of the OLS regression can be seen in Figure 19.

5.3 OLS Regression Results and Analysis

Figure 19. OLS Regression Results

GDP Sum	1.88***	1.01***	0.92***
	(0.07)	(0.14)	(0.14)
Distance	-0.47***	0.09	0.21
	(0.21)	(0.20)	(0.21)
Exchange rate volatility	0.17	-0.10	-0.09
	(0.05)	(0.13)	(0.12)
EU	0.71***	0.54***	0.54***
	(0.05)	(0.05)	(0.05)
EFW	0.04***	0.16***	0.16***
	(0.03)	(0.04)	(0.04)
STRI	-16.74***	1.00	-7.23***
	(0.88)	(2.72)	(1.53)
Adjacency	-1.97***	1.71***	1.02
	(0.79)	(0.62)	(0.80)
Constant	-8.28***	-11.14***	-6.32***
	(1.97)	(2.51)	(1.86)
Observations	520	520	520
Adjusted R^2			
Country	Yes	No	Yes
Year	No	Yes	Yes

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results are presented in 3 columns. The first column shows the result with country pair as fixed effect. The second column controls for time effect (years) and the last column shows the results controlling for both country and years. We focus our analysis on the latter, as we are interested in the effect of both of these fixed effects on bilateral trade in services.

GDP, which measures the size of the economy, has shown a positive coefficient, which means that as the GDP increases, so does bilateral trade in services. The estimation is highly significant with $p<0.01$. We can interpret the results in the following way. A 1% increase in the sum of the GDPs will lead to a 1.8% increase in bilateral trade in services. This also implies that UK will trade more with countries that have a larger GDP. This is in line with the original gravity model theory.

The second variable, present in all gravity models, is the distance between London and main economical centers of the partner countries. The results indicate that distance is not statistically significant. The variable also shows a positive sign of the coefficient. In our assumptions, we state the possibility of distance not having an effect on bilateral trade in services at all. The reason for a positive coefficient may be that the most distant countries in our data set are countries previously linked by colonial ties to the UK (US, Australia, New Zealand). Furthermore, the distance does not constitute a relevant variable in analyzing trade in services, due to the nature of these industries, which do not require transportation.

Exchange rate volatility affects the bilateral trade in services negatively; however, it is not statistically significant. This means that the variable does not predict bilateral trade. The reason for such results may be the short time span of the data, during which time there was little fluctuation in the exchange rates. Furthermore, the majority of countries in the sample are part of the Eurozone, which means that there is no fluctuation of the exchange rate between those countries.

The EU dummy variable is statistically significant at the 0.05 level and shows that being a member in the European Union leads to an increase of 71.6% ($e^{0.54}$-1) in bilateral trade in services. This is in line with our assumptions, considering that EU has lower trade barriers, which encourage overall more trade among member countries. The large percentage increase could also be caused by rapid growth in bilateral trade between the UK and countries that joined the EU in 2004 (e.g. Poland, Slovakia and Czech Republic). Therefore, we expect that if the data was over a larger time span, this effect would be smaller.

Economic Freedom of the World index is also statistically significant with $p<0.01$. The strong positive relationship between EFW and the bilateral trade in services indicates that the countries that are more economically open (more freedom) both import and export more

services. This is also in line with our assumptions, given that the increase in the index implies more economic freedom within the countries policies and institutions, which should boost trade.

Service Trade Restrictiveness Index is also statistically significant with $p<0.01$. The coefficient estimate is negative, in line with our assumptions. The result indicates that the more trade barriers to imports and exports of services, lead to lower bilateral trade in services. Therefore, greater economic restrictiveness to trade leads to countries exporting and importing fewer services.

Adjacency showed a negative coefficient estimate and was not significant. This means that whether UK shares a (sea or land) border with the partner country does not have an impact on bilateral trade in services. Such possibility was mentioned in the assumptions. This shows that geographical location overall (including distance) does not influence trade in services.

5.4 Trade Potential

5.4.1 Trade Potential Methodology

In this section we will estimate the potential trade values for 2000-2012 data and compare them to the actual values, in order to determine whether the trade volumes have been underused or overused. There are two methods that prevail when calculating the trade potential, particularly the use of point estimated coefficients and speed of convergence. Given the criticism of the former method by Egger (2001) over its high uncertainty, we decided to follow the latter approach. We use the formula given by Jakab et al (2001):

$$Speed\ of\ Convergence = \frac{average\ growth\ rate\ of\ potential\ trade}{average\ growth\ rate\ of\ actual\ trade} \times 100 - 100 \quad (8)$$

The above formula takes into account scenarios, where the trade potential may be smaller than actual trade, in which case the speed of convergence will be negative. Thanks to the increased accuracy (this method allows for the flexibility of data), speed of convergence method is preferred over the point estimates method. As stated in Jakab et all (2001), the

negative speed of convergence does not reflect the convergence of potential and actual trade, which is why we will also look at the difference between the actual and potential trade values, as given in the formula below.

$$\Delta Trade = potential\ trade\ value - actual\ trade\ value \qquad (9)$$

If the speed of convergence value sign and the ΔTrade value sign are different signs (one positive and one negative), then we can observe a convergence. If both signs are the same (both positive or negative), we can observe a divergence. If the result for the countries is convergence, then those countries will have a high potential for increasing bilateral trade with the UK. If the result will be divergence we will examine whether the countries are currently overtrading or if the potential is restricted.

5.4.2. Trade Potential Estimation

To estimate the formulas given in the section above (Trade Potential Methodology), we use equation (7) to calculate the trade potential. We also take the average growth rate of the actual trade values based on the 2000-2012 OECD data.

The results of the trade potential are given in Figure 20. On the right-hand side in column named 'Result' we captured whether we observe a convergence (1) or divergence (0). The results show that the UK has the convergence in trade with all the countries studied (EU, OECD, BRICS), which means there is trade potential and therefore an opportunity to grow trade with these countries.

Figure 20. Trade potential between the United Kingdom and foreign partners

County ISO Code	Actual Trade	Potential Trade	Speed of Convergence	Difference between actual and potential trade	Result
AUT	2,236	2,126	5.22	-110.87	1
BEL	7,535	2,188	244.38	-5,346.81	1
CZE	1,268	2,067	-38.67	799.42	1
DNK	5,088	2,029	150.80	-3,059.37	1
FIN	2,386	2,011	18.62	-374.49	1
FRA	26,923	3,729	621.96	-23,193.79	1
DEU	26,338	4,453	491.43	-21,884.68	1
GRC	4,898	2,107	132.49	-2,791.40	1
HUN	1,182	2,011	-41.21	828.67	1
IRL	16,177	2,003	707.50	-14,173.80	1
ITA	13,091	3,563	267.46	-9,528.50	1
LUX	3,086	1,876	64.48	-1,209.99	1
NLD	17,706	2,443	624.68	-15,262.98	1
POL	2,820	2,412	16.89	-407.47	1
PRT	3,525	2,073	70.05	-1,452.19	1
SVK	407	1,938	-79.00	1,531.43	1
ESP	21,785	3,018	621.75	-18,766.76	1
SWE	8,878	2,155	312.07	-6,723.86	1
EST	154	1,866	-91.76	1,712.57	1
SVN	161	1,890	-91.51	1,729.51	1
LVA	258	1,874	-86.24	1,616.20	1
LTU	308	1,892	-83.73	1,584.30	1
CAN	6,094	2,943	107.07	-3,150.77	1
CHL	345	2,069	-83.34	1,724.06	1
ISL	350	1,855	-81.14	1,504.74	1
ISR	1,459	2,020	-27.79	561.44	1
JPN	10,734	5,481	95.85	-5,253.34	1
KOR	1,929	2,988	-35.43	1,058.46	1
MEX	1,203	3,167	-62.02	1,964.27	1
NZL	1,285	1,953	-34.20	668.14	1

NOR	4,828	2,063	133.97	-2,764.47	1
CHE	13,182	2,162	509.71	-11,020.25	1
TUR	2,932	2,725	7.62	-207.53	1
USA	74,915	14,089	431.73	-60,826.33	1
BRA	1,487	3,918	-62.04	2,430.46	1
RUS	3,401	3,919	-13.23	518.41	1
IND	4,972	11,505	-56.78	6,532.93	1
CHN	4,238	9,612	-55.91	5,373.87	1
ZAF	3,933	2,307	70.46	-1,625.64	1
AUS	8,475	2,556	231.52	-5,918.47	1

Note: 1 - convergence, 0 – divergence

We can observe that while actual trade is higher than potential trade predicted using our regression in most EU countries, there is an untapped trade potential for Eastern and Central European countries such as Hungary, Czech Republic, Slovakia, Slovenia and the Baltic States. We can also observe an untapped trade potential in most of the developing BRICS economies, particularly China, India, Russia and Brazil. The actual trade in South Africa is higher than the potential trade, which could be explained by the colonial ties of UK to its trading partner.

