The impact on trade of the Brexit referendum between the United Kingdom and the Commonwealth

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MSc in Economics - Master Essay I

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May 2024

Abstract

The aim of this paper is to investigate the impact of the Brexit-referendum on export trade between the United Kingdom and the Commonwealth countries. The UK has long historical ties with the Commonwealth countries, in addition to its departure from the EU, it is interesting to investigate the British trade policy after Brexit. By constructing a synthetic United Kingdom from the remaining countries in the European Union, namely the EU-15, a counterfactual outcome is created where the leave vote in the Brexit referendum would not have occurred. This is compared with the actual outcome of the export trade to five large economies within the Commonwealth. The findings suggest that the synthetic control units are larger for most of the country-pairs than the treated unit, indicating that the trade would have been higher if the remain vote for Brexit would have won. The results are not robust after running a number of sensitivity tests. The concluding remarks suggest that it is imperative to use other methods and additional data to conclude secure results of future trade policies between the UK and the Commonwealth.

Key words: Brexit, The Commonwealth, Synthetic control method, European integration

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1. Introduction

European integration dates back to shortly after the second world war, as the European countries were trying to rebuild their economies after the war (Hansen, 2001). Today, the European Union (EU) comprises 27 member states after several enlargements throughout the years. However, in 2016, the United Kingdom was the first country to vote to leave the EU, and in 2020, it became the first country to officially exit the EU after growing discontent with the EU membership (Whiteley, 2023). Historically, the UK has ties with several countries around the world as a result of the British empire. Today, they are commonly known as the Commonwealth countries. After the second World War, the first countries that were a part of the Commonwealth were important for the UK to maintain its status as one of the most prominent economies in the world at the time (Abbott, 2020). The Commonwealth countries continue to represent a significant part of the UK's trade relations, particularly because it constitutes major economies on the global market (Ward, 2023a). Following the Brexit-referendum, it has been imperative for the UK to forge and sustain trade relations to both the EU but also with nations beyond its borders because of the loss of the EU internal market. This is exemplified by the recent signing of the free trade agreements with the Commonwealth countries Australia and New Zealand (Webb 2023a).

This paper aims to analyze the impact of Brexit on trade relations between the UK and the Commonwealth countries. Previous literature suggests that the UK incurred substantial trade losses upon its departure from the EU. However, the literature regarding effects on trade after the Brexit referendum between the UK and the Commonwealth is scarce. Previous findings suggest that specifically the UK exports to the EU countries has decreased (Kren and Lawless, 2023). Born et. al (2019) finds that the UK's GDP started to decline already before the referendum took place. Moreover, there are empirical findings suggesting that the loss of the EU internal market may be difficult to compensate for (Brakman et. al., 2023). The politically and economically important relationship between the UK and the Commonwealth nations, alongside the diverse economies within the Commonwealth, offer a valuable insight to the UK's trade dynamics outside the EU. This offers a deeper understanding of economic partnerships and trade policies after Brexit and whether the Commonwealth could potentially compensate for the trade losses incurred from the UK's departure from the EU. The research question this paper thus aims to

explore is how the trade between the UK and the Commonwealth has been affected after the Brexit referendum, with a focus on exports from the UK to the Commonwealth countries.

Since the establishment of some of the cornerstones of what we today know as the European Union, the European Coal and Steel Community (ECSC) and the European Economic Community (EEC) the union has undergone multiple enlargements from its initial six founding member states. Subsequent to the creation of the EEC, a custom union was formed to harmonize and facilitate trade and foster closer economic ties among the member states. Almost three decades after the EEC was formed, the EU single market was established, creating the renowned 'four freedoms' which facilitated efficiency, accessibility and specialization in trade between the EU countries. The 'outer seven', comprising seven countries standing outside the EEC formed the European Free Trade Association (EFTA) in the 1960s to facilitate free trade among its member countries. Today, the EU comprises 27 member countries, with the most recent enlargement taking place in 2013 (Hansen, 2001). The UK was the first country to trigger article 50 of the Treaty of the European Union. The events leading up to the Brexit-referendum emerged within the UK already in the 2010s following discontentment, particularly regarding immigration and concerns over British sovereignty (Fieldhouse, 2019). Subsequent extensive negotiations between the UK and the EU, resulted in a referendum in 2016 with the vote for leave that secured a small majority (Walker, 2021).

This paper uses the synthetic control method as outlined by Abadie (2021) to achieve a deeper understanding of Brexit's effect by creating a counterfactual scenario if the remain vote for Brexit would have won in the referendum. In essence, the Synthetic control method (Abadie 2021; Abadie et al. 2010) aims to create a control unit of bilateral pairs and compare with a unit that has been exposed to an intervention. In this paper, the intervention will be the referendum that was held in the UK about Brexit in 2016 and the treated unit is the UK. It is essential that the countries that will build the counterfactual UK must be of similar characteristics as the UK. The synthetic UK will thus be built up of the countries joining the EU up until the enlargement of 1995. Each of the control units will be assigned a weight based on how well they are similar to the treated unit, the UK. The control units that closely resemble the UK receive a higher weight. The synthetic control method thus ensures that the countries that have a higher weight are

relevant to the analysis for an accurate counterfactual outcome. The donor pairs will be formulated utilizing a subset of Commonwealth countries, notably Australia, Canada, India, South Africa, and Singapore. This selection is based on their significant historical ties with the UK and their prominent position as key trading partners within the Commonwealth for the UK. The results, supported by robustness checks, suggest that the donor pool did not yield accurate results.

Given the unique characteristics of the British withdrawal from the EU, their historic ties with the Commonwealth in addition to the importance of the European integration process and economic relevance, this paper aims to broaden the analysis of the trade relation between the UK and the Commonwealth countries. This paper will contribute to the existing literature in the sense that it will deepen the understanding of global trade relationships, economic integration and development and its implications of Britain leaving the EU. The relations to the Commonwealth may serve as an important market post-Brexit compensating for the loss of the EU internal market, in regards to the economic and political ties. This study highlights the post-Brexit trade policy with the Commonwealth, and their future trade strategy. Hence, this paper aims to enrich the existing literature with a deeper understanding and analysis on the UK's trade relations with the Commonwealth after the Brexit referendum. The paper will start with a foundation of the historical background of the Commonwealth and the UK as well as European integration. Chapter 2 will further explore the landmarks coming up to Brexit. Chapter 3 will cover a literature review of the topic and previous relevant research. In chapter 4, the theoretical expectation will work as a foundation to get a deeper understanding of the complexity of the research question. Chapter 5 will provide the reader with an explanation of the synthetic control method in detail and in chapter 6 the results will be presented. Chapter 7 will conclude the paper.

2. Tracing the historical and political landscape

In this section, four fundamental background aspects will be outlined. This will lay the foundation of the analysis and give an understanding of the background to the trade relation between the UK and the Commonwealth in the light of European integration.

2.1 The historical relationship between the UK and the Commonwealth

Table 1: History of the Commonwealth

| Year	Historical event	Milestones for the Commonwealth nations
1926	Balfour Declaration	The countries belonging to the British empire were granted greater self-governance, foundation of a modern Commonwealth
1947	India becomes independent	India wanted to transition into a republic while maintaining its membership within the Commonwealth
1949	London declaration	Foundation of the modern Commonwealth. Australia, Canada, India, New Zealand, Pakistan, South Africa, Sri Lanka and the UK agreed on the freedom and equality among the Commonwealth nations and cooperation based on shared values.
1957-1960	Commonwealth enlargement	Ghana, Malaysia and Nigeria joins the Commonwealth
1961	South Africa withdraws	South Africa withdraws following pressure from member states regarding apartheid policies
1961-1970	Commonwealth enlargement	The Commonwealth is joined by; Cyprus, Sierra Leone, Tanzania, Jamaica, Trinidad and Tobago, Uganda, Kenya, Malawi, Malta, Zambia, Gambia, Singapore, Guyana, Botswana, Lesotho, Barbados, Mauritius, Eswatini, Nauru, Tonga, Samoa and Fiji
1971	Singapore declaration	Stated the common Commonwealth values among the member states
1972-1990	Commonwealth enlargement	The Commonwealth is joined by; Bangladesh, the Bahamas, Grenada, Papua New Guinea, Seychelles, Solomon Islands, Tuvalu, Dominica, St. Lucia, Kiribati, St. Vincent and the Grenadines, Zimbabwe, Vanuatu, Belize, Antigua and Barbuda, Maldives, St. Kitts and Nevis, Brunei Darussalam and Namibia
1991	Harare Declaration	Priorities for the upcoming decades regarding democracy, human rights and equality
1994	South Africa rejoins	After the end of apartheid South Africa rejoins
1995-2009	Commonwealth enlargement	The Commonwealth is joined by; Cameroon, Mozambique and Rwanda
2013	Commonwealth Charter	Signed by Queen Elizabeth II regarding the development of free and democratic societies, advocating for peace and prosperity
2022	Commonwealth enlargement	The Commonwealth is joined by; Togo and Gabon

Source: Commonwealth secretariat (2024a)

British colonization dates back to several hundred years with former colonies all over the world. Table 1 outlines the history of the Commonwealth, starting already in 1926 with the establishment of the Balfour declaration where the countries belonging to the British empire were granted greater self-governance. This was the first foundation of a modern Commonwealth (Loft, 2023). In 1932, the so-called Imperial and Commonwealth preferences were negotiated in Ottawa which aimed to lower tariffs among the Commonwealth countries and enhance trade. Following the second World War where a lot of the economies in Europe were destroyed, the Commonwealth countries became important bilateral trading partners for the UK (Abbott, 2020). In 1949, the London declaration was adopted by the United Kingdom together with 7 upcoming Commonwealth countries. The London declaration formed the modern Commonwealth and stated the collaboration and shared values among the different nations (London Declaration, 1949). Following the establishment of the modern Commonwealth in 1949, the Commonwealth was important for Britain to maintain its dominant status. The British currency, sterling, was used by the majority of the Commonwealth nations or that the countries fixed their own currencies' exchange rates to sterling, which became an important tool to maintain Britains status. Following World War II, approximately fifty percent of global trade was conducted in the sterling currency (Gowland, 2022). In the end of the 1940s, the Bank of England stopped the convertibility of the sterling due to ensuring economic stability of the sterling (Krosewski, 1996). The value of the sterling eventually started to decline and the world trade with the United States increased and increased the desirability of the american dollar. During the same time, relations between the UK and the Commonwealth began to weaken. For instance, several former colonies became independent during the 1940s and 1950s and other agreements and policies were entered into, which reduced trade with the UK. The trade to the Commonwealth nations started to decrease even more drastically after the UK in 1973 successfully joined the EEC (Abbott, 2020).

Today, the Commonwealth nations encompass 56 independent states, most of them tracing their origins to the British Empire. Figure 1 shows the distribution of Commonwealth countries for different regions around the world. The majority of the Commonwealth countries are located in Africa. The most recent countries to join the commonwealth were Togo and Gabon in 2022 (Ward, 2023a). None of them have a relationship with Britain nor the Commonwealth but were able to join as a result of that any country can join today when sharing the same values as stated

in the Declaration of Commonwealth Principles issued in Singapore in 1971 (The Commonwealth, Declaration of Commonwealth Principles, 1971).

Figure 1: Number of Commonwealth countries by region
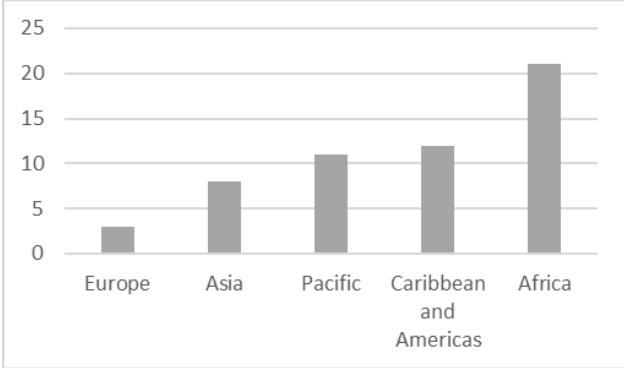
Source: Commonwealth secretariat (2024b)

The Commonwealth is a voluntary association which promotes and supports the member states in areas such as democracy, politics, human rights and trade. Since the establishment of the Harare Declaration on human rights in 1991, the work and promotion on human rights in its member states have become even more active. Several times, Fiji, Pakistan, and Nigeria have faced suspension from the Commonwealth due to their violations of the human rights values (Loft, 2023).

2.2 The UK's current trade relation with the Commonwealth

As of 2020, the Commonwealth member states encompass a population of 2.5 billion individuals and command a Gross Domestic Product (GDP) estimated at approximately 13.1 trillion US dollars. As illustrated in figure 2, several major economies worldwide, such as India, Australia and Canada are part of the Commonwealth. These countries, along with Singapore and South Africa, represent vital trading partners for the UK (Ward, 2023a).