In terms of overtrade situation in some major countries, USA, Spain, France and Germany present the highest numbers of actual trade being larger than the potential trade. The main reasons may be the promotion of investment, sizes of the economies, developed services trade, high level of English language in all those countries and geographical proximity of the European trading partners.

We were also interested to see the time of convergence for some of the economies which can be calculated in the following way:

(10)

This calculation produces an absolute number – time (which cannot be negative). Thanks to this formula we can observe that the most potential countries (countries, which bring the actual trade value to the potential one the most quickly) have higher speed of convergence and smaller difference between actual and potential trade.

Figure 21. Top 10 countries with smallest time of convergence

	Country ISO Code	time of convergence
1	ISL	-18.54588881
2	EST	-18.66341514
3	LVA	-18.74042902
4	LUX	-18.7647314
5	SVN	-18.90044126
6	LTU	-18.92142414
7	SVK	-19.38427322
8	NZL	-19.53451229
9	IRL	-20.0335369
10	HUN	-20.1067165

As seen in Figure 21, the time of convergence is the quickest for countries in the EU, all countries in the table are in the EU with the exception of New Zealand. The exception is most likely due to the colonial ties with the countries and smaller language barrier. The small time of convergence may be caused by the level of integration within the EU. Leaving the EU, could lead to larger time of convergence for the UK and some of these partners. Nonetheless, depending on the method of exit, UK could significantly and quickly improve trade in services with Iceland and New Zealand.

Figure 22. Top 10 countries with largest time of convergence

	Country ISO Code	time of convergence
1	USA	-140.8913522
2	IND	-115.0500563
3	CHN	-96.11641286
4	JPN	-54.80658425
5	DEU	-44.53242556
6	RUS	-39.19026595
7	BRA	-39.17694944
8	FRA	-37.29129181
9	ITA	-35.62572446
10	MEX	-31.6727442

As seen in Figure 22, the time of convergence for countries such as Russia, India and China is long, which could have been caused by a smaller institutional convergence, smaller economic integration between the UK and these trading partners, as well as the developing nature of these economies. According to the STRI index, those are also countries with the most barriers to trade in services. Furthermore, when measured by the EFW index, these are also countries with markets less open economically than most countries in the EU. However, these are also very populous countries, which mean that even if time of convergence is large, the benefits may be highly lucrative.

5.5. UK exit scenarios analysis

Having analysed what affects the international trade in services and establishing the potential in trade that has not been used utilised by the UK with its partners, we focus on the Brexit scenarios. To capture the effects of Brexit on the UK economy we take a few assumptions:

1) The effect of Brexit on change in GDP is in accordance with the LSE and PWC studies. As discussed in the literature review, both the studies analyse the effect on the British economy depending on the EU exit scenario that will be negotiated. The change in GDP used is presented in the Figure 23 below:

Figure 23. Different scenarios effects on real GDP

Brexit Scenario Model	Norway	Switzerland	Canada	WTO
Effect on real GDP	-1,28%	-1.30%	-3.10%	-5.50%
Source	LSE	LSE	PWC	PWC

2) The effect of Brexit on trade in services measured by the Service Trade Restrictiveness Index (STRI). This effect will be measured by using the STRI of Norway, Switzerland, and Canada as proxies for the scenarios. For WTO, we took the average of the BRICS and the USA STRI as a proxy for the change in trade barriers for services. The reason for using BRICS and the USA is because of high trade of these economies with the UK as well as the economic openness of these nations (USA is one of the most liberalized markets).

Figure 24. STRI in different scenarios based on country proxies

Brexit Scenario Model	Norway	Switzerland	Canada	WTO
STRI	0.295	0.308	0.223	0.346
Source	OECD	OECD	OECD	OECD

3) The effect on bilateral trade in services will take place after the formal departure of UK from the EU, which is expected to happen in 2019. We also assume that by then UK will negotiate a trade deal with the EU. If not the WTO scenario applies.
4) The forecast of the GDP of all countries excluding the UK will grow at a rate calculated based on the exiting trends estimated through regressions of each country performed on the 2000-2012 data (see appendix 9.4).

Solving the gravity model equation using the regression results we estimate the effect of STRI and the change in GDP on the bilateral trade in services for the UK with its EU partners. As seen in Figure 25, the WTO scenario would lead to a highest bilateral trade in services drop of 30% in the short term. This is likely because of the high decline in UK's GDP estimated by PWC, as well as the large service barriers imposed under the MFN system of WTO. Under the Norway model the decrease in bilateral trade in services is the lowest, however the number still reaches 18%. The Switzerland model seems to be a more attractive scenario than the Canada model, as the decline in bilateral trade would be 5% smaller. These results are short-term; the high impact is due to a shock effect, which we expect to diminish in the long-term. According to these results, the UK should aim at negotiating a FTA similar to that of Switzerland and Norway in terms of trade barriers. However, to satisfy the wants of the British people in terms of border control regulations as well as the membership fee to the EU, the Canada model would be a more appropriate choice politically. Thus, we conclude that the shock effect for the new FTA will lie somewhere in between -18% and -23%.

Figure 25. Change in bilateral trade in services between UK and EU based on the exit scenarios in 2021

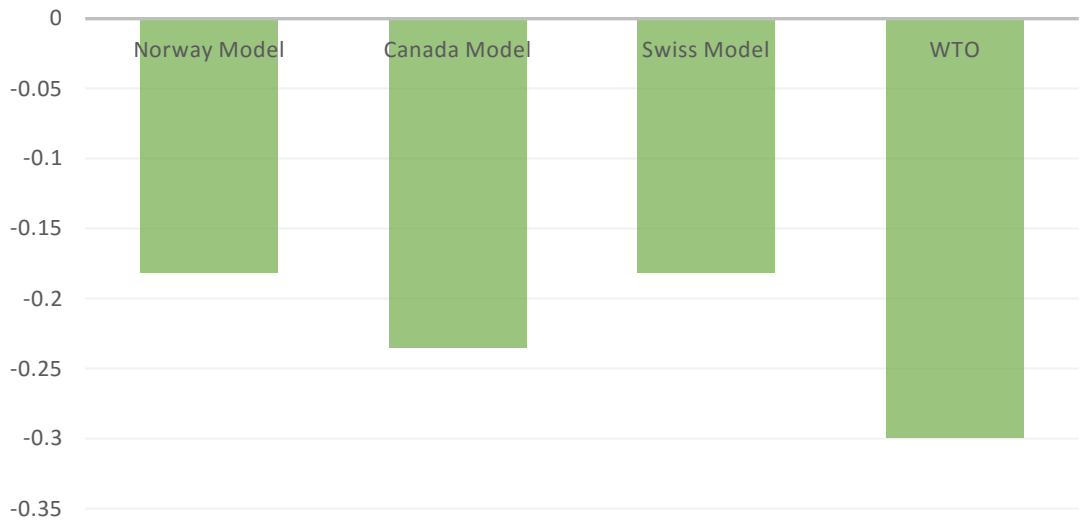


Figure 26. Change in bilateral trade in services between UK and EU based on the exit scenarios in the near term (2017-2021)

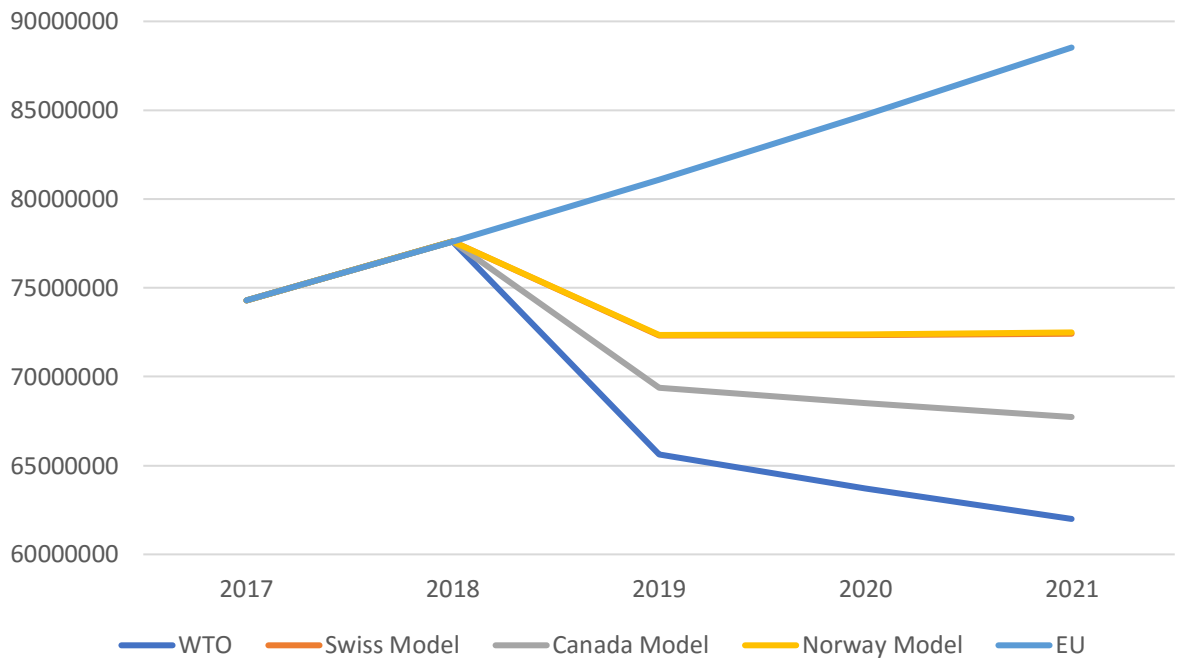


Figure 26 illustrates the changes to bilateral trade in services between the UK and the EU using different scenarios across years 2017-2021. The changes can be seen taking effect in 2019, as we assume a trade deal will be negotiated at the same time as the formal departure

from the EU is negotiated. The graph shows that there will be a sharp decline in bilateral trade in services immediately after departure. The Switzerland model presents numerical values very close to the Norway model, which is why the (orange) line on the graph is represented under the Norway Model (yellow line). The Norway and Switzerland models predict stabilization in the short term, while the Canada and WTO show a continuous decline in bilateral trade in service over time. By looking at the overall change in bilateral trade in services over time, it is clear that the Norway and Switzerland models would benefit trade in services the most.

When looking more closely into the country groups, it can be observed that the bilateral trade for the UK will also decrease for other country groups (not only for the EU trading partners) such as OECD and BRICS. OECD countries comprise of almost all the EU countries, which is why it is expected that the bilateral trade would be moving in similar direction. It can be observed that the effect is slightly offset by the bilateral trade with other developed economies. The bilateral trade in services of UK with BRICS economies will also be affected by the exit from the EU, however given the growth of these economies, it is expected that as soon as the initial economic shock settles in 2019, the bilateral trade will continue to grow regardless of the exit scenario.

Figure 27. Change in bilateral trade in services between UK and EU based on the exit scenarios on short term (2017-2021)

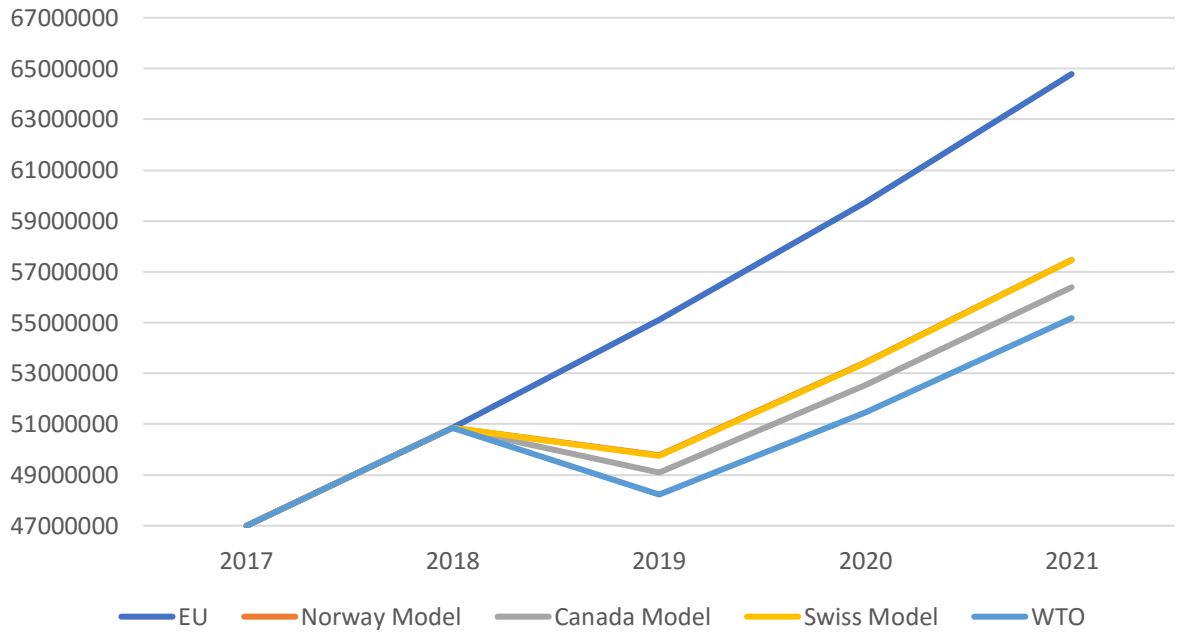
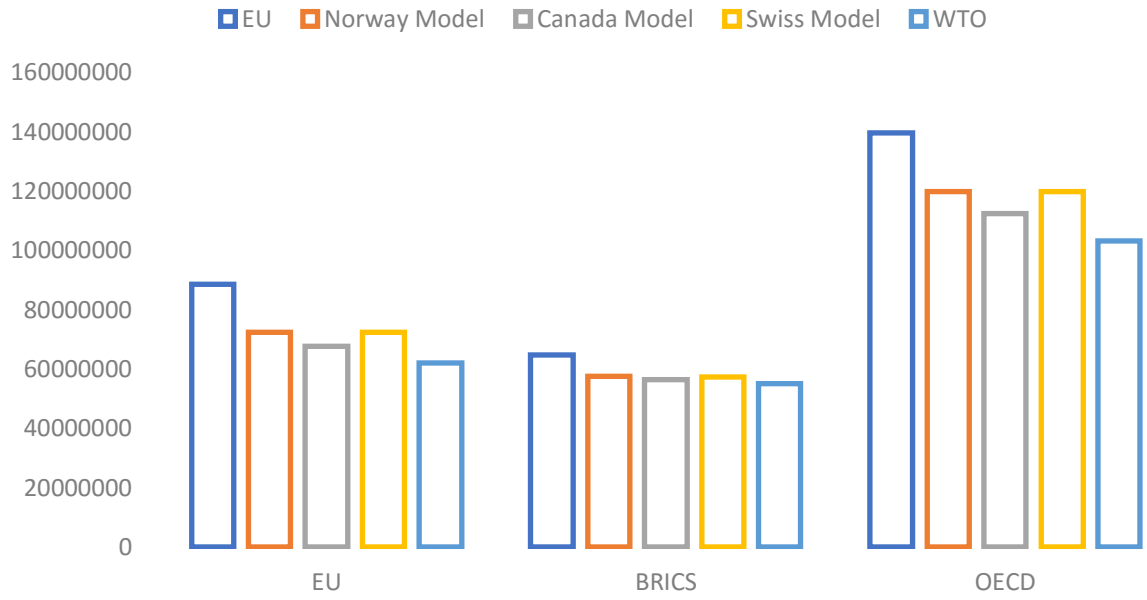


Figure 28 illustrates a comparison of the country groups according to a model. The preferential exit model for bilateral trade in services is either the Norway model or the Switzerland model, which is mainly due to the access to the single market that these options offer. WTO is the most expensive scenario as it imposes additional trade barriers. However, WTO model is not very significantly less attractive when looking at the trade with BRICS. This is because most of these countries trade under the MFN rules.