Figure 2: Size of commonwealth nations after GDP, current prices in US dollars, 2022
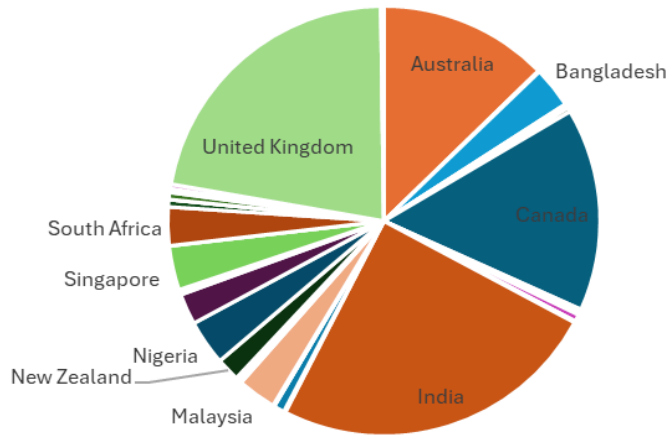
Data: United Nations Statistics division (2023)

The Commonwealth countries account for 10 percent of the UK total exports and 9 percent of their total imports. Today, India is the UK's greatest export and import market among the Commonwealth nations. However, the EU represents the primary destination for the majority of the UK exports. Compared with the Commonwealth nations, the exports and imports to the EU were respectively four and six times larger in 2022. During the coronavirus pandemic, the UK export to the Commonwealth countries decreased with 13 percent and the imports fell by 34 percent. Both the exports and imports increased in 2022 again with 23 and 30 percent respectively. The biggest trade partners account for 74 percent of UK exports to the Commonwealth and 68 percent for imports (Ward, 2023).

After Britain exited the largest trading bloc in the world, the implementation of a new trade policy has been imperative. The first free trade agreements that came into force after Brexit were with both Australia and New Zealand. They are considered significant in the sense that they represent an important move towards establishing their own trade policy post-Brexit (Egan and Webber 2023). The free trade agreements with both countries entered into force on the 31st of May 2023. The UK and Northern Ireland are important trade partners to Australia. The trade agreement with Australia removes 99 percent of tariffs on exported goods from Australia and the estimated increase in UK-imports from Australia is 66 percent (Webb 2023a; Department for

Foreign Affairs and Trade n.a). Australia exports a lot of agricultural foods to the UK which potentially is estimated to affect the domestic production of these goods in the UK. However, the Government argues that the UK consumers prefer British production and that the agreement creates greater export opportunities for UK agriculture. Further, the agreements will promote lower prices and better market access for both British citizens and Australians. The UK's intention with the free trade agreement is also to promote and increase trade in the Asia-Pacific region (Webb 2023a; Department for Foreign Affairs and Trade, 2024). The Free trade agreement with New Zealand will eliminate tariffs on 99.5 percent of New Zealand goods to the UK, this will equivalently mean savings of 17 billion pounds each year for UK exporters (Webb 2023b). In addition, the exports are estimated to account for an increase of 700 billion pounds (Webb 2023b). The impact of the Free Trade agreements on the UK's GDP growth is modest, yet it remains highly uncertain of the long run impacts (Webb, 2023a; Webb 2023b). The UK has also signed a Digital Economy Agreement with Singapore to promote digital trade, and are currently negotiating free trade agreements with India and Canada (UK Government, 2023).

2.3 European Integration and the UK

Table 2: History of European economic integration

Year	Historical event	Relevant treaty	Milestones of the economic integration
1945	End of World war II in Europe		Start of a united Europe
1949	Council of Europe is established		Promote democracy, protect human rights and the rule of law
1951	Establishment of European Coal and Steel Community is	Treaty of Paris	Founding member states: France, Germany, Italy, Belgium, the Netherlands, Luxembourg
1957	Establishment of European Economic Community, Euratom	Treaty of Rome	Establishment of a customs union. Factors of production could now move freely
1973	First enlargement		New member states; UK, Denmark, Ireland
1981	Second enlargement		New member state: Greece
1986	Third enlargement		New member states: Spain and Portugal
1986	Single market	Single European act	The EU internal market
1993	Foundation of European Union	Maastricht treaty	Discussion about an Economic and Monetary Union, foreign and security policy, cooperation in justice and home affairs
1995	Fourth enlargement		New member states: Austria, Finland, Sweden
1997	European Union	Treaty of Amsterdam	Stronger united voice of Europe and more efforts to improve employment
1999	The Euro		The first euro countries; Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain
2004	Fifth enlargement		New member states: Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia
2007	Sixth enlargement		New member states: Bulgaria and Romania
2013	Seventh enlargement		New member state: Croatia

Source: European Union Directorate General for Communication (2024); Hansen (2001)

As can be seen from table 2, European integration traces its origins to the aftermath of the Second World War, a period marked by division in Europe but which also became the start of a unification of Europe. To achieve this, the goal became to foster economic prosperity among the European states to share the same values and avoid future wars. One of the first steps towards European integration was the creation of the European Coal and Steel Community signed in 1951 by the six founding member states that laid the foundation for economic partnership (Segers, 2023; Hansen 2001). During this time, coal and steel were fundamental for the economies and to foster economic growth. The idea was to maintain price stability and balance

supply and demand (Hansen, 2001). Later on, the European Economic Community (EEC) and Euratom were established through the Treaty of Rome and came into force in 1958. The EEC has been one of the more influential developments in EU history, with the creation of a customs union to facilitate trade. Subsequently, the Internal Market was formed to reduce trade barriers. It enabled free movement of goods, services, persons and capital to facilitate efficiency, accessibility and specialization for the market and consumers. Subsequently, within the same decade, specifically in 1999, the Economic and Monetary Union (EMU) was established, ushering in a unified currency within the union (Hansen, 2001). Not all European countries were accepted into the EEC and its economic benefits, hence, the European Free Trade Association (EFTA) was negotiated by the so called 'outer seven', namely; the UK, Sweden, Norway, Denmark, Austria, Switzerland and Portugal in 1960 (Kreinin, 1960). To further integrate economically with the EEC, the European Economic Area (EEA) was introduced and included Sweden, Norway, Austria, Iceland and Finland where they could benefit from access to the internal market (Hansen, 2001).

The UK's integration to the EU started to be more pronounced in the 1960s, which resulted in a first initial attempt to become a member of the European Economic Community (EEC) which was established a few years earlier (Abbott, 2020). Moreover, economies within the EEC started to grow, as well as the US economy resulting in GDP growth surpassing that of the UK (Adam, 2020). In addition, the dollar replaced sterling as the reserve currency and the US started to dominate global trade. Thus, in 1961, the UK voted to become a part of the EEC. However, they were vetoed by the French president Charles De Gaulle in 1963[1]. This was also the case after the second attempt in 1967 (Wall, 2020). Six years later, in 1973, the UK acceded to the European Community (Adam, 2020).

After four decades of EU membership, the UK became the first country to hold a referendum about leaving the EU on the 23 of June 2016 (Stack and Bliss, 2020). It sparked discussions about how it would impact the economy especially since they primarily joined because of the economic benefits (Graziano et. al. 2020, Breinlich et. al. 2020). Nonetheless, it was not until

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[1] The veto was primarily argued on economic and political grounds, including concerns about the threat of France's position within the EEC (Adityo et. al. 2019).

2020 that the UK formally exited the EU. There were several reasons to leave the European Union for the UK. In essence, the desire to uphold British independence from the EU was a significant factor (Whiteley, 2023). The vote out of the EU was however not a spontaneous event, but rather a matter that had been embedded in the political debate for many years (Clarke, 2017).

2.4 The Brexit referendum

Table 3: Landmarks towards Brexit

Year	Event	Landmarks towards Brexit
1975	Referendum on UK's membership of the EU	The 5th of June 1975, 67.27% voted in favour to stay within the EEC while 33% voted against
2013	Initial discussions of a Brexit	Prime Minister David Cameron discusses the future of the European Union and declares a referendum
2015	Conservative Manifesto for 2015 General Election	Promises regarding a referendum about an in-out membership of the EU before the end of 2017
2015	General election	The Conservatives win over the Labour who have been in power for 10 years
February 2016	Draft Decision on EU-UK	Donald Tusk proposes a new arrangement for the UK within the EU to the European Council members. The European Council publishes a draft decision regarding the issue.
February 2016	UK special status in the EU	Prime Minister David Cameron issues a statement regarding his aim to negotiate a special arrangement granting the UK special status in the EU
February 2016	Announcement of the referendum date	Prime Minister David Cameron announces the date of the referendum and declares the new special status of the UK in the EU in the House of Commons
June 2016	Referendum on UK's membership of the EU	On the 23rd of June, the UK held a referendum regarding their membership of the EU.
June 2016	Result of the referendum	On the 24th of June, the result showed that 48.1% voted for remain, and 51.9% voted for leave the EU
March 2017	Triggering of article 50	President Donald Tusk triggers article 50 for the first time
June 2018	European Union (Withdrawal) Bill	The European Union (Withdrawal) Bill becomes an Act in the Parliament and receives Royal Assent
23rd January 2020	European Union (Withdrawal Agreement) Act	European Union (Withdrawal Agreement) Act becomes law and receives Royal Assent. This is the final legislation to enact the withdrawal agreement between the UK and the EU
31st January 2020	Brexit	The United Kingdom officially leaves the European Union. The transition period begins. The UK is now considered a third country.

Source: Walker (2021); Miller (2015); European Council (2024)

Since the UK accessed the European Union in 1973, the public opinion regarding a membership has been volatile (Clarke, 2017). Outlined in table 3, the vote to join the EU in 1975 resulted in

67.27 percent against 32.8 percent in favor for a membership in the EU (Miller, 2015). Disapproval of UK membership in the EU started in UK politics as early as 2010, following nearly four decades of EU membership. After the 2010 General Election in the UK, the Conservative Party prevailed over the Labour Party. The votes for smaller parties also increased in the 2010 election, specifically UKIP, suggesting the dissatisfaction with political decisions of the public opinion (Fieldhouse, 2019). In both the election to the European Parliament in 2014 and the general election in 2015 the Eurosceptic party UKIP became influential in UK politics. Since its establishment in 1993, they have advocated for national sovereignty to the EU. However, opinions regarding UKIP have been volatile throughout the years. The skepticism towards the EU stems from various events such as the euro crisis in 2010, increased immigration and a lower trust in politicians (Clarke et. al. 2017). The increased immigration from Eastern Europe and the enlargement of 2004 (refer to table 2) of Eastern European countries were seen as damaging to the economy (Whiteley, 2023).

The opinion among the parties were divided regarding whether to remain or leave the EU as outlined in table 4. In the 2015 General Election the Conservatives had to stick to their promise to hold a referendum on Britain's membership of the European Union. Their 2015 manifesto was also aimed to regain votes from UKIP. The Liberal Democrats lost a lot of votes to both the Labours, the Greens and the Conservatives. Even if they are a pro-EU party, 27 percent voted leave within the party. This was not only the case for the Liberal Democrats, up until the referendum, there were divided opinions within the parties whether to remain or leave (Fieldhouse et. al. 2019). However, the anticipated referendum led by the former Conservative Prime Minister David Cameron occurred on June 23, 2016 (Whiteley, 2023). The vote resulted in 51.9 to 48.1 percent in favor of leaving the EU, a significantly closer outcome than that of 1975. Following the referendum, David Cameron announced his resignation. Prior to the exit in 2020, there were negotiations between the EU and the UK for a new situation, with the European Union (withdrawal) Bill being drafted to be enacted into law. This was introduced a year after the referendum by the Government and became an Act of Parliament in 2018 (Walker, 2021). The General election in 2017 resulted in a win for the Conservatives with most seats and Teresa May becoming the new Prime Minister. The Labour party announced their General Election Manifesto affirming their acceptance of the referendum results. They emphasized their

commitment to promote a new, close relationship with the EU while retaining the benefits of the Single Market. Moreover, the Liberal democrats promised in their election manifesto to put a new deal on Brexit with the option to stay within the EU over the upcoming two years (Walker 2021).

Table 4: The stance on Brexit of UK political parties

Party	Opinion about Brexit
The Conservatives	Initiated the referendum for Brexit. In favour for Brexit.
The Labour Party	In favour to remain within the EU. Emphasize new close relationship with the EU after Brexit
Scottish National Party (SNP)	In favour to remain within the EU.
Liberal Democrats	In favour to remain within the EU.
United Kingdom Independent Party (UKIP)	In favour for Brexit.
The Green Party	In favour to remain within the EU

Source: Fieldhouse et. al. (2019)

Article 50 of the Treaty of European Union facilitates the voluntary withdrawal for an EU member state, which had never before been put into action. In March 2017, President Donald Tusk triggered the article which would take effect two years later in March 2019. The Article was extended three times, but was finally put in action on 31st of January 2020. This marks the official day of Brexit and the end of Britain's membership of the EU (Walker, 2021). In 2021, the Trade and Cooperation Agreement (TCA) entered into force between the UK and the EU. The agreement is supposed to foster quota and tariff free trade, economic and social partnership, enhancing security for EU citizens and governance structure for the EU-UK relationship (European Parliament, 2023).