Figure 28. The exit scenario on bilateral trade in services based on country groups in 2021

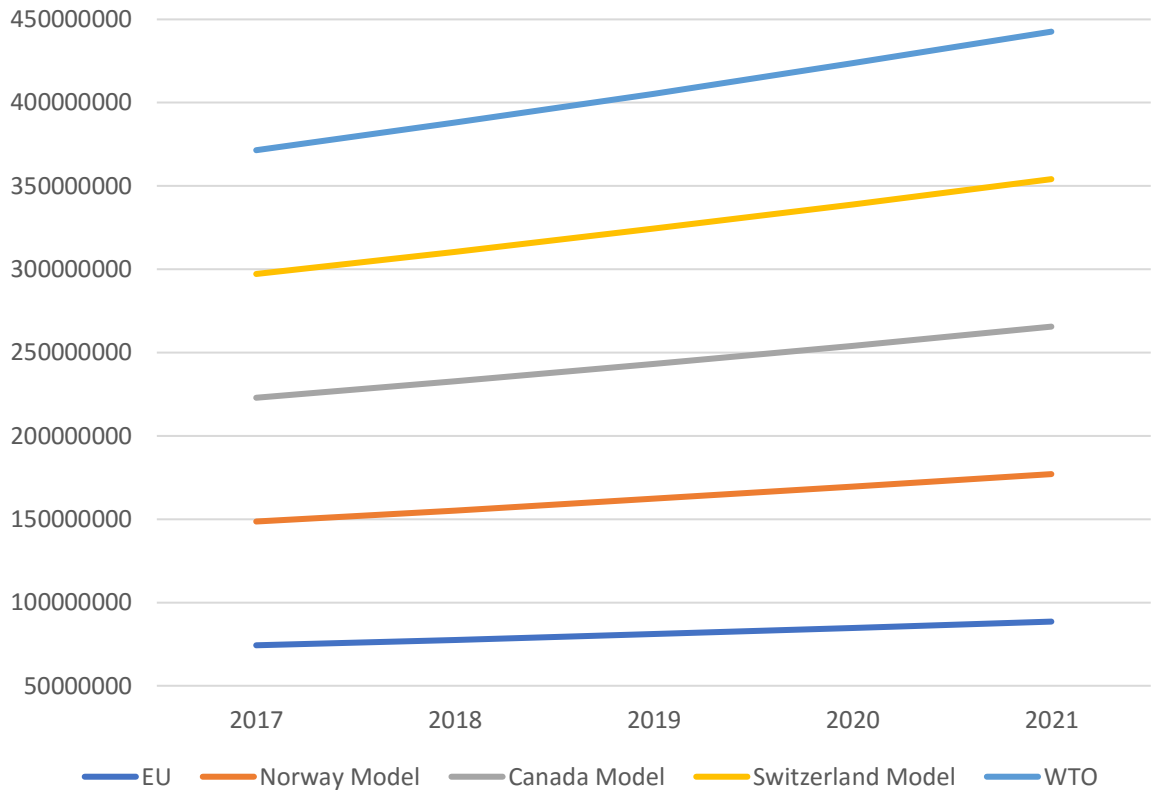


We have looked at two cases for future prediction. The first case included both the GDP change, as suggested by PWC consultants and LSE scholars, and the STRI. The second case focused only on controlling the STRI and assuming that GDP grows at the same rate based on the growth trend in 2000-2012 estimated through regression analysis.

Figure 29 represents the exit scenarios assuming no change in GDP growth. In this case we only controlled the Service Trade Restrictiveness Index as a proxy to barriers to trade in service. The graph presents the Switzerland model as the preferential model in terms of bilateral trade in services, while the Norway model is second to the last in terms of value of trade. This is caused by the different STRI levels of Norway, Switzerland, Canada and nations trading under the WTO rules. We present these results in order to show that the bilateral trade in services of the UK will highly depend on the negotiated tariff and non-tariff

barriers. We expect that the higher the cost of trade the higher the negative impact on the volume on trade.

Figure 29. The exit scenario effects on bilateral trade in services between UK and EU assuming no change in GDP



Based on the analysis above, we conclude that the most preferential model in terms of the impact on bilateral trade in services would be the Norway and Switzerland models. Given the nature of the agreements that Switzerland and Norway have with the EU, it is not a model that would be suitable for the United Kingdom. We believe the terms of the FTA to display some characteristics of the Canada model due to the requirements of stricter border controls. Given the geographical and cultural proximity of the UK to EU, we expect that the government will be willing to pay some fee to the EU, in order to have a seat on the council (even if they will not have a voting power). Since the EU is UK's largest trading partner, we foresee the negotiations to focus on keeping the trade restrictions low, in order to encourage businesses to continue trading to benefit both parties. The results are only an approximation of the impact of Brexit on bilateral trade. Given the uniqueness of this situation and the size of the British economy, the FTA will most likely differ to some extent from the models proxied by other countries.

6. Discussion

6.1. Limitations

As with any empirical studies, there are many limitations that we have encompassed. First of all, the data availability for services is very poor. We have collected data on bilateral trade in services from OECD EBOPS 2000 and 2010. The data is only available for the 12 years (2000-2012). The reason for such poor data is the complication of tracking it. If the study had been done collecting the exact data from the different statistical department in each government, there is a chance the study would be more accurate. Unfortunately, contacting every department would take a very long time. The data for trade in goods is much better due to the ease of collecting at the border tariffs on goods. This is probably the reason why so many studies have focused solely on trade in goods.

Furthermore, the current data on services only takes into account supply mode 1 and mode 2. OECD does not currently collect data on commercial presence and the presence of natural people. The data available only covers OECD countries, of which the majority is in the EU, and some other major economies such as the BRICS. Unfortunately, we had to exclude Malta, Romania, Croatia, Cyprus and Bulgaria, because even though they are members of the EU, the OECD database does not currently provide information on their bilateral trade with the UK. However, since these countries have joined the EU rather late (e.g. Cyprus joined in 2013), we did not think excluding them will have a significant effect on the study.

The second major limitation is the use of Service Trade Restrictiveness Index. The Index is currently only based on some industries, while exclude others such as investment banking. Nonetheless, STRI is the most comprehensive index on non-tariff barriers to trade in services. The alternative would be to create a new index, however there is a large probability it would not be as good of a representation of reality as the one offered by OECD.

Third major limitation to this study has been the gravity model itself. Many academics argue that it is not the most accurate model for predicting trade. It is essentially based on a Newton's model, where arguably the law of physics works in a different way than does the law of trade. Mele and Baistrocchi (2012) claim that the 'most critical problem with the model is defining the parameters involved in Newton's original formulation'. In their study

they also mention that the model is based on an 'incorrect result of the logarithmic transformation of the gravitational constant'. Additionally, there are more variables that could be included in the model. Given the scope of our research and the desire to decrease collinearity as much as possible, we focused only on a few of the many possibilities. This means that the model can be very easily adapted to whatever the researcher wants to show and may not fully represent the reality of trade. Furthermore, as argued by Theie (2004), there is a possible reverse causal relationship. In our assumptions we argue that higher income (measured by GDP) will lead to more trade, but there is a possibility that more trade leads to higher income. This could be especially important given that as economies are shifting from manufacturing to informational economies (more focused on trade in services) the nations are becoming wealthier.

Another limitation to this study is the fact that we do not analyze the bilateral trade with all the countries in the world. This means that the study is not an accurate representation of UK's trade. Nonetheless, we argue that given the scope of the study and the data available, the results are a good representation of UK's trade in terms of EU.

This study also does not include the political influences and events that may impact trade volume; it only focuses on the purely economic effects. This is largely to the difficulty of measuring political effects as opposed to the economical ones. However, we do expect politics to play a major part in the UK leaving the EU. Particularly, there is a sound possibility of the Scottish referendum on independence from United Kingdom taking place following the enactment of the Article 50 of the Lisbon Treaty, which will definitely change the volume of trade significantly. Furthermore, politics will affect the negotiations on the exit strategy, which is why the current scenarios presented in this study are to some extent an oversimplification.