3. Literature review

There is a wide literature regarding the impacts of Brexit from different points of view, and especially regarding the impacts on trade. However, analysis regarding the economic implications of the Brexit referendum and the relations to the Commonwealth, alongside literature regarding European integration, remains relatively limited in scope. Previous literature covers mainly the impacts on specific geographic regions. Most literature covers the UK-EU relations, because of its unique role in the study of European integration.

To estimate the trade relations between the UK and the EU there are several methods that have been applied. For example, the difference-in-difference method to account for a counterfactual scenario and policy effects. Kren and Lawless (2023) investigate the effect of Brexit on the European internal market by looking at trade flows between the UK and the current EU member states using the difference-in-difference method with the EU relative to the rest of the world as a control group. They found a decline in the trade flow on both UK to EU trade as well as EU to UK trade, although the latter was smaller. A similar study was conducted by Freeman et al. (2022) using the difference-in-difference method. This study examines the short-term impact on trade in goods resulting from Brexit and the disintegration between the EU and the UK. They analyze both the periods before and after the introduction of the Trade and Cooperation Agreement (TCA) in 2021 relative to the UK-trade with the rest of the world. Before the implementation of the TCA, the authors found no evidence of an impact of Brexit and concluded that trade flows show comparatively low response to the emergence of trade barriers. After the TCA was implemented there was a decline in the number of the extensive margin of the UK-exports to the EU of low-valued products. Although it did not yield a large effect on imports nor a negative effect on value of exports, rather the opposite effect on exports. As Kren and Lawless (2023) mentions, Freeman et. al. (2022) does not find a decline in tradeflow, except for immediately after the Trade Cooperation Agreement (TCA) in 2020. This is argued to depend on the difference in estimation and data, especially regarding the choice of control group. Nevertheless, Freeman et. al. (2022) highlights that they do not evaluate the long-term effects but only the first year after the end of the renegotiation process. However, Graziano et. al. (2020) likewise finds that there is a reduction in the UK-EU trade through estimating uncertainty

elasticities of exports. Especially exports were affected due to the uncertainty during the renegotiation period. Similar findings as Graziano et. al. (2020), Du et. al. (2023) use the synthetic difference-in-difference method to account for the TCA causal impact on trade between the UK and the EU and the rest of the world. They find that the UK experienced a decline in exports of varieties of goods to the EU as well as a general decline in exports since the TCA based on data up to the first quarter of 2021. Du et. al. (2023) further underscores the uncertainty of the long run effects of trade resulting from Brexit.

The widely used gravity model within trade theory has been used in several studies regarding European integration and regionalism to estimate bilateral trade. For instance, Stack and Bliss (2020) investigate EU trade related agreements effects on trade in addition to their development over time. Both including the trade within the customs union, and other trade agreements with other countries around the world. They also estimate the effect of Brexit using the gravity model with data from the 15 first EU-member states. They come to the conclusion that there are positive effects of the trade agreements, although the positive effects might diminish over time. Brexit, as in accordance with previous literature, makes the trade effects between the UK and the EU decrease. In contrast, the estimated effects are not anticipated to be excessively severe because the trade with the rest of the world is projected to rise. Further, from the gravity model, Buigut and Kapar (2023) assess the impact of Brexit on both UK-EU trade and intra-EU trade of the remaining 27 EU countries. Their central findings regarding the effects of Brexit suggests that the trade between the UK and the EU were affected negatively during the referendum phase by approximately 10.5 percent. During the transition phase there was an estimated additional reduction in trade with 15 percent. During the negotiation process of the TCA, businesses started to adjust to the new situation in trade relationships between the EU and the UK which resulted in a further decrease in trade with 24 percent. The intra-EU trade however, increased during both the referendum period as well due to the TCA. These findings imply that some of the trade between the EU and the UK has shifted to trade within the remaining EU-countries instead as businesses shifted investments when adapting to the TCA. Hence, concluding remarks suggest that trade agreements with other countries are essential, especially beneficial could a trade agreement with India turn out to be as India is an important emerging global market (Buguit and Kapar, 2023). However, Brakman et. al. (2023) estimate the trade effects of Brexit and UK's

Global Britain strategy of signing free trade agreements with other countries by using the gravity model. They find that the Global Britain strategy is not enough to compensate for the trade with the EU. In addition, other EU countries such as Malta, Ireland and Cyprus suffer losses in international trade because of Brexit. When estimating the effect of several countries outside the EU, signing new FTA's with economies outside the EU, such as with India, Australia and the US could potentially limit the loss of trade. Although, the decline in trade would still amount to 26 percent for the UK.

The synthetic control method has proven to be relevant in the analysis of Brexit and trade. Due to the importance for the UK to access the EU market, Breinlich et. al. (2020) uses the synthetic control method and finds that there was an increase in investments from UK firms in the remaining EU-countries, but not the other way around. On the other hand, as mentioned previously, there are several studies analyzing the cost of Brexit for both the UK and the EU. That indicates that remaining access to the EU is more important because of the market size of the EU. It might be less appealing for the EU-countries after Brexit to remain on the British market which makes it more costly for the UK to disintegrate with the EU (Graziano et. al. 2020; Breinlich et. al. 2020). Moreover, by using the synthetic control method, Born et. al. (2019) found negative impacts on Britain's GDP already before the treatment effect occurred in addition to evoking economic uncertainty. Moreover, similar to this paper, Douch and Edwards (2021) use the synthetic control method to analyze the effect of the Brexit announcement on UK exports. The control units are from both EU and non-EU countries. They found a significant effect on commercial services exports and found that prior to the referendum, the uncertainty whether the UK would leave the EU affected the trade. The market had already started to foresee a potential leave in 2015 and its effect on the British market due to uncertainty effects.

Regarding the long history the UK has with the Commonwealth nations, there is limited research addressing British relations with the Commonwealth and the effect of Brexit. Grier and Munger (2021) use the synthetic control method to estimate the effect of lost trade for New Zealand after the UK joined the EEC in 1973. New Zealand lost their privileged access as a protected export market to the UK which had long-lasting effects on their economy. This is also supported by Abbott (2020) who estimates a decline in export and imports from the Commonwealth countries

already during the 1960s when Britain started to integrate to a larger extent with the EU. The authors compare the outcome for New Zealand and suggest that Brexit may be similarly economically harmful of leaving a customs union for the UK. Furthermore, Salamat and Ali (2023) analyze the consequences for African countries after Brexit using the difference-in-difference method. They account for the impact of heterogeneity and include both Commonwealth countries and Non-Commonwealth countries. Although, they do not find any significant differences between the two groups which they mention is in line with the findings regarding weakening in relations to colonies after independence made by Head et. al. (2010). However, the results still indicate a negative impact on African exports to the UK after Brexit, in comparison to both the remaining EU countries as well as the rest of the world. Utilizing the gravity model, Jackson and Shepotylo (2018) mean that potential trade deals with other countries such as the Commonwealth countries and the US will not make up for the losses caused by Brexit. Historically the UK has relied on the importance of the Commonwealth countries to maintain a powerful status.

The contribution to the previous literature is the aspect of estimating the effect of Brexit to the Commonwealth nations. Given the significant historical and economic ties between the UK and the Commonwealth, it is relevant to further analyze the importance of the UK in both historical and contemporary trade contexts. Like Salamat and Ali (2023) and Grier and Munger (2021) have examined the effects of Brexit on Commonwealth countries, this paper will focus more closely on the use of the synthetic control method to analyze these effects. By employing the synthetic control method, this study aims to provide a comprehensive view of the trade implications between the UK and the Commonwealth after the Brexit referendum. This aims to enhance our understanding of how historical economic relationships and current trade dynamics are affected by this unique change in trade policy.

4. Theoretical expectation

There are different views on how Brexit has affected trade between, first and foremost the EU, but also the Commonwealth countries, which are pertinent to this paper. This section aims to analyze the theories leading up to the anticipated effects of Brexit on trade between the Commonwealth and the UK. To build on the background to answer the research question, it is imperative to utilize a theoretical framework to understand the implications of Brexit and the following uncertainty on the trade market. Specifically, this chapter focuses on the theory of economic integration.

Custom unions have garnered a lot of attention in research within the neoclassical theory of economic integration. Customs unions reduce tariffs and quotas for internal trade and common tariffs towards third countries. Integration can enhance the welfare of countries in such a way that it decreases trade costs and promotes specialization in which countries have comparative advantages. It facilitates competition among firms and can develop more efficient sectors. (Jovanovic, 2015). When the UK was a member of the EU, third countries had a competitive disadvantage when trading with the UK, since there were no tariffs or quotas to be paid between the EU countries and the UK (European Union, 2024). When the UK announced the Brexit referendum, the shock of Brexit raised uncertainty on the market between the EU and the UK (Graziano et. al. 2020).

To understand how uncertainty affects trade in the light of Brexit, the concept of trade policy uncertainty (TPU) is of relevance. An important event within trade policy was when China joined the WTO which has been analyzed in regards to TPU. Alessandria et. al. (2023) examines the trade effects of the renewal of China's normal trade relations (NTR) in the US that happened yearly, before China became a member of the World Trade Organization (WTO). Following the 1974 Trade Act in the US, the US granted Most Favored Nation (MFN) status to countries with no market-economies to whom they had a free trade agreement and that followed the freedom of emigration requirement. For China, the latter was the source of uncertainty. China's MFN status was thus never actually revoked. The trade policy uncertainty is based upon the size of the policy change, the likelihood for it to occur and the duration until the uncertainty is resolved. The

findings indicate that firms increase their trading activity by stocking up inventories when faced with uncertainty of potential increase in tariffs due to TPU. When the size of the tariffs are uncertain, firms will wait and see and delay their orders if the size of the tariffs remain. This uncertainty for firms' affecting their trade activities when experiencing expected change in trade policy was eliminated when China accessed the WTO. Related to the same subject, Handley and Limão (2017) finds by estimating the TPU on China's accession into the WTO and captures the effects between uncertainty and investments to Chinese exporters. A reduction in TPU increased exports to the US and lowered export prices. The firms facing higher sunk costs to export are most affected by TPU. Further, Bloom (2014) analyzes the uncertainty caused by shocks in the economy, which varies over time. When firms are hit by uncertainty, they take cautious actions about investments and hiring for the potential expense of reversing such decisions. Moreover, the increased risk premia firms are facing when entering the market suggests that the amount of firms entering the market diminish. The market's confidence in the future can affect precautionary savings and investments in projects caused by rising prices (Bloom, 2014). The uncertainty stemming from the Brexit referendum, would thus explain the negative impact on trade between the UK and its trading partners after the referendum.

On the other hand, the possibility for countries outside the EU to trade with the UK would after Brexit not face the same competitiveness from the other EU countries to the British market. A potential positive effect would thus be for the Commonwealth countries to gain in trade with the UK (The Commonwealth, 2016). Although, in the aftermath of the Brexit vote, Born et. al. (2019) show that there was a reduction in GDP for the UK, in addition to that households and firms have lowered the expectations for their future incomes. This could thus cause a reduction in trade with other countries post-Brexit also outside the EU.

5. Empirical Strategy

The Synthetic Control Method has been widely used in economics and social science research after it was introduced by Abadi and Gardeazabal (2003) in the context of using it in comparative case studies. It has been used in research for immigration, taxation, political connections and other political matters, but also used outside academia (Abadie et. al., 2010). The main idea behind the Synthetic Control Method is to estimate the causal effect of a treatment (also referred to as intervention) on a unit of interest, for example a country. This is done through creating a synthetic version of the country in question. The aim is then to find other countries with similar characteristics to create the synthetic unit. These countries are then chosen as country pairs from a donor pool. This means that these comparison country pairs should mimic the observed pre-treatment country pair in terms of for example GDP and values of bilateral trade flows (Saia, 2017). Although, they should not be affected by the treatment. When measuring the causal effect of the intervention, the comparison units are composed by a combination of units from the donor pool that mimic the outcome if the intervention would not have occurred. Hence, the synthetic control will be a weighted average of the donor pool units, which will represent the counterfactual outcome in the absence of the treatment. Thus, the weights should be chosen in order for the synthetic control to be similar to the pre-treatment outcome (Abadie, 2021). The objective is to minimize, hence optimize, the difference of the weights using a data driven algorithm (Abadie, 2021; Saia, 2017). This will determine how the constructed donor units contribute to the synthetic control, and therefore also the estimation of the counterfactual (Abadie, 2021). Regarding the trade between the United Kingdom and the Commonwealth using the synthetic control method, this paper will investigate the export trade outcomes if the United Kingdom would not have left the European Union.

5.1 The Synthetic Control Method

Comparative case studies have been important for estimating counterfactual effects (Abadie, 2021). The Nobel Prize laureate David Card (1990) estimated the effect on the labor market for native workers due to the Cubans who mass emigrated to the United States 1980. The findings were later replicated by Peri and Yasenov (2017) using the synthetic control method and contributed to the robustness of his findings. Moreover, the fellow Nobel Prize laureate Guido

Imbens stated in the paper *The State of Applied Econometrics: Causality and Policy Evaluation* together with Susan Athey (2017) that the synthetic control method is one of the most prominent methods used in policy evaluation literature. The synthetic control method has been applied in trade research to assess a range of interventions. Moreover, it has got attention for analyzing the impacts of Brexit, a widely researched topic due to its significant implications.

The synthetic control method is relatively new (Abadie and Gardeazabal, 2003). There are other similar and popular methods used to estimate causal effects within policy interventions and trade. Namely, the difference-in-difference method and the gravity model. Similar to the synthetic control method, the main idea behind the difference-in-difference method is to have a treatment and control group and estimate the effect of the counterfactuals and examine the intervention in a pre- and post-treatment period (Salamat and Ali, 2017). The difference-in-difference method relies on parallel trends. On the contrary, the synthetic control method uses the weighted averages of the units in the donor pool instead and makes the matching more accurate (Abadie, 2021).

The gravity model was introduced by Tinbergen (1962, cited in Head and Mayer 2014) and has since been important in empirical research regarding bilateral trade. Distance is a fundamental variable in the gravity equation and can be used to measure the variation in income of a country depending on the bilateral distance. Moreover, cultural bonds such as language are also a contributing factor to trade patterns (Head and Mayer, 2014). The gravity model estimates the average impact of the integration (Head and Mayer, 2013) while the synthetic control method in the case of trade is used to look at trade diversion dynamics over time by creating country pairs and doing a counterfactual estimation. In sum, the synthetic control method through its specific way of choosing weights to create the synthetic control unit and to be more transparent than other methods (Abadie, 2021).

Following the notation from Abadie (2021), Abadie et. al. (2015) and Breinlich et. al. (2020), the first important characteristic of the synthetic control method is the sample of units used to create a synthetic control of bilateral pairs consisting of optimally chosen weights to be compared with a treated unit. The first unit, the unit exposed to the intervention, is denoted j=1, and the rest of

the units are the control units j=2...j+1. The time period t=1...T starts in T_0 where $T = T_0 + T_1$ before the intervention has occurred. The treated unit is affected by the intervention in $T_0+1...T$ (Abadie et. al. 2015). As mentioned, the synthetic control is aimed to be created as accurately as the treated unit, consisting of the estimated weights of the untreated units, $W=(w_2...w_{J+1})'$ (Abadie, 2021). w_j is the weight of unit j of the untreated units in the donor pool (Abadie and Gardebazal, 2003). The vector should be positive, that is, $0 \leq w_j \leq 1$ for the untreated units j= 2...J (Abadie et. al. 2015). The outcome variable of the treated unit after being affected by the intervention is Y_1 which is a vector of $(T_1 \times 1)$ in time t, while the vector $(T_1 \times J)$ with $j = j+1$ for Y_0 is the outcome variable of the units from the donor pool after the intervention at time t (Abadie et. al., 2015). Y_0 will be the outcome if the unit of treatment would not have been affected by the intervention (Abadie, 2021).

Following Breinlich et. al. (2020) and Abadie (2015), the estimation of the synthetic control, hence the weighted average of the units in the donor pool, is constructed as;

$$\alpha_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j Y_{jt} \text{ where } \sum_{j=2}^{J+1} w_j Y_{jt} \text{ is equal to } Y_0 W$$

The weights $W = (w_2...w_{J+1})'$ used to estimate the synthetic control, are chosen to minimize the distance between the pre-treatment outcomes, the values for the unit affected by the treatment, and the units from the donor pool. In other words, minimizing the mean squared prediction error (MSPE) (Abadie, 2021) and are constructed as;

$$X_1 - X_0 W = (\sum_h v_h (X_{h1} - W_2 X_{h2} - ... - W_{J+1} X_{hJ+1})^2)^{1/2}$$

Notation used from Abadie and Vives-i-Bastida (2021).

5.2 Applying the Synthetic Control Method on the Brexit referendum

The synthetic control method will be used in this paper to analyze the effect of the Brexit referendum on trade with the commonwealth countries. The goal is to use this method to create a synthetic control unit of the bilateral pairs for the UK by using some countries with similar characteristics in the European Union as the donor pool. The synthetic control unit is supposed to

be constructed to be similar to the unit affected by the intervention (the UK). Although, not be affected by the intervention themselves (Abadie, 2021). The intervention used in the method is the referendum prior to Brexit, namely June 2016 (Papyrakis et. al. 2023).

5.2.1 Donor pool

In order to estimate the treated unit to find the effect of the intervention on the UK, the synthetic control needs units to be compared to. As mentioned, the countries chosen to the donor pool thus need to be similar to the treated unit, the UK. The UK was one of the first states to join the EU in 1973 together with Denmark and Ireland, and became at that time one of nine member states, the EU-9. In the ensuing decade, Greece took the initial step, followed subsequently by Spain and Portugal, joining in 1981 and 1986, respectively. The Union was later enlarged to 15 member states in 1995, the so called EU-15, and now covered the majority of western Europe (European Commission, n.a). The countries who joined the Union during this period, have similar integration status, but are also similar in the sense of living standards and politics (European Union External Action, 2021).

The UK's journey within the EU from its early membership when joining with Denmark and Ireland to create the EU-9, would thus be good benchmarks for the UK given the similarities in country structure and because these countries were ready to join during the same time. The subsequent expansion culminating in the EU-15, provides a rich backdrop for comparative analysis in the sense that they are big economies in Europe and eligible to be part of the EU. By leveraging the experiences of still being a part of the EU and its integration of Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, the Netherlands, Austria, Portugal, Finland, and Sweden, I will construct a robust synthetic control group that mirrors the UK's characteristics pre-Brexit. Because of insufficient trade data of Luxembourg, it will be excluded from the analysis. However, the countries differ in terms of for example language (except for Ireland), size and relations to the Commonwealth. Although, to be able to construct a synthetic UK if they would not have left the EU, it is imperative to use countries that are still represented as member states of the EU to account for the counterfactual effect. As stated by Abadie et. al. (2010) and Abadie (2021), the donor pool should be constructed of units with similar characteristics as the treated variable to account as a good control for the treated unit. This will

also be important when doing placebo interventions. Not all countries in the donor pool may contribute to the synthetic control, hence these units will not be assigned a weight. The countries that do in fact get a weight, are controlled by the predictor variables.

The countries that will represent the Commonwealth countries to estimate the trade with the UK and the synthetic control units are Australia, Canada, India, South Africa and Singapore. The biggest trading partners among the Commonwealth countries for the UK are in fact those countries (Ward, 2023). These countries, therefore, offer a comprehensive representation of the Commonwealth concerning both data availability and the potential impacts of trade resulting from Brexit. This is in line with Hearne et. al. (2019) who choose Australia, Canada, India and Nigeria. The motivation is that India and Nigeria are big economies and Australia and Canada are two developed economies when investigating the effect of post-Brexit trade relations with the commonwealth and EUs impact on what future trade will look like. I will also argue for the interesting aspect that each of the countries representing the Commonwealth countries are located on different continents for this analysis. This geographical dispersion offers a comprehensive perspective on UK trade beyond the EU borders.

In sum, the countries in the donor pool will thus be Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, the Netherlands, Austria, Portugal, Finland and Sweden. The counterfactual effect will then be estimated with the countries Australia, Canada, India, South Africa and Singapore. This will in turn create pairs from which weights will be calculated and construct the synthetic control unit for the comparison of the UK with the Commonwealth countries. The pre-intervention period, before the referendum in June 2016, will go back to 1975 in order to get a sufficiently large estimation period prior to the referendum. This year is also chosen because of the UK's accession into the EEC this year (refer to table 2). The post-intervention period will range from 2016 until 2020.

5.2.2 Predictor variables

To be able to evaluate the effect of the referendum on trade with the commonwealth after Brexit the treated unit and the countries in the donor pool, it is relevant to add additional information to estimate the effect. The predictor, also called covariates, are variables aimed to explain the

dependent variable of interest. This could be variables such as investments, population growth and democracy to name a few. The predicted variables can also be lagged values of the outcome variable, this means that the predictors are values of past outcomes (Kaul et. al., 2021). According to Abadie (2021), the predictors are important to include in order for the synthetic control estimators to be able to resemble the value before the intervention. Ferman et. al (2018) means that since there is no general definition of what exact variables to include, there is room to find specific characteristics to create better results. Kaul et. al. (2021) prove both empirically and theoretically that when using all outcome lags as covariates may make the rest of the covariates irrelevant. Although, they note that depending on how large the pre-treatment period is, and the relevance of unobserved factors and the observed covariates, may vary in how much it will affect the explanation of the outcome variable.

Abadie (2021) points to the importance of using enough pre-intervention information to create an accurate synthetic control to estimate the outcome of the treated unit. As mentioned in section 5.2, when analyzing different aspects of bilateral trade, variables such as distance is a main variable in the gravity model to estimate. In this paper, when estimating the trade effect on the Commonwealth countries with the UK due to Brexit, cultural aspects are relevant regarding the history between the countries (see section 2.1 for historical context). Therefore, including language as a predicting variable would be important. Another covariate to include referring to previous papers that have estimated causal effects and is of relevance for this paper is GDP as it provides important characteristics of a country's economic size. In addition, Head and Mayer (2014) highlights the importance and the fundamental aspect of distance in the gravity model when estimating bilateral trade between countries. Therefore, this paper will also include distance as a predictor variable. Since the Commonwealth countries are widespread all over the world (refer to chapter 2.1), distance to the different countries may play an important part for the estimation.

This paper aims to use two different approaches, the first one where all lags are included in addition to the covariates mentioned above. As mentioned, according to Kaul et. al. (2021) all covariates may become irrelevant. Ferman et. al. (2018) evaluate the use of all outcome lags, thus they highlight the need for further research of when to use all outcome lags and additionally

suggest that researchers should use different specifications when estimating the treatment effect. Therefore, a second approach includes just the outcome lags.

5.3 Data

The data used in this paper will be collected from CEPII from their Gravity database which contains data from 1948 to 2020. The data includes 252 countries and is collected from among others, the IMF, UN COMTRADE and BACI. The database contains data on different variables aimed for research with gravity equations. It is constructed such that it contains Gravity as the primary dataset and the dataset Countries as an additional dataset. The variables contained in the Gravity dataset have variables characterizing both unilateral and bilateral variables such as GDP, population and distance. Each dataset contains variables corresponding to each pairing, representing both exporting and importing nations, along with a year (Conte et. al., 2022). In this paper, the years 1975 until 2020 will be used to estimate the effect of Brexit on trade between the UK and the Commonwealth nations. 1975 was the year that the referendum on whether the UK should remain in the EEC or not, which makes the pre-treatment period before the intervention 41 years, and the post-treatment period 4 years. As previous literature have highlighted, there are uncertainties of estimating the long-run effects of Brexit. Abadie (2021) discusses the importance of having a large enough time span both before and after the intervention to be able to reproduce the trajectory if the intervention would not have occurred. Further, to accomplish a comprehensive view of the intervention, the post-intervention information should include sufficient forward-looking information that can have been affected by the intervention. Previous literature has attempted to estimate the long-term effects of Brexit (Du et. al., 2023: Breinlich et. al., 2022; Graziano et. al., 2020) although there are yet varying speculations of the prolonged consequences. The UK did not leave the EU until 31st of January 2020, the year of which the data pertains. However, there is still enough data that will estimate potential effects before the treatment to be able to further contribute to the discussion of future post-Brexit effects.

5.4 Robustness of the method

The Synthetic control method has since it was first used by Abadie and Gardebazal (2003) been adopted in a wide range of research to account for a counterfactual scenario (Albalate et. al. 2021). However, Abadie et. al. (2015) based on Abadie et. al. (2010) suggests that by using

placebo studies the synthetic control method allows researchers to minimize the potential effect of the small sample-size, lack of randomization and absence of probabilistic sampling from the synthetic control method. This means that there is a potential that the outcome shows effects beyond the date of the intervention, and the confidence of an accurate estimation would decrease, hence, an option is to use "in-time placebos" and assign a different date to the treatment period. In addition to this, Abadie et al. (2015) propose that another way to address the issue is to test "in-space placebos" to account for the possibility that the units in the donor pool do not accurately represent the treated unit if some similar estimates occurred for the synthetic units. Abadie et. al. (2015) therefore further suggests that an alternative is to assign the treatment to a unit that did not in fact experience the treatment. From this it is possible to compare the estimated effect to the placebo effects. Moreover, Albalate et. al. (2021) also points to the problem with the covariates importance of the method and stability of the estimation, and the dependence on the donor pool units that can cause unstable results of the estimated weights.