Another limitation is that we are unable to compare the current data (with the UK in the EU) to what the trade volume was before UK joined the EU. The reasons for that are multiple. First of all, the data before 1970s is not available for most countries. Second of all, given the changes in the world such as technology (e.g. internet), growing interdependence between countries, more borderless economy and the fast communication, comparing the world today to the one over 40 years ago would not yield the desired results.

The limitation to the exit scenarios effects is the use of the forecasts of the GDPs for years 2017-2021. Firstly, we assumed that the growth of the countries (excluding UK) GDP will be based on the existing trends estimated through a regression of the 2000-2012 data. This is a limitation due to the short time span of our data and the fact that we use historical data to predict the future. Secondly, we assume the growth (decline) of the GDP based existing literature and reports of PWC and LSE. The limitation of this point lies in the assumption on the validity of the existing studies.

Finally, our analysis focuses mainly on the changes in trade between the UK and the EU. We do not analyze in depth the bilateral agreements UK may negotiate with other large trading partners such as China, India and United States. Given the growth of the developing economies, the bilateral trade between them and the UK may increase leading to an increase in the overall GDP.

6.2. Further research

Further research into the effects of Brexit on the UK, the EU and the rest of the world is vital, as the current research is very limited. Researchers should look into estimating the effects of the Scottish vote for independence as well as investigate other variables that may affect bilateral trade between the UK and other nations. The future Brexit studies should also examine the effects on the financial services industry. However, academics need to keep in mind the existing gap in the available database on the exact trade volumes in some industries such as banking.

Future research should also focus more on continuously adapting the gravity model to changes in the environment. Particularly, scholars should investigate the model's significance when estimating bilateral trade in services, as they are becoming ever more significant (growing volume). As seen based on our study, as well as on others before, distances seem to not play as important of a role for services as they do for goods. Therefore, the use of distances as an independent variable may need to be abandoned. If so, the gravity model becomes obsolete and should be replaced by a more innovative approach.

7. Conclusion

This thesis aims to investigate the economic effects of Brexit on the bilateral trade in services between the UK and its main trading partners, focusing the attention on the trading relationship of the UK with the EU. In order to estimate the effects on bilateral trade, in this research has been applied the gravity model of trade, altering the original model to include trade in services instead of trade in goods, as well as variables such as STRI and EFW.

The result of the gravity model application indicated that the effects of the European Union on bilateral trade in services are estimated to be 71.6%. The OLS regression illustrated that an increase in barriers to trade by 0.1 in the STRI leads to a decrease by 7.25%. Furthermore, the size of the economy was the most significant factor affecting bilateral trade, suggesting that a 1% increase in the sum of the GDPs will lead to a 1.8% increase in bilateral trade in services. The findings also indicated that distance, adjacency and exchange rate volatility do not have a significant influence on bilateral trade in services.

Based on the gravity model results, it has been performed a trade potential analysis, which indicated that the UK has untapped trade potential with BRIC economies, which suggests that the UK could negotiate preferential trade agreements, which in turn could offset the negative effects of Brexit. However, the results also showed that BRIC economies present the longest time of convergence. Time of convergence is the quickest for members of the European Union, possibly due to the high degree of integration within the EU that is the reason a trade deal with the EU would result in the quickest trade gains.

The short-term effects of Brexit on bilateral trade in services are estimated to have an overall negative effect. The Switzerland and Norway Model present the least detrimental effects, however those are also models which require payments to the EU budget and free movement of people. Those conditions would, however, be against the will of the British people, as they have been the main promises of the leave campaign. We do acknowledge that the UK will negotiate a deal differing from the existing agreements and therefore the effects may alter, depending on the conditions negotiated.

The presented findings are subject to certain limitations. It is imperative to recognize that some of the data is based on other scholars' and consultants' research findings. Furthermore,

the bilateral trade in services data is not as detailed as data on trade in goods. There are also other factors that may influence the results such as the Scottish Independence Vote, Londependence and the future of Northern Ireland and Gibraltar. Moreover, there is a need for a comprehensive model that would be more tailored to analysing services data. Thus, further research is required to both analyse trade in services worldwide, as well as the effects of Brexit.

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9. Appendix

9.1. History of the economic relationship between the UK and the EU

The United Kingdom has always 'had a 'vis-à-vis' position with the European Union, which has historically been determined by an intricate interplay between political and economic interests' (Bank of England, 2016 and Jensen et al, 2016). Ever since the British Empire has been created, the nation worked to strengthen its position in the continent and worldwide, through raising funds, engaging in wars to gain political power, built colonies and aimed at becoming a trading actor. Following World War II, European countries shared similar views on political peace in the region. In order to push the continent into a quick economic recovery and to assist in the implementation of the Marshall plan, 16 European countries participated in a joint conference and established the Committee of European Economic Cooperation (CEEC) in 1947. In 1948, the countries signed a Convention to establish the Organization for European Economic Cooperation (OEEC). The aim of both CEEC and OEEC was to raise funds to speed up the reconstruction process and collectively boost the economic growth of the region. In 1950, the OEEC was substituted with European Payments Union (EPU), which allowed for an easier process of converting European currencies by setting up exchange rates based on real economic scenarios of the 18 signing countries. The EPU ensured stability of exchange rates and encouraged free trade among its Member States. The EPU was later (in 1958) substituted by the European Monetary Agreement (EMA). To secure further economic integration, European countries engaged in multiple other agreements. The first supranational authority was European Coal and Steel Community (ECSC) signed in 1951 (Dedman, 2009), which later became what we now know as the European Union.

The initial member countries were Belgium, France, West Germany, Italy, the Netherlands and Luxembourg and by the end of 1950s these countries formed the European Economic Community (EEC). Great Britain was not a founding country and together with Denmark, Ireland and Norway was vetoed against joining in 1961 by France. In order to ensure an agricultural policy favorable to France and to consolidate the EEC's position with respect to the USA, Charles De Gaulle imposed a veto to UK's membership despite being Britain's commercial partner and political ally (Parr, 2006). The same four countries applied for a membership in the EEC again in 1967, when George Pompidou lifted France's veto. In 1970, the official negotiations for the common agricultural policies began and by 1973 UK, Ireland

and Denmark became member of the EEC (Parr, 2006). The goal of the organization was to create a supranational authority, which would not be affected by political changes of a single nation. Each member was required to transfer the decision making on certain economical policies to the organization. In case of lack of compliance, the country not cooperating was to be sanctioned (Dedman, 2001).

In 1957, the members of ECC signed the European Atomic Energy Community (EURATOM), whose purpose was to create a special market for nuclear power in Europe. This organization is legally distinct from the EU and currently has 28 members (EU and Switzerland). The three presented authorities ECSC, EEC and EURATOM were independent authorities in charge of different aspects of common trade regulation among its member countries. The ECSC regulated the trade of Coal and Steal, the EEC oversaw the custom unions and the EURATOM had power over the regulation and integration of the nuclear energy sector.

In 1970, the members of the above organizations established the European Political Community (EPC), as an attempt to create a common foreign policy and a common defense strategy. The presence of the UK in the EPC, guaranteed a favourable position of the Western European countries with regards to the United States of America, and thus towards NATO, rather than towards a common strategy with the Union of Soviet Socialist Republics (Dedman, 2001). At the time, the focus of the western European countries was to create the possibility of free movement of people within the borders of the member countries. As a result, in 1985, some of the member countries signed the Schengen Agreement, as a gradual creation of a borderless region and lifting passport control (Cunha et al., 2015).

In 1992, the development of Western Europe toward a unified economic, social and political area continued with the Maastricht Treaty, which lead towards the creation of three new authorities. First and foremost, the aim was to unify the three economic communities under one, the European Community (EC). The second authority formed a foundation for a justice organ, the Justice and Home Affair (JHA). Finally, the third authority was formed under the name of Common Foreign and Security Policy (CFSP), which acts as a defense organ of the EU (Blair, 2012). These three authorities became the pillars of the European Union, regulating the economy, politics and justice in the region.

The European Union was formally established in 1993 under the Maastricht Treaty. In 2002, 12 member nations replaced their currencies with Euro. Since then, the Eurozone has moved to include a total of 19 countries. In 2004, the EU experienced the most significant enlargement of the membership countries, as it moved to include post-soviet economies, namely Poland, Estonia, Lithuania, Latvia, Slovakia, Czech Republic, as well as Slovenia, Malta and Cyprus.