The in-time placebo and in-space placebo as first proposed by Abadie et. al. (2010) has been used in previous research when using the Synthetic control method. Following Abadie et. al. (2015), this paper aims to use the placebo effects suggested to secure a significant result with the method. This in turn will show whether the placebo effects will yield the same large effects as the actual treated unit in the estimation (Abadie et. al. 2015). If the estimation yields low p-values, the results can be considered significant, specifically, if the actual treated unit is larger than the placebo treatment (Grier and Mungel, 2021). To account for the sensitivity of the results, this paper will also include a robustness check by changing the control units to some of the bigger economies within the OECD.

6. Empirical findings

This chapter will present the results from the synthetic control method. The chapter will present the results from the two different approaches, both when including covariates and without covariates. The final subchapter will include robustness checks of the empirical findings as discussed in chapter 5.4.
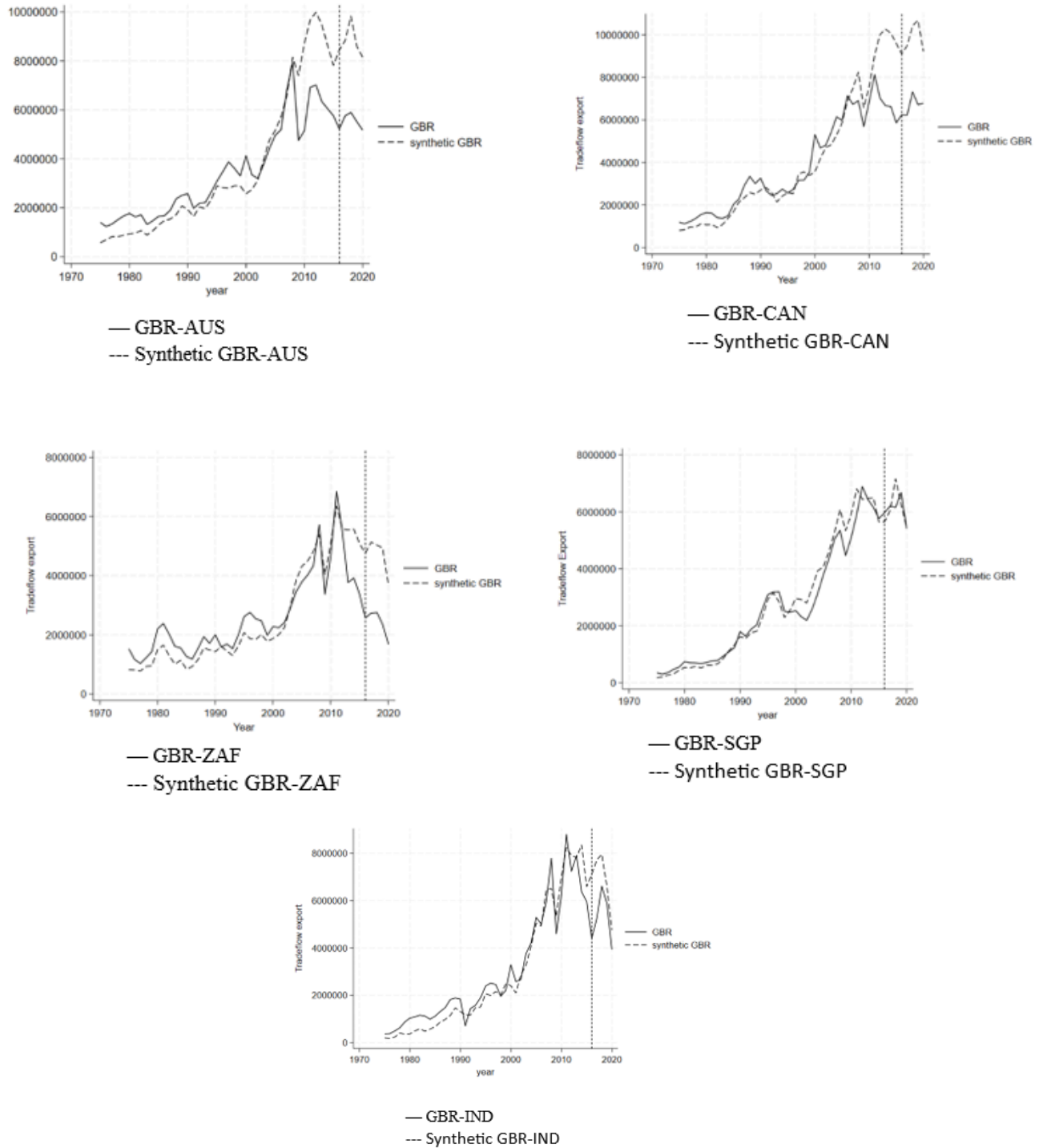
6.1 Specification with lags and covariates

In this section, the estimation will be used with both the outcome lags and the covariates. The model has a pre-treatment period ranging between 1975 to 2015, and a post-treatment period from 2016 to 2020. In Appendix 3 the weights for each country pair are detailed. This section includes the relevant gravity covariates as well as some lags for the export variable followed from the advice discussed in chapter 5.2.2. As mentioned, the weights are calculated to minimize the distance between the pre-treatment outcomes, thus the values for the unit affected by the treatment, and the units in the donor pool. In figure 3, the graphs illustrate the trend between the real UK and the synthetic UK constructed by the European countries specified in chapter 5.2.1 for each of the Commonwealth countries chosen for this study. From the graphs in figure 3, it is evident that the synthetic- and the treated units do not follow each other perfectly for the period before the Brexit-referendum. When examining Australia, Canada and South Africa, it is notable that an event occurred before the Brexit-referendum in the early 2010s. When evaluating the model with different lags and attempting to exclude some covariates, this approach yielded the best match. Predictor variables and covariates and the lags are described in Appendix A2.

For Australia the difference between the Synthetic and treated unit begins to diverge already before 2010 and continues to persist after the post-treatment period. Similar is the outcome for Canada, although the difference does not start until just after 2010 which is the same effect as can be seen for South Africa. This is surprising since the effects for Singapore and India are not as large. Specifically for Singapore there does not seem to be any noticeable impact at all around the time for the referendum. Further for Singapore, the synthetic control fits the treated unit very accurately compared to the other country pairs in the pre-treatment period. There is a

diminishing effect for India that the synthetic control follows. However, for India there is a larger difference during the time of the referendum which diminish just after 2016.

Figure 3: Synthetic versus real UK with each Commonwealth country, with covariates

— GBR-AUS
--- Synthetic GBR-AUS

— GBR-CAN
--- Synthetic GBR-CAN

— GBR-ZAF
--- Synthetic GBR-ZAF

— GBR-SGP
--- Synthetic GBR-SGP

— GBR-IND
--- Synthetic GBR-IND

Notes: Total tradeflow reported by the exporter in thousands current US dollars. The results are obtained using the synth command in stata (Abadie, 2015).

Table 5. Average Treatment Effect (ATE) for each Commonwealth country, with covariates

	Australia	Canada	South Africa	Singapore	India
ATE	-0.390	-0.319	-0.486	-0.00039	-0.2368

Notes: ATE for each Commonwealth country. The ATE is expressed as the percentage difference between the treated unit and the synthetic control. The values were obtained using the synth2 command in stata (Chen and Yan, 2023).

The ATE indicates that the effect of if the leave vote would not have happened is higher. Table 5 predicts that South Africa would have had the largest effect on average between the pre- and post treatment period in thousands of current US dollars if the remain vote would have won in the referendum. The estimated effect would have been an increase of 48.6 percent. This is a notable counterfactual effect. Noteworthy, the UK's top export markets are India, Canada, Singapore, Australia and South Africa in descending order (Ward, 2023). This is notable since neither Singapore nor India seem to yield a large effect if the UK would remain within the EU. Australia and Canada share English as the main language which is an important aspect in bilateral trade (Head and Mayer, 2014). Moreover, South Africa is an important developing country in Africa, hence why there might be larger effects of the UK remaining within the EU on those countries. If the vote for Brexit would have been the remain, the counterfactual scenario indicates that trade would have been higher. The predictor weights summarized in Appendix 2, shows that all country pairs match the lagged outcome variable and give less weights to the covariates.

As discussed in the theoretical framework, the uncertainty following from being outside a customs union might affect the incentive to trade. The uncertainty, discussed as a foundation for the theoretical expectation, following from the Brexit referendum might not only affect trade between the EU and the UK as has been analyzed in previous literature (Kren and Lawless, 2023; Breinlich et. al, 2020). In addition, in line with the findings of Brakman et. al. (2023), the Global Britain strategy might not be enough to compensate for the loss of the EU market. Since leaving the EU, which is the largest trading block in the world, the UK lost access to the benefit of the inner market and thus also trade agreements and the already established trade relations the EU has with other countries. Although, based on previous literature and the theoretical
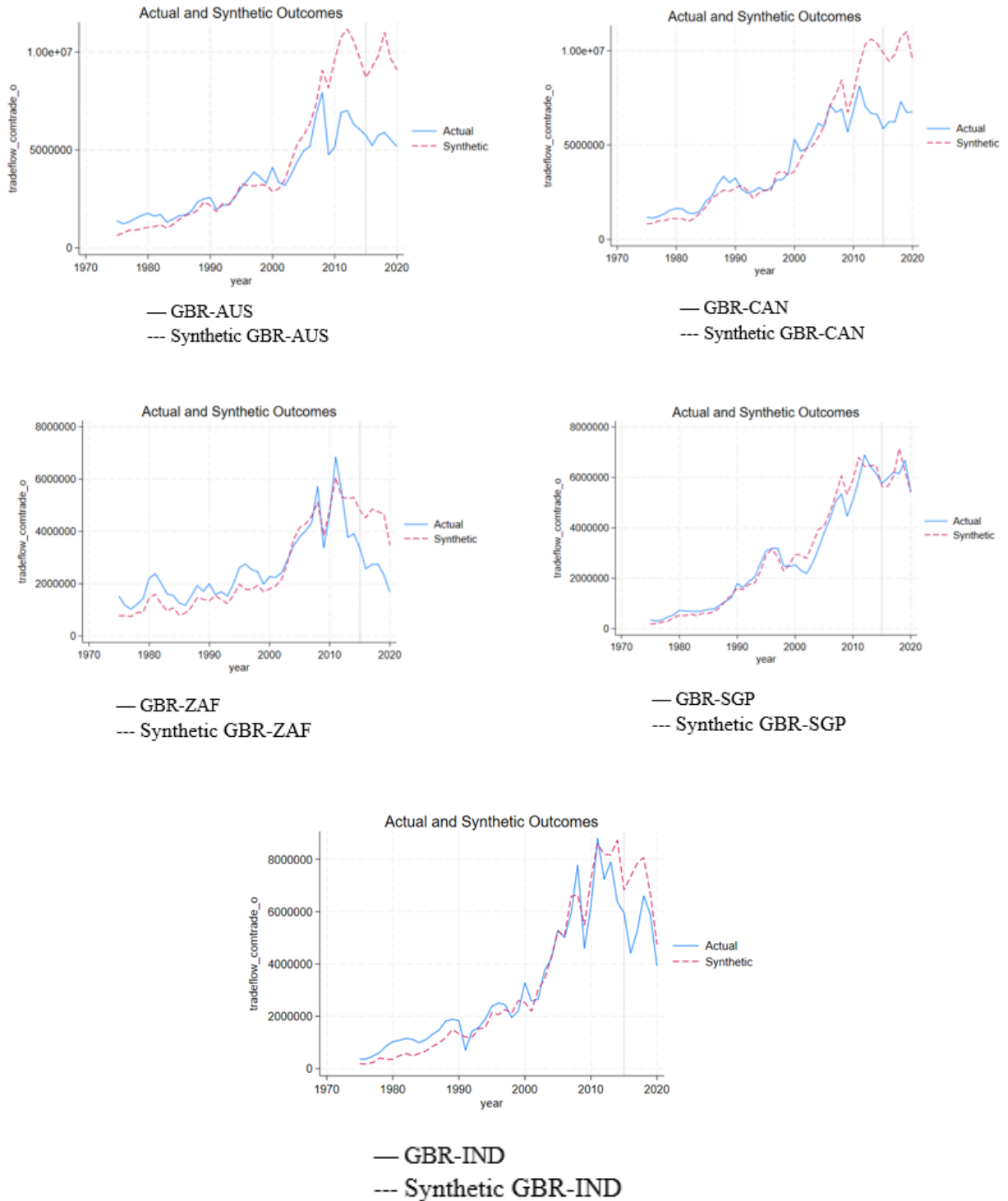
framework, trade with third countries outside the EU could potentially be expected to increase. However, this is not the case for the counterfactual outcome. The initial discussions regarding Brexit starting in the early 2010s outlined in chapter 2.4 may help to explain the increased effect of the synthetic control unit observed in figure 3 for Australia, Canada, South Africa and slightly India. It is recommended that future research includes more data and controls for effects occurring prior to the Brexit referendum.

When examining the output, the results indicate that the synthetic control in the pre-treatment period is not able to match the tradeflow to the Commonwealth countries with accuracy. As discussed in chapter 2.1 and 2.2, the UK has a special relation with the Commonwealth country considering their history, which might explain the difference in trade pattern.

6.2 Specification with lags and without covariates

As discussed in chapter 5.2.2, this paper will estimate the synthetic control with all outcome lags as in the previous chapter, but also exclude the covariates within the same model specification with a pre-treatment period ranging between 1975 to 2015, and a post-treatment period from 2016 to 2020. Kaul et. al. (2021) raises concerns that using all outcome lags would make the rest of the covariates irrelevant. However, using all outcome lags would focus on the time series of the pre-treatment trend of the outcome variable. In Appendix 4 the weights for the Commonwealth countries are presented. Table 6 presents the graphs for the synthetic control unit and the Commonwealth for the outcome when only the outcome lags are included.

Figure 4: Synthetic versus real UK with each Commonwealth country, without covariates

— GBR-AUS
--- Synthetic GBR-AUS

— GBR-CAN
--- Synthetic GBR-CAN

— GBR-ZAF
--- Synthetic GBR-ZAF

— GBR-SGP
--- Synthetic GBR-SGP

— GBR-IND
--- Synthetic GBR-IND

The graphs were obtained from the synth2 command in stata (Chen and Yan, 2023).

Suggested by Kaul et al. (2021), the covariates might be irrelevant when using all outcome lags since the estimation is fairly similar. Although the predictor variables are also important to capture effects of previous events. The fit in this case remains as when covariates are included in the model. As mentioned in the previous chapter, in Appendix 2 shows the pre-outcome values for the specification when including the covariates, the covariates do not carry significant weight for any of the country pairs. In table 6, the Average Treatment Effect (ATE) for each Commonwealth country is presented.

Table 6. Average Treatment Effect (ATE) for each Commonwealth country, without covariates

	Australia	Canada	South Africa	Singapore	India
ATE	-0.435	-0.340	-0.457	-0.0029	-0.248

Notes: ATE as a percentage for each of the Commonwealth countries. The ATE is expressed as the percentage difference between the treated unit and the synthetic control. The estimation was made from the synth2 command in stata (Chen and Yan, 2023).

The largest difference of the treatment effect is mostly notable for Australia between the period 2000-2010, where the match between the synthetic control and the treated unit was more accurate in the estimation with the covariates. The effect is overall very similar to the estimation with covariates. This can also be seen through comparing the ATE which is fairly similar to the ATE when including covariates. Moreover, the treatment effects are still negative for all countries. When considering only the lagged values in the model, Australia, Canada and India have a more negative effect compared to the model with covariates, although it is relatively minor. For Singapore the effect is less negative when excluding the covariates. When excluding the covariates, the results of the UK remaining within the EU and the effect on export trade with the Commonwealth countries, would still have been higher if the remain side would have won. However, the estimation including the covariates will be subject for further estimation of robustness checks since there was still a slightly better fit of the model.

6.3 Robustness tests and discussion

This chapter will conduct the robustness tests using both in-space placebo and in-time placebo tests in addition to a sensitivity check for the results by changing the control units.

6.3.1 In-space placebo test

The In-space placebo test is conducted following Yan and Chen (2023), first using all fake treatment units, the units that have a mean squared prediction error (MSPE) that is two times larger than the treated unit, the UK, is not included. The graphs for the respective commonwealth country can be found in figure 6. In Appendix 5 the p-values and the graphs for the respective country can be found for each country when all fake treatment units are included. The estimation for South Africa when including all units as fake treatment units, did not gain any result. For the other countries, the p-values indicate that the results are not significant at the 5 percent level. The post/Pre MSPE can be found in table 7. Following Abadie et. al. (2010), by choosing to look at the ratio of the post/pre MSPE values to eliminate the need to exclude poorly fitting placebo runs that do not have a good fit. The low post/pre MSPE value of the UK for all four placebo runs indicates that if the intervention were assigned a random unit in the dataset, the probability of obtaining a post/pre-treatment MSPE as the UK does not yield a significant p-value. This suggests that the control unit countries are not a good fit for the pre-intervention period. Intuitively, if other units not affected by the intervention gain effects of the estimation, the confidence of the synthetic control decreases (Abadie, 2015).

Table 7. Post/Pre MSPE for the respective Commonwealth countries

Country	Post/Pre MSPE Australia	Post/Pre MSPE Canada	Post/Pre MSPE India	Post/Pre MSPE Singapore
GBR	2.8428	2.0727	8.9079	3.2318
AUT	38.3798	2.1793	18.3261	0.2175
BEL	0.5049	4.3471	4.6887	12.9858
DEU	6.2512	7.1513	9.3727	0.3536
DNK	3.4691	6.8740	1.9114	2.6899
ESP	21.9296	15.7232	3.0808	4.8003
FIN	2.2696	5.7149	8.3080	3.7393
FRA	10.0024	3.3174	44.9000	32.7045
GRC	2.2296	10.6756	1.1465	0.9253
IRL	14.1658	60.2834	1.5260	0.5131
ITA	0.2616	10.3950	0.9466	2.7814
NLD	48.7565	16.1871	5.8724	10.1978
PRT	2.0513	17.3343	0.8339	0.6621
SWE	0.2271	3.6782	13.6926	5.0576

Notes: The data is obtained by the synth2 command in stata (Yan and Chen, 2023).

To account for the fact that South Africa was not included in the placebo run when using all fake treatment units, I ran a simple placebo test when replacing the UK with Ireland. The choice of Ireland is mainly because of that Ireland and the UK are geographically close to each other, in addition to that they share the same language, but that Ireland has not been affected by the intervention following Abadie and Gardeazabal (2003). Figure 6 does not necessarily suggest a huge effect around the Brexit referendum.The exception is that there is a difference for Canada, suggesting that the actual exports started to rise from Ireland a lot during the Brexit-referendum in 2016, and was larger than the synthetic control. This is also the case for South-Africa that the actual treated unit is larger than the synthetic. Thus, it seems like the effect of Brexit was not as large for exports from Ireland to the Commonwealth countries. The exports tradeflow in the post-treatment period follows each other more closely in the case of Ireland-Australia and Ireland-Singapore. For Australia the actual trade rose in 2016, but matched the post-treatment fit immediately after the referendum. The pre-treatment matching is not accurate, especially for Ireland-India, Ireland-South Africa and Ireland-Singapore.

Figure 5. In space placebo test with Ireland as treated unit

Ireland-Australia

Ireland-South Africa

Ireland-Canada

Ireland-India

Ireland-Singapore
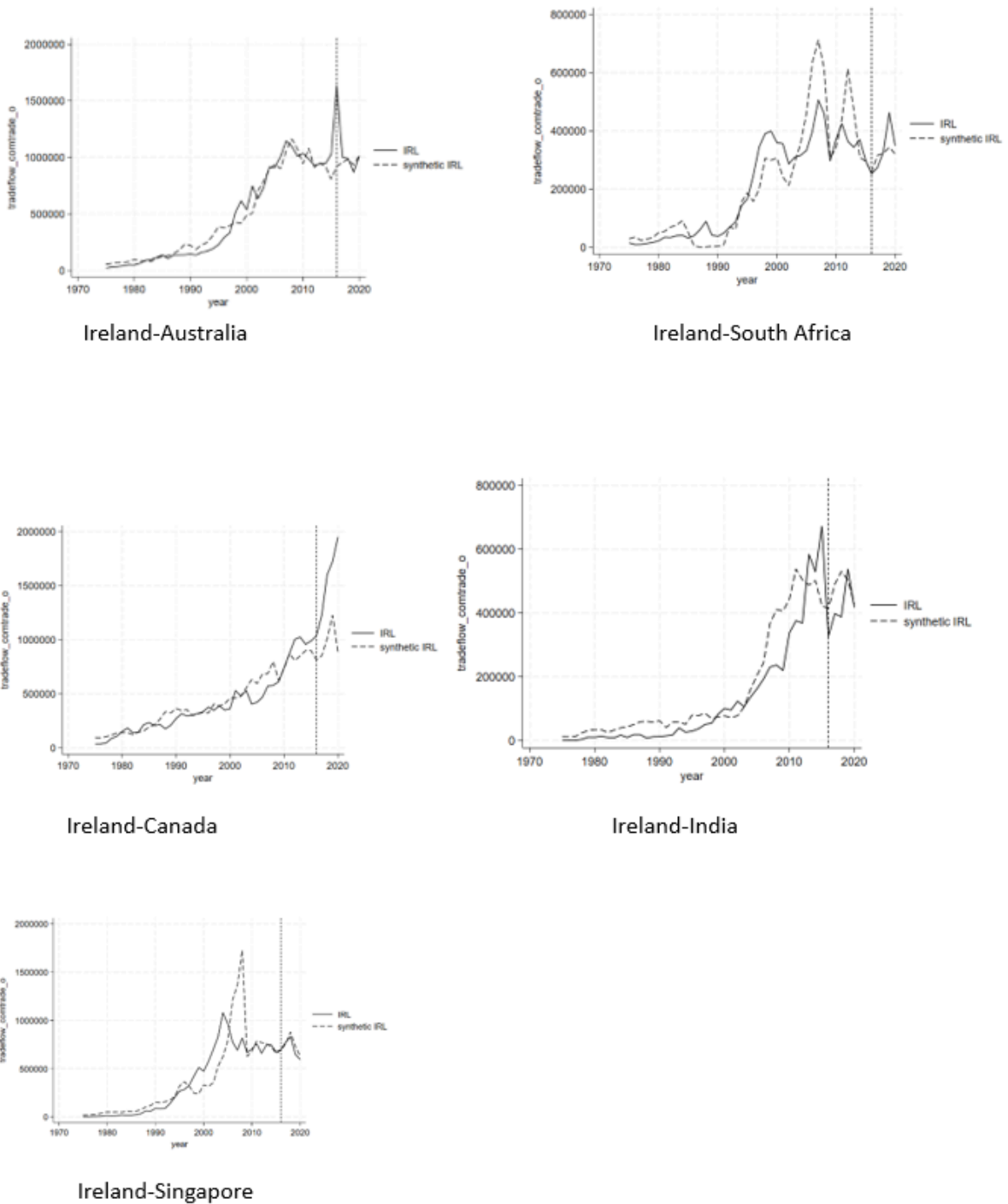
Notes: The graphs are obtained using the synth command in stata (Abadie, 2015).

6.3.2 In-time placebo test

The second placebo test mentioned in chapter 5.4 included in this paper is the in-time placebo, when assigning a different year as the intervention. The in-time placebo will use 2005 as the placebo intervention, to still account for a sufficiently large pre-treatment period. This is also before there started to be an effect between the synthetic and the treated unit in 2010 as seen from figure 3 and discussed in chapter 6.1, prior to the Brexit referendum. If there are large effects in the fake treatment time, the synthetic control results would not be reliable in indicating the true treatment effect (Abadie et. al 2015). The pre-treatment period will thus range from 1975 to 2005, and the post-treatment period will range from 2006 to 2020.