UK has always played a very important role in the European Union, however always keeping the relationship at an arm's length. The nation opted out of the Schengen Treaty in 1999 (together with Ireland) and still exercises the passport border control. "The United Kingdom and Ireland may continue to make arrangements between themselves relating to the movement of people between their territories ('the Common Travel Area') "(Treaty of Amsterdam (1997), Art. 7A, Art. 2, p. 97). Thus, UK enjoys a different legislation toward the free movement of people, with respect to other EU countries. This legislation does not however affect the freedom of movement of people, which is one of the four freedoms of the EU. Under the EU laws, citizens of EU and UK have the right of entry, right of residence, right to work, social security rights, right to do business and provide services, consumer protection and passenger rights, right to non-discrimination, voting and political rights and access to all EU institutions.

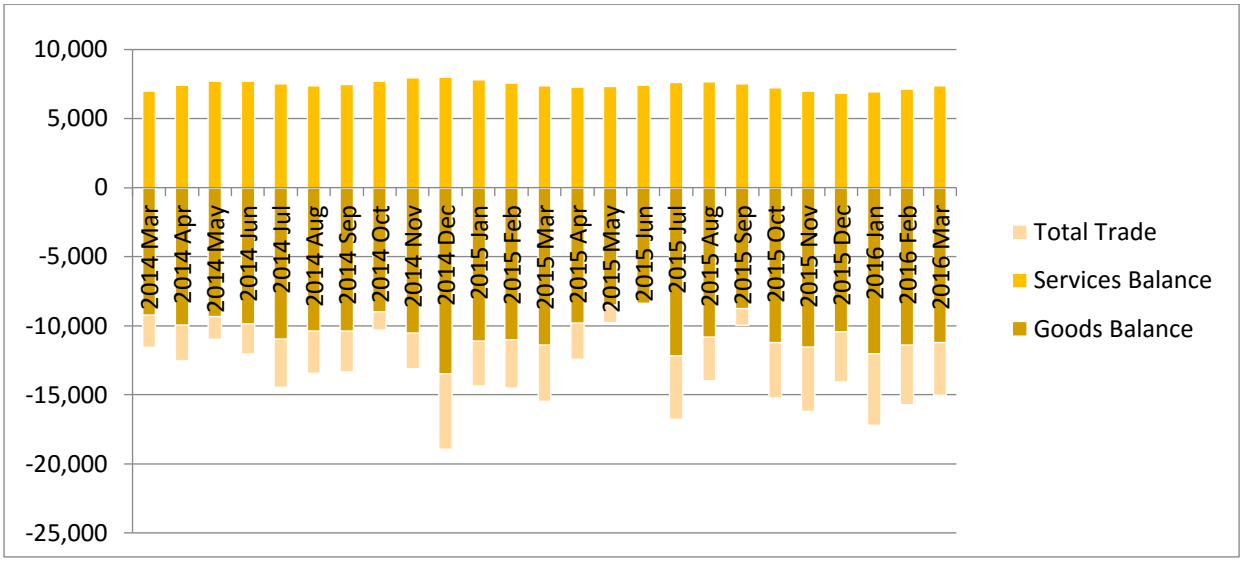
Furthermore, the UK did not join the Eurozone and decided to keep the sterling as its national currency instead. Nonetheless, it was a central actor for forming the European Union thanks to its large population and therefore a large economic market. The political ties of the UK to United States, has allowed for a quick economic reconstruction of the western side of the European continent, which now is an independent, strong economic area. The economical help provided by the United States after the Second World War boosted western European economy, and encouraged the development of Free Trade Agreements (FTAs) among different economic areas.

9.1.1. Trade in Services between UK and EU

The UK's economy is largely shaped by the trade in services, which is the reason of this research focus over service sector. Currently, services account for 79% of UK's gross domestic product with business and finance services accounting for over 40% of all services

(ONS, 2016) . According to the ONS data (Office of National Statistics in the UK), between 2014 and 2016 UK has been mainly exporting services and importing goods from its trading partners. Figure 30 illustrates the trade deficit position of the country in terms of goods and services

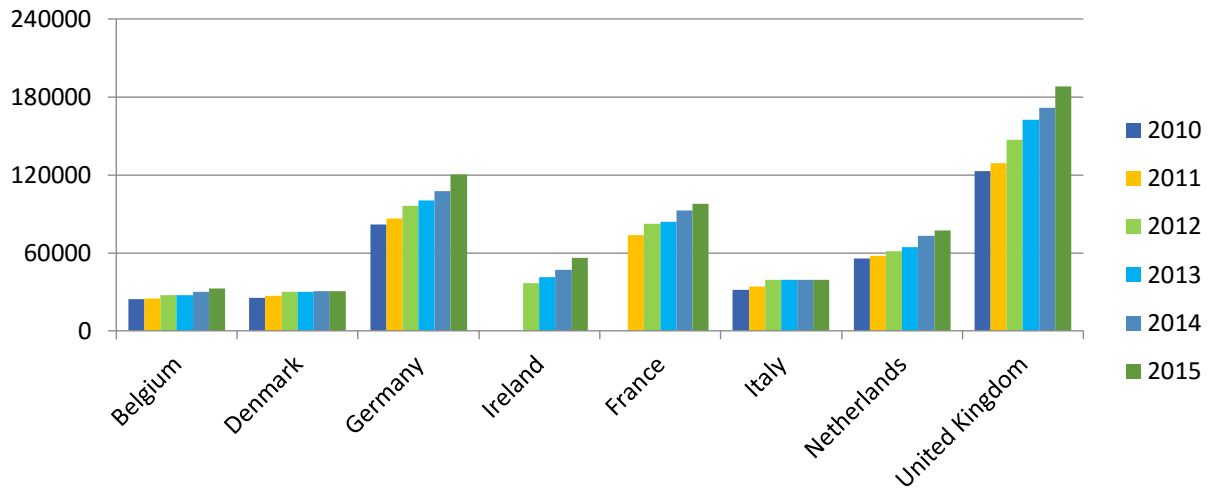
Figure 30. UK's Goods, Services and Total Trade Balance 2014-2016



**Source: Office of National Statistics 2016*

Taking a deeper look at the service trade between EU Member States (intra-EU trade), the UK accounts for the largest amount of services exports to other EU Member States, with 123 billion euros in 2015, followed by Germany and France both with 118 billion euros, as seen in Figure 31. On the other hand, in imports of services Germany has the highest amount of services imported by other member countries, with imports valued at 151 billion euros, in front of France that imports services for the value 125 billion euros. UK's services imports are valued at 94 billion euros.

Figure 31. Top EU services exporter (2010-2015)



**Source: Eurostat 2015*

The two leader countries in export and import of service within the EU are also the leaders in the services trading with non-EU countries. This provides the importance the EU as the main exporter of services inside and outside of the economic region. The UK's position as a top service exporting country has been developed through careful negotiations within the EU members and with EU's external partner countries.

One of the biggest advantages of the EU is its single market, within which the EU enforces mainly non-tariff barriers for the services sector. The European Market Access Database distinguishes between different types of services: Communication (including postal services), Construction, Distribution, Energy, Financial, Transport and Recreational (including news agency services). Those services present specific regulation for discriminatory treatment, subsidy grant, documentation practices and specific requirements for the financial service activities. Although, the non-tariff barriers are still in force, which means the market is not completely self-regulated, the import and export of services has increased overtime allowing for the application of new technologies in service market, which essentially make them available for the consumers and bring down the costs of providing such services (Deardorff, 2000).

9.2 Brexit

Many argue that the existence of the European Union should in many respects be attributed to some of the charismatic figures of the 50s and 60s such as Winston Churchill. The British Prime Minister, who led the UK to the victory of World War II, has expressed in his speech at the University of Zurich the willingness to create a "European Family". His idea was to stablish the "United States of Europe", where countries, like states, would work together on guarding a universal peace in the region.