Figure 6. In-Time placebo, treatment period 2005
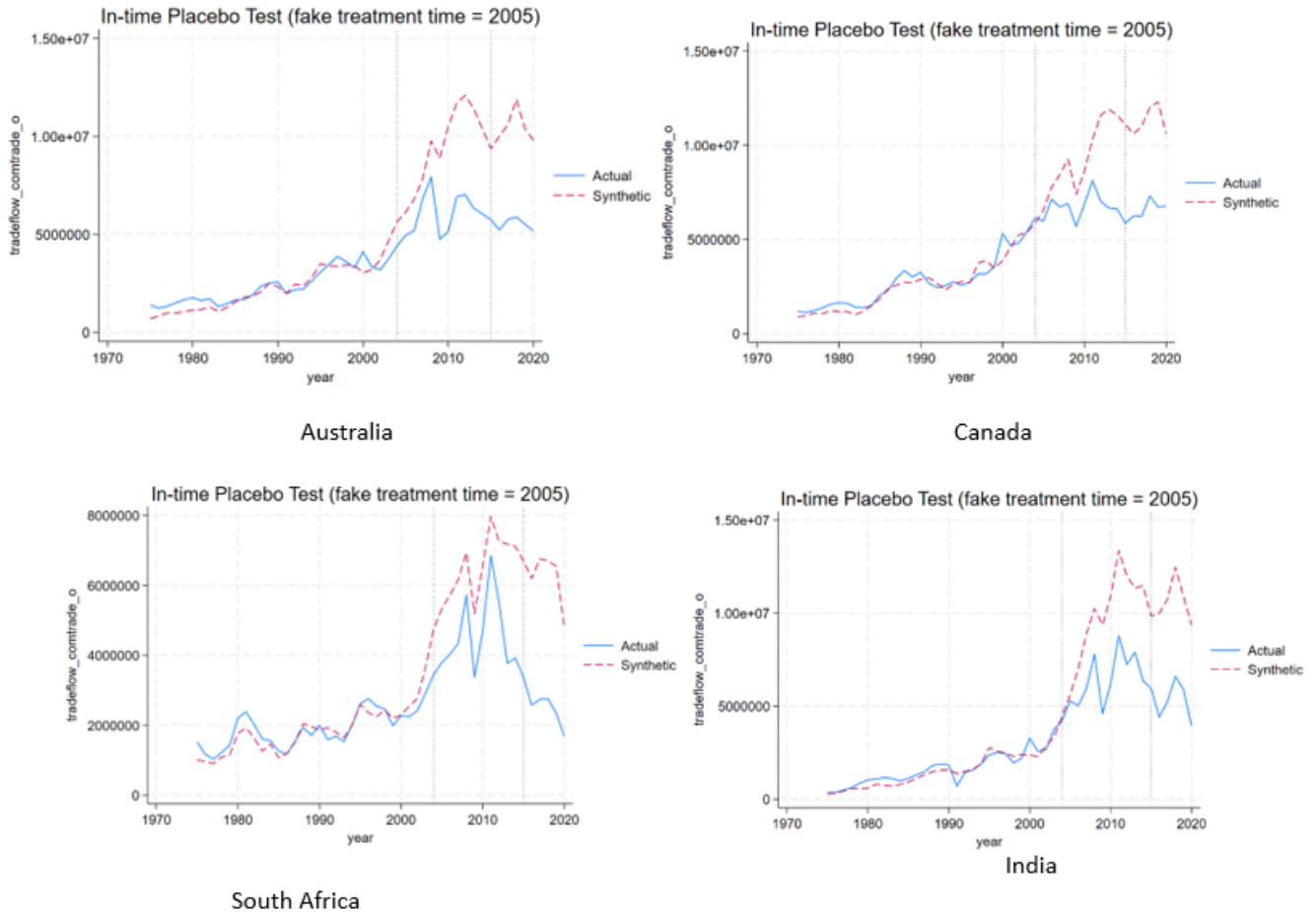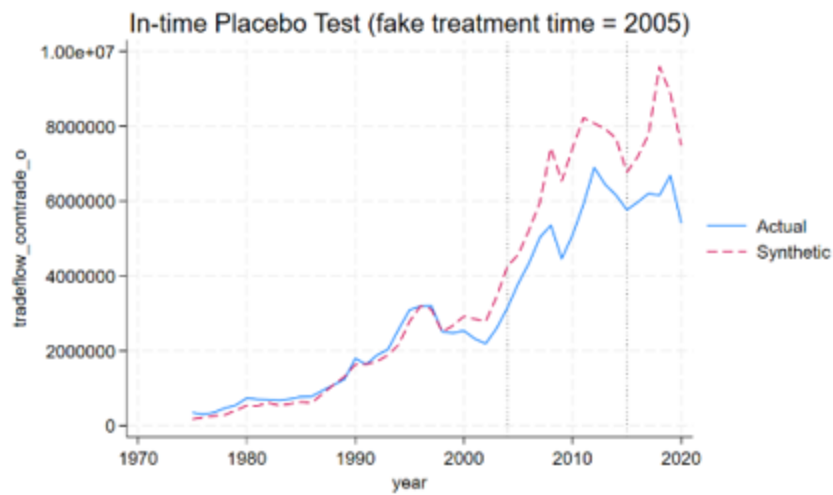
Singapore

Notes: The graphs are obtained using the synth2 command in stata (Yan and Chen, 2023).

From the results when using the treatment period 2005 as a placebo-in time robustness test, it is evident that for all Commonwealth countries there is an effect starting already during the fake treatment period in 2005. According to Abadie et. al (2015), when the synthetic control estimates effects already during the fake treatment period, the validity of the results are not reliable. For the pre-treatment period, the synthetic and the treated UK resemble each other up until the treatment. For Australia, India and Singapore, the synthetic control started to differ already in the early 2000s. The negative effects of the UK not remaining within the EU is still in line with the original model of the treatment period in 2016. Although, the large effects occurring already in the fake treatment period further suggests that the donor pool might not be a good estimation for the UK export trade with the Commonwealth countries. Intuitively, according to Abadie (2010), the synthetic control method may not be a good method in this case. This suggests that other methods may be relevant to be able to draw robust conclusions.

6.3.3 OECD countries as control units

To obtain a better understanding of the effects of the Brexit referendum and the trade between the UK and the Commonwealth countries, I will also, as an additional robustness test, replace the control unit with some of the big economies within the OECD. These countries are the USA,

South Korea, Türkiye and Mexico. Those countries were predicated on their significant status as major economies within the OECD, like the UK. Singapore and South Africa are excluded because of insufficient data during the pre-treatment period. Comparing the main analysis with other countries can help to evaluate the sensitivity of the results. This is also in line with Douch and Edwards (2021) who uses non-EU countries when estimating the effect of exports from the UK. They note that the effects from the non-EU countries should not yield an as large effect in the short-run after the Brexit referendum.

Figure 7. Synthetic control of the OECD-countries

— GBR-AUS
--- Synthetic GBR-AUS

— GBR-CAN
--- Synthetic GBR-CAN

— GBR-IND
--- Synthetic GBR-IND
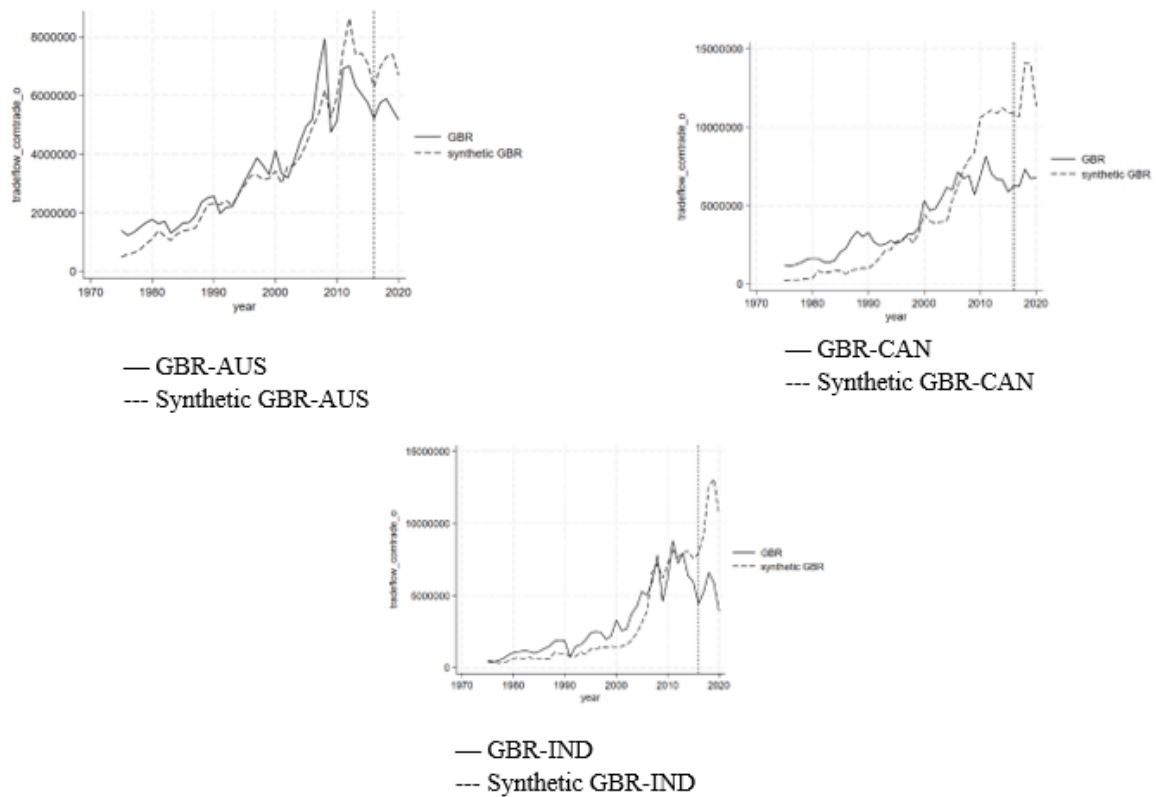
Notes: The graphs were obtained using the synth command in stata (Abadie et. al. 2015).

Similar to the main study, as can be seen from figure 8 there is an event happening for both Australia and Canada prior to the actual treatment, starting already in the early 2010s. For India there seems to be a smaller effect prior to the referendum when the synthetic and the treated unit starts to differ. The overall results indicate that the synthetic control has a larger effect than the treated unit just like the results obtained for the main analysis. However, the pre-treatment

outcome does not match well. Also, the OECD countries differ from the EU countries in terms of first and foremost size of the economies and that they are located at different places around the world which may explain the difference in the pre-treatment period.

7. Concluding remarks

The Brexit referendum was, to say the least, a significant event in European history. The UK was the first country to vote for leaving the EU in 2016, which raised concerns about the future new trade dynamics of leaving the benefits from the inner market. Further, the UK has long-standing relations with several countries around the world, stemming from its past as a global empire, today commonly known as the Commonwealth. The Commonwealth countries comprises several large economies and important trading markets for the UK regarding their historical ties. After leaving the EU, it has been imperative for the UK to establish new trade agreements. The special event when the UK left the EU, the unique historical relations the UK has with several countries around the world, and the uncertainty following the Brexit referendum, highlights the importance of gaining insights into UK's trade policies after Brexit and the benefits of economic integration.

The Synthetic Control Method used in this paper aims to estimate the counterfactual effect of if the UK would have remained within the EU after the Brexit referendum in 2016. The countries joining the EU up until the 1995 enlargement represent the synthetic scenario to which the export tradeflow from the UK to the Commonwealth countries was compared. When using robustness tests to validate the results that the UK exports to the Commonwealth would have been larger if they would have remained within the EU, the findings suggest that the donor pool used for the estimation, may not be good estimates to obtain a counterfactual effect of the Brexit-referendum. However, changing the control units in the analysis also suggests that there were significant developments occurring prior to the Brexit referendum. Future research is advised to further investigate the important relation between the UK and the Commonwealth countries regarding future trade relations by including additional data. Moreover the importance of integration within the international economy.

Regarding the scarce amount of literature covering the trade relations between the UK and the Commonwealth countries after the Brexit-referendum, this paper has contributed to a foundational analysis of the consequences for the UK beyond the EU borders, emphasizing its important historical ties with the Commonwealth nations. This paper has focused on the export trade from the UK to the Commonwealth countries and given the small amount of data and

countries, there are possibilities for future research to further evaluate trade relations between the UK and the Commonwealth using different methods to ensure robust conclusions.

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Appendix

The Appendix aims to describe additional information relevant for the main content.

A1. Country codes

The countries in some tables in the paper are denoted in their respective country code, this section aims to provide a description of the country codes for clarification.