It is no surprise therefore, that Great Britain was one of the leading countries pursuing a European integration and a real hope for united future. The economic prosperity of the west has been one of the contributors to the end of the Cold War and the fall of the Berlin Wall. The union boosted the growth of the economies, increased the degree of integration in terms of politics, economics and even culture. The growth of this supranational authority led to the creation of numerous symbols, whose aim was to further integrate the society. Over time the EU gained a flag, an anthem, the idea of the citizenship, a capital in Brussels and a common passport policy (Polyakova & Fligstein, 2013). Some scholars argue that the creation of common identity in the EU was forced and did not lead to an increase in 'Europeaness' but on the contrary led to the increase in the nationalism within the citizen of certain member countries such as Greece, Italy or France (Polyakova & Fligstein, 2013). Polyakova & Fligstein (2013) argue that the spread of nationalism can be attributed to the varying interests of the countries and not simply to financial crisis. Citizens of the UK also started to express the want to draw boundaries and to have autonomous control over the policies affecting the UK.

The UK Independence Party (UKIP) is one of the Eurosceptic, nationalist parties born in the early 1990's which has overtime grown to become a strong political power. Nigel Farage was the leader of the party from 2006 to 2009 and then again from 2010 to 2016. On multiple occasions, the political party leader defined the EU as an undemocratic system with the interest in only a few countries, not taking into account the needs of the UK (Dye, 2015). We do realize that the facts are only rarely considered when it comes to the opinions of politicians. The EU is in fact a democratic organization and citizens of the EU have the right to vote for their country's representatives in the union. However, such elections do usually get as large broadcasts as national elections, which is why people often feel uninformed.

Nonetheless, the political opinions of politicians such as Nigel Farage and Boris Johnson have shaped the people's decision to vote the UK out of the European Union.

UKIP is said to be populist in that it 'asserts that there is a fundamental divide between the political establishment and the people' and anti-establishment in that it 'challenges the status quo in terms of major policy issues and political system issues' (Abedi and Lundberg, 2009). The additional prefix 'right-wing' is not often systematically addressed, but has become a commonplace in reference to UKIP's mostly-Tory origins and its positions on immigration and the welfare state (Abedi and Lundberg, 2009).

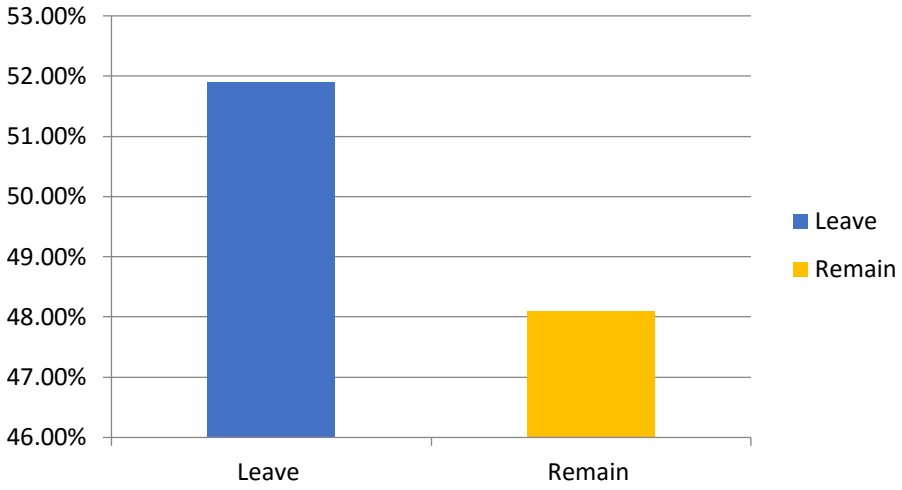
UKIP is part of the family of the Eurosceptic parties, which are growing their influence in the political arena in Europe (Moufahim et al., 2016). Since the thrust of nationalist parties such as the UKIP, a new word in the political-economic vocabulary has been introduced in 2016: Brexit. This word is used to define the event of the UK giving up the membership to the EU, otherwise known as Britain + Exit. On June 23rd 2016, UK citizens were called to vote for the referendum to decide whether the UK should leave or remain in the European Union. This is not the first time UK citizens have the right to vote on the future of their country within the European region. The last referendum in UK history about the political decisions around the presence in the EU had been taken around 40 years ago, in 1975, when the British were called to the polls to decide whether the UK should leave the European Economic Community (EEC); in that occasion UK citizens voted to remain in the community (Glencross, 2015). There were also two other attempts at making the UK abandon the European economic agreements, respectively in 1983 by the Labour Party and in 1993 by the newly formed Referendum Party. Both of the attempts failed, however in 2012, David Cameron, at the time the leader of the Conservative Party, announced that if he won the election he would hold a referendum on the EU membership of the UK. David Cameron won the election and arranged for a referendum in June 2016 (Iyengar, 2016).

In the months running up to the referendum, the public was torn between two campaigns, the stay and leave campaigns. The parties in favor of the union memberships were the Conservative Party, the Labour Party, the Liberal Democrat Party, the Scottish Nationalist Party, Plaid Cymru and the Green Party. The parties in favor of UK leaving the EU were UKIP, the BNP (British National Party), the EDL (English Defence League), the DUP

(Democratic Unionists, Ulster). All in all, the opposite sides were constituted of the liberal, pro-Europe parties and the nationalist, Eurosceptic ones.

Jensen and Snaith (2016) show that in the events following up to the referendum, the economic arguments of the campaigns had no significant influence on the pooling results. Politics was the main determinant of the referendum result, where trade unions, lobbyists and certain interest groups had a direct influence over the choices of citizens. The outcome of the referendum is shown in figure 32 below, with the victory of 51.9% to 48.1% by the leave camp. 71.8% of the active population went to vote.

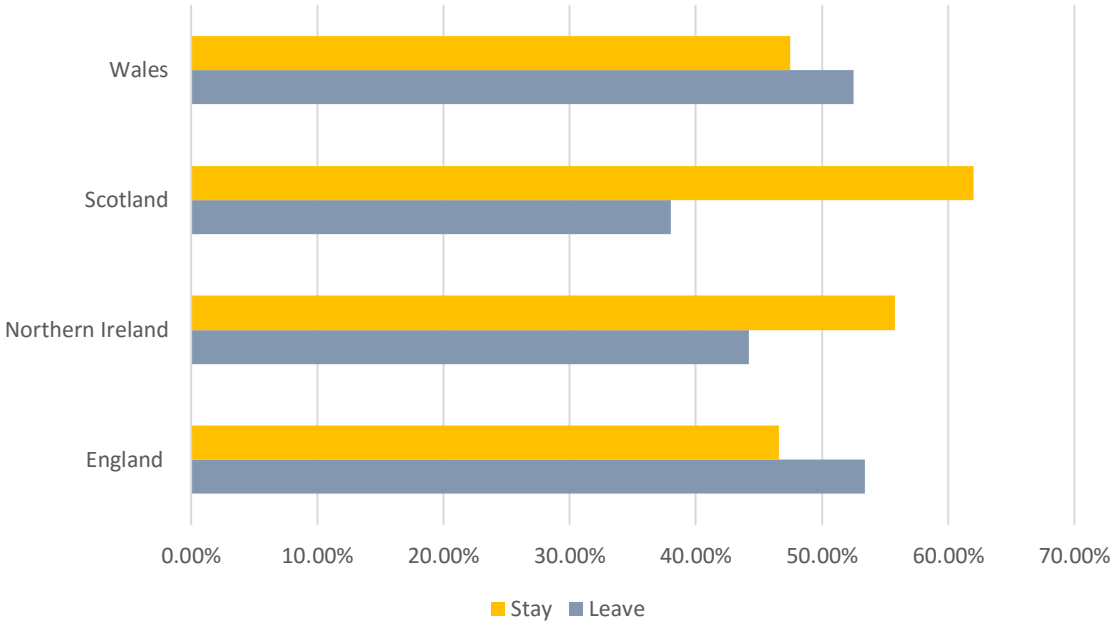
Figure 32. National Pool Result of EU Referendum 23rd June 2016



**Source: http://www.bbc.com/news/politics/eu_referendum/results*

The outcome was a victory of the leave by 51.9% to 48.1% (Figure 32), with a turnout of 71.8% of active population voting. As seen in Figure 33 below, the country was divided with England and Wales voting mainly to leave, while Scotland and Northern Ireland voted to stay.

Figure 33. National Referendum Results June 2016



In the events immediately following the referendum, the British pound (sterling) dropped to a 15% lower against the dollar and by 10% against the euro (Hunt and Wheeler, 2017). According to ONS data, inflation rose to 2.3% in February 2017, while the unemployment has continued to fall and stood at 4.8%, an 11-year low (Hunt and Wheeler, 2017). In view of currency exchange, Brexit news created an economic instability hindering the growth of the country.

UK's departure from the European Union is both a political and an economic event, which brings about image repercussions for the UK, as a safe country to do business and as a gateway to Europe. Apart from the drop in the value of the pound and the increase in inflation, UK risks capital flight. A country with an unstable and uncertain economic policy creates uncertainty among investors, who may pursue opportunities available in more stable markets. Various investments funds, such as the Intermediate Capital Group, consultancy companies as Oliver Wyman and investment associations, such as the Alternative Investment Management Association, have expressed their concern with the UK leaving the EU (Ram and Marriage, 2016). Asset managers working in the UK are proposing to move their business activities to mainland Europe, which is a risk for the existing competitive advantage of London as the economic and financial capital of Europe (Cox, 2017).

Concerns have also been expressed by companies in Japan and Germany, which trade with UK companies. In an open letter to EU and UK, Japanese business groups, which have made various investments in Britain, urged the governments for a "post-Brexit" settlement, which would preserve the integrity of the single market, deliver a smooth transition and avoid creating obstacles to trade and investment (Gordon et al., 2017). Moreover, in a survey by Der Deutsche Industrie und Handelskammertag (DIHK), a German chambers of commerce and industry, 1 in 10 German companies in the UK expressed their interest in shifting investments to other EU states even though the exit agreement is not yet in place (Gordon et al., 2017).

Based on the above, it is clear that until a specific deal is negotiated, the uncertainty in the market will remain and will affect the trade volumes in the UK. There are other political factors such as the intent of the Scottish government to have a referendum on the independence of Scotland from the United Kingdom as well as small (but nonetheless) possibility of a London independence from England or full independence as a city-state.

In 2014, Scotland hosted a referendum on Scottish Independence, with 55.3% votes against it and 44.7% in favor of Scotland gaining independence from the UK (BBC, 2014). The referendum had a record high turnout of 84.5% (Jeavans, 2014). Although the majority of the population voted against Scotland's independence, the referendum resulted to some extent in a greater autonomy from the UK. Scottish first minister Nicola Sturgeon, after the pools, has announced that she intends to hold another independence referendum in autumn 2018 or spring 2019 (Fidler, 2017). On 28 March 2017, the Scottish Parliament voted 69–59 in favor of seeking permission for another referendum on Scottish independence (BBC, 2016). The reason to hold another referendum so soon after the 2014 referendum is Brexit. As seen in Figure 33, the majority of the country voting to remain in the EU. If the referendum will result in the populations' want to gain independence from the UK, Scotland may remain part of the single market. This has happened before in case of Greenland, which in 1985 gained its independence from Denmark and left the European Economic Community (EEC), while Denmark remained (Carrell, 2016). However, the continuation of the membership is not guaranteed, Scotland may risk leaving the UK and still not being a member of the EU. If Scotland does not succeed to retain its membership, it will have to apply to become a member country, a standard accession process which can take many years and may result in costly compliance with EU's regulations. However, since Scotland is already in compliance with

the existing European rules, meeting the membership criteria may be achieved much faster than any other country before (Carrell, 2017). Nicola Sturgeon has also confirmed the possibility of the Norway Model for Scotland (BBC, 2016), to ensure Scotland can continue having access to the single market (Hudson, 2016)

The Scottish Independence opened a Pandora box for the UK, with Northern Ireland and London also expressing the want for independence. Northern Ireland's position is very different from Scotland. While Scotland may have to join the back of the membership queue in the EU, Northern Ireland could become part of the Republic of Ireland, which is already an existing EU member (The Independent, 2017). On the other hand, Londoners urged the Mayor of London, Sadiq Khan, for a vote on London's independence. The Londependence movement calls for declaring London a city-state and joining the EU. London voted overwhelmingly 60% against Brexit, in some boroughs of London such as Southwark 94% voted to remain (The Independent, 2016). Although it is unlikely that England and Wales will remain the only two nations forming the UK and leaving the EU, the chaos around Brexit, will continue to cause a strain on trade and economic growth.

David Cameron, as a leader of a party, which urged citizens to vote for the stay camp, has since left his post as a Prime Minister and his position has since been filled by Theresa May, who's key message to the people of United Kingdom has been "Brexit means Brexit". On 29th of March 2017, Theresa May triggered the Article 50 of the Lisbon Treaty, which is a two-year negotiation time arrange the agreements and the terms for the separation of the UK. If the two parties fail to reach an understanding, following the 2-year period, UK automatically leaves the EU and the parties have to trade with each other based on WTO rules, which are discussed in the Brexit Scenarios section. Theresa May announced that Britain departure from the European Union saying it is "a historic moment from which there can be no turning back" (Cox, 2017). With the Article 50 that has been triggered, the terms of Britain's exit will have to be agreed by 27 national parliaments across the all EU, which is a process that may take more than two years. According to the Lisbon Treaty the negotiation of the exit terms should be concluded in two years, unless the UK and the 27 remaining EU member states agree to extend the deadline for talks. Thus, UK will leave on 29th March 2019.

While the negotiations begin, the UK will still be covered by the EU and will be part of all EU Treaties, however, is not allowed to take part in any decision-making process of the EU. The negotiations are only based on the exit terms from the EU and not on any future trade agreements. Depending on the exit scenario, the UK may lose the access to the single market. The country will also lose all existing trade agreements with any countries outside the union. Some of the key reasons citizens voted to leave the EU were the contributions to the EU budget, migration laws and lack of autonomy on product regulations. The future deal will need to take into account those specific aspects.

9.3. F-test

In order to be absolutely certain of the choice of the regression model, we have also conducted an F-test, to determine whether fixed effects model or pooled OLS model is the most appropriate. The F-test's null hypothesis is that in the model the observed and unobserved fixed effects are equal to zero. Rejecting the null hypothesis means that they are non-zero. If the test is significant, the most appropriate model is the fixed effects model.

Figure 34. F-test

Bilateral Trade	2.490952	1.578275
E	0.035277	0.187823
U	0	0

9.4. OLS regression results of country groups

Figure 35. OLS Regression per Country groups

	EU Countries .	OECD without EU countries	BRICS and South Africa.
GDP Sum	1.00	1.12*	0.55***
	(1.35)	(0.64)	(0.16)
Distance in km	1.28***	-15.28	-1.72
	(0.33)	(18.66)	(1.70)
Exchange Rate Volatility	-0.64	-0.06	-0.25
	(0.40)	(0.13)	(0.22)
EU	0.59***	0.00	0.00
	(0.07)	(.)	(.)
EFW	0.12	0.08	0.49***
	(0.09)	(0.05)	(0.08)
STRI	1.00	-493.19	-4.49
	(1.40)	(580.94)	(3.17)
Border	5.86***	0.00	0.00
	(0.59)	(.)	(.)
Constant	-20.04	238.79	13.88
	(19.77)	(306.78)	(15.18)
Observations	286	169	65
Adjusted R^2			

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

9.5. Country's GDP forecast from 2017 to 2021

We forecasted the GDP values for each of the countries included in the panel by running a regression. The variables regressed are the countries' GDP in the logarithm form and time (2000-2012).

The result of the regression provides us with the growth percentage of the GDP based on the trend of the data in the considered time horizon. For example the growth rate applied to Canada is 4.4% or the one to France is 2.3%. An example of the regression for Austria can be seen below.

lGDP	Coefficient	Standard Error	t	P> |t|	[95% Conf. Interval]	
Time	.0611404	.0162952	3.75	0.001	.0275087	.0947721
Constant	-100.959	32.64774	-3.09	0.005	-168.3406	-33.57735

Prob > F = 0.0010
R squared = 0.3697
Adj R-Squared = 0.3434
Root MSE = .62317

9.6. Change in bilateral trade in services between the UK and OECD countries based on the exit scenarios in the short-term (2017-2021)

Figure 36. Change in bilateral trade in services between the UK and OECD countries based on the exit scenarios in the short-term (2017-2021)