Table A1. Country codes

Country code	Country
DEU	Germany
DNK	Denmark
PRT	Portugal
ITA	Italy
NLD	The Netherlands
GBR	Great Britain
SWE	Sweden
AUT	Austria
FIN	Finland
GRC	Greece
BEL	Belgium
ESP	Spain
FRA	France
IRL	Ireland

Country code	Country
AUS	Australia
CAN	Canada
ZAF	South Africa
SGP	Singapore
IND	India

A2. Predictor Variables and weights

This section will provide the reader with a description of the predictor variables of interest. This section clarifies each predictor variable. The covariates used and discussed in chapter 5.2.2 are GDP, distance and language. Additionally the other predictor variables used to construct the synthetic control were lagged values of the outcome variable. In the tables down below, the
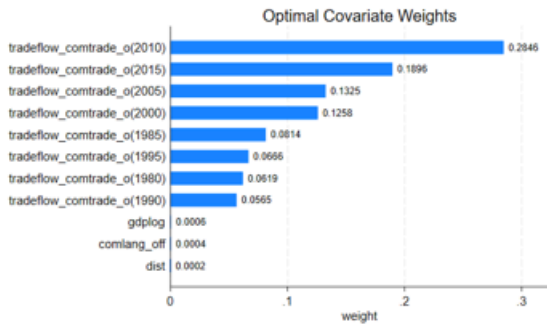
weights assigned to each predictor for each of the country-pairs are shown from the approach when including the lagged values and the covariates from chapter 6.1.
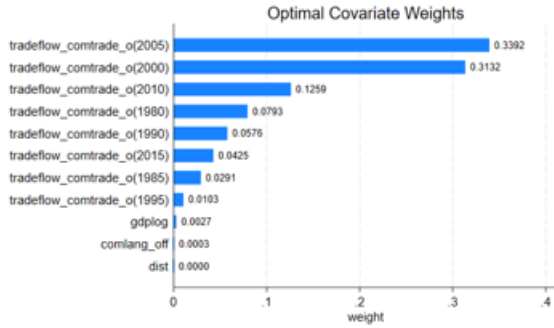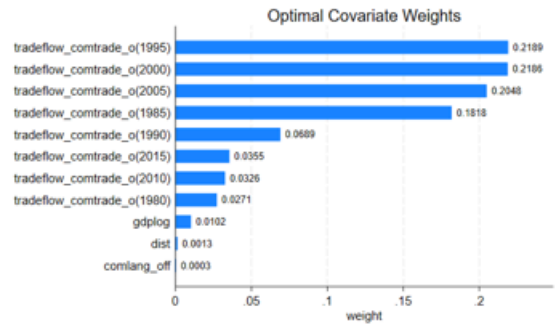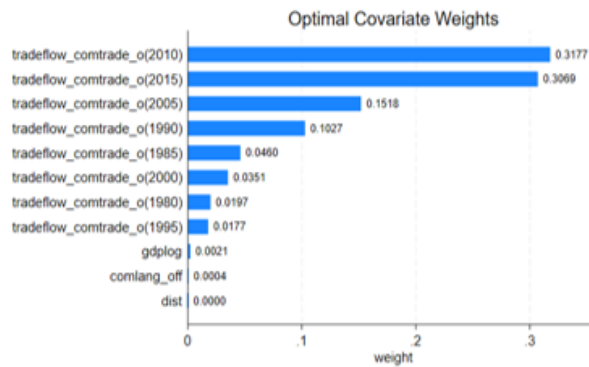

Australia
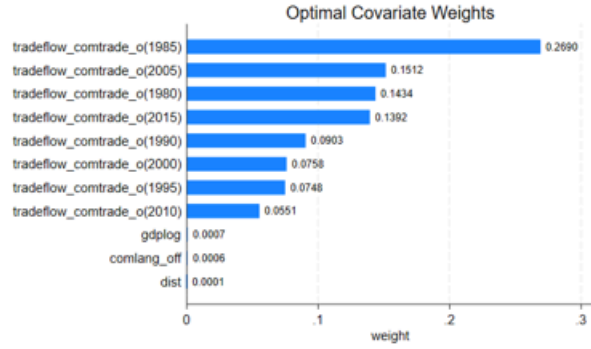
Canada

South Africa

Singapore

India

A3. Weights for the country pairs with covariates

Table A.3.1

Country-pair Synthetic	Weight
AUT-AUS	0.00
BEL-AUS	0.00
DEU-AUS	0.758
DNK-AUS	0.00
ESP-AUS	0.00
FIN-AUS	0.00
FRA-AUS	0.00
GRC-AUS	0.00
IRL-AUS	0.00
ITA-AUS	0.242
NLD-AUS	0.00
PRT-AUS	0.00
SWE-AUS	0.00

Country-pairs Australia

Table A.3.2

Country-pair Synthetic	Weight
AUT-CAN	0.00
BEL-CAN	0.00
DEU-CAN	0.799
DNK-CAN	0.00
ESP-CAN	0.00
FIN-CAN	0.00
FRA-CAN	0.201
GRC-CAN	0.00
IRL-CAN	0.00
ITA-CAN	0.00
NLD-CAN	0.00
PRT-CAN	0.00
SWE-CAN	0.00

Country-pairs Canada

Table A.3.3

Country-pair Synthetic	Weight
AUT-ZAF	0.00
BEL-ZAF	0.00
DEU-ZAF	0.350
DNK-ZAF	0.00
ESP-ZAF	0.00
FIN-ZAF	0.00
FRA-ZAF	0.650
GRC-ZAF	0.00
IRL-ZAF	0.00
ITA-ZAF	0.00
NLD-ZAF	0.00
PRT-ZAF	0.00
SWE-ZAF	0.00
IRL-ZAF	0.00

Country-pairs South Africa

Table A3.4

Country-pair Synthetic	Weight
AUT-SGP	0.00
BEL-SGP	0.00
DEU-SGP	0.665
DNK-SGP	0.00
ESP-SGP	0.00
FIN-SGP	0.00
FRA-SGP	0.00
GRC-SGP	0.00
IRL-SGP	0.00
ITA-SGP	0.335
NLD-SGP	0.00
PRT-SGP	0.00
SWE-SGP	0.00
IRL-SGP	0.00

Country-pairs Singapore

Table A3.5

Country-pair Synthetic	Weight
AUT-IND	0.00
BEL-IND	0.660
DEU-IND	0.00
DNK-IND	0.00
ESP-IND	0.00
FIN-IND	0.00
FRA-IND	0.340
GRC-IND	0.00
IRL-IND	0.00
ITA-IND	0.00
NLD-IND	0.00
PRT-IND	0.00
SWE-IND	0.00
IRL-IND	0.00

Country-pairs India

Notes: Data obtained with command synth2 in stata (Abadie, 2015)

A4. Weights without covariates and predictor balance

Country-pair Synthetic	Weight
AUT-SGP	0.00
BEL-SGP	0.00
DEU-SGP	0.664
DNK-SGP	0.00
ESP-SGP	0.00
FIN-SGP	0.00
FRA-SGP	0.00
GRC-SGP	0.00
IRL-SGP	0.00
ITA-SGP	0.336
NLD-SGP	0.00
PRT-SGP	0.00
SWE-SGP	0.00

Country-pair Synthetic	Weight
AUT-IND	0.00
BEL-IND	0.713
DEU-IND	0.00
DNK-IND	0.00
ESP-IND	0.00
FIN-IND	0.00
FRA-IND	0.287
GRC-IND	0.00
IRL-IND	0.00
ITA-IND	0.00
NLD-IND	0.00
PRT-IND	0.00
SWE-IND	0.00

Country-pair Synthetic	Weight
AUT-ZAF	0.00
BEL-ZAF	0.00
DEU-ZAF	0.349
DNK-ZAF	0.00
ESP-ZAF	0.00
FIN-ZAF	0.00
FRA-ZAF	0.651
GRC-ZAF	0.00
IRL-ZAF	0.00
ITA-ZAF	0.00
NLD-ZAF	0.00
PRT-ZAF	0.00
SWE-ZAF	0.00

Country-pair Synthetic	Weight
AUT-AUS	0.00
BEL-AUS	0.00
DEU-AUS	0.875
DNK-AUS	0.00
ESP-AUS	0.00
FIN-AUS	0.00
FRA-AUS	0.00
GRC-AUS	0.00
IRL-AUS	0.00
ITA-AUS	0.125
NLD-AUS	0.00
PRT-AUS	0.00
SWE-AUS	0.00

Country-pair Synthetic	Weight
AUT-CAN	0.00
BEL-CAN	0.00
DEU-CAN	0.840
DNK-CAN	0.00
ESP-CAN	0.00
FIN-CAN	0.00
FRA-CAN	0.160
GRC-CAN	0.00
IRL-CAN	0.00
ITA-CAN	0.00
NLD-CAN	0.00
PRT-CAN	0.00
SWE-CAN	0.00

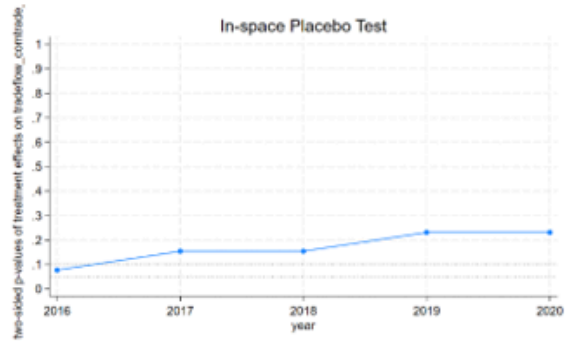Notes: Data obtained with command synth2 in stata (Abadie, 2015).

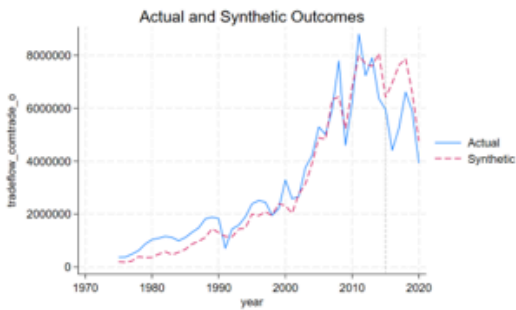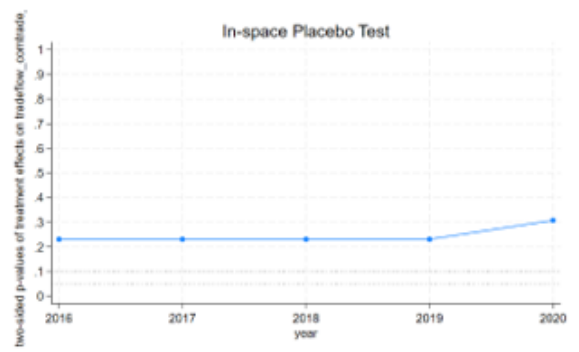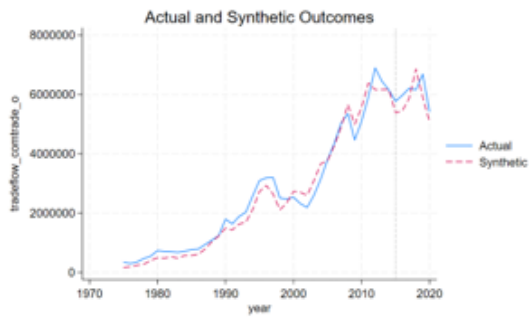# A5. Robustness test, In-Space Placebo
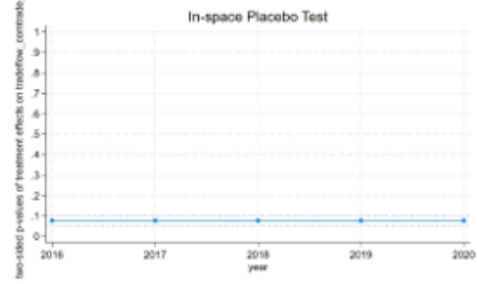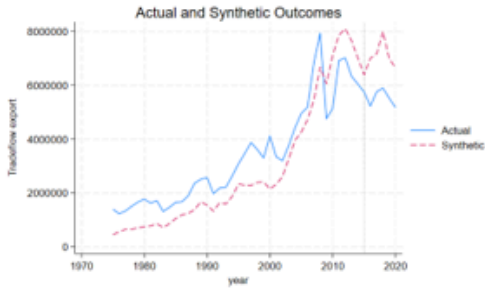
Australia
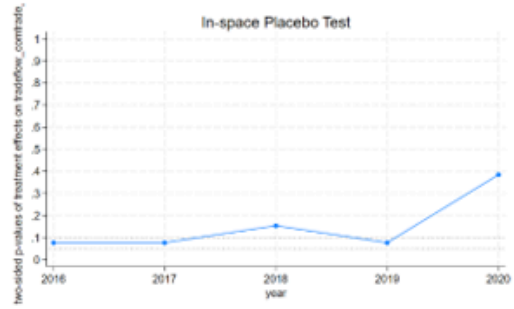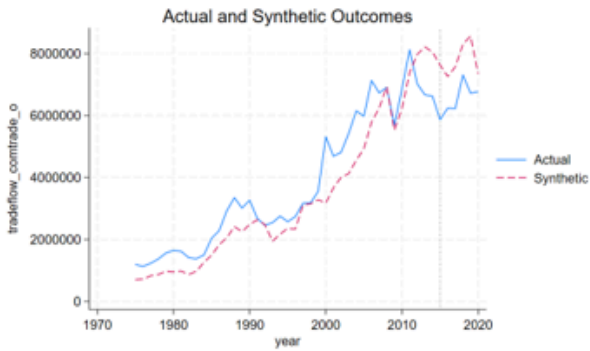
Canada

India

Singapore

Notes: The graphs are obtained with the synth2 command in stata Yan and Chen, 2023).