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The Swedish way: Turning down a common currency and its effects on economic development

A synthetic control method approach

Jan Trudrung

ja1110tr-s@student.lu.se

Abstract: This thesis aims at evaluating the Swedish decision not to adopt the euro even though this is thought to bear economic benefits. In particular, my research confronts the question: What would have been Sweden's economic development if the country would have adopted the euro in 1999? By taking advantage of the synthetic control method, I scrutinize the potential developments of both, Sweden's bilateral trade flows and unemployment rate, respectively. According to the model, bilateral trade flows between the European Monetary Union and Sweden would have been 13.47 percent higher between 1999 and 2019. Moreover, 1.315 million jobs could have been created from substituting the Swedish krona within the same period. Hence, my findings suggest that the Swedish decision has arguably relinquished welfare gains as the country has not joined the European common currency experiment.

Key words: *Common currency area, Sweden, bilateral trade flows, unemployment, synthetic control method*

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List of Acronyms

CEPII Centre d'Études Prospectives et d'Informations Internationales

DOTS Direction of Trade Statistics

ECB European Central Bank

EMU European Monetary Union

ERM Exchange Rate Mechanism

EU European Union

FRED Federal Reserve Economic Data

GDP Gross Domestic Product

ICT Information and Communications Technology

IMF International Monetary Fund

ISO International Organization for Standardization

NATO North Atlantic Treaty Organization

OCA Optimal currency area

PPP Purchasing power parity

UK United Kingdom

UN United Nations

US United Stated

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1 Introduction

Much ink has been shed on the advantages and disadvantages of a common currency in the context of an ever more globalized world. With the signing of the Maastricht Treaty in 1992, European Union (EU, hereafter) member states settled on the euro as their single currency. However, not all of the eligible nations wished to be part of the allegedly largest economic policy experiment (Baldwin, 2006; Calmfors et al., 2012). As of today, 19 countries share this currency and an easing of financial processes is enjoyed by both, companies and private consumers.

Sweden is one of the remaining eight countries of the European Union that holds on to its national currency, the Swedish krona. The decision of the Swedish parliament in 1997 and the opinion of the Swedes themselves in the context of a referendum in 2003 not to join the common currency union gives an incentive to question whether or not this choice has been beneficial for the national economy after almost 20 years past.

Taking an overall perspective, there is a trade-off between enjoying the alleged benefits of a common currency that, for instance, facilitates trade processes between nations and the loss of independent monetary policy which embodies the impairment of macroeconomic tools to use when facing a national demand shock (Obstfeld & Taylor, 2007). According to Österholm (2010), on the other hand, Sweden was able to mitigate large negative effects of the financial crisis in 2008 due to its ability of applying individual fiscal policies. In the light of increasing euro scepticism (see, e.g. Weßels, 2007), the literature presents a gap as it lacks an ex-post comparison between the arguments of euro sceptics and euro advocates.

Facing these circumstances, this thesis, thus, aims at assessing the comprehensive effects of Sweden if the country was to adopt the euro after its introduction. Therefore, the following research question is scrutinized:

What would be the effects on Sweden's economic development
if the country would have adopted the euro in 1999?

As a proxy for economic development, I account for both trade- and unemployment effects in a synthetic setting. Thus, potential benefits and drawbacks can be analyzed and compared with the actual Swedish outcomes. This setting sheds light on the question whether potential benefits outweigh the initial concerns discussed in Sweden and other parts of the world.

In general, the existing literature has so far only examined a one-sided perspective, i.e. whether or not joining a currency union would have been beneficial in the context of trade (see, e.g. Saia, 2017) or whether joining a currency union impedes national sovereignty and the ability to independently steer the economy (see, e.g. Frankel, Schmukler, & Serven, 2004). Thus, to assess whether or not to join a currency union, both alleged positive and negative effects need to be taken into account. The contribution of this thesis therefore rests in the joint examination of two factors, namely the bilateral trade flows and the unemployment rate, as those aspects were heavily discussed during the Swedish referendum in 2003. Hence, this paper aims at closing the gap in the literature by illuminating the context under discussion in a more comprehensive fashion.

By conducting a comparative case study using the novel synthetic control method, I employ data from several sources such as the Penn World Tables (Feenstra, Inklaar, & Timmer, 2015), the International Monetary Fund (IMF) Direction of Trade Statistics (DOTS) data base, the World Bank Indicators or from the Centre d'Études Prospectives et d'Informations Internationales (CEPII). By evaluating the Swedish decision of not joining the euro area, my findings suggest that Sweden's bilateral trade flows and registered unemployment rate would have experienced a positive impact. Average bilateral trade between Sweden and the European Monetary Union would have increased by 13.49 percent whereas the unemployment rate would have been reduced by 0.674 percentage points which translates into more than 1.3 million Swedes being less unemployed.

This paper is structured as follows. Section 2 provides an comprehensive overview of the subject under discussion by stressing the corresponding historical- and theoretical background and examining the related literature. Subsequently, Section 3 introduces the underlying empirical model which embodies the synthetic control method. This comparative study approach aims at answering the aforementioned research question in an innovative manner. The resulting outcomes are displayed in Section 4 and the corresponding implications and limitations are further discussed in Section 5. The final Section 6 closes with concluding remarks.

2 The European Project and its Economic Outcomes

This section provides a background of the overarching topic to the reader. First, Section 2.1 shortly stresses the historical background of the euro and the European currency union. Second, I analyze theoretical implications of adopting a common currency in Section 2.2 before I, third, consult in Section 2.3 relevant and corresponding literature and its entanglements to this study.

2.1 Historical Background

Forming the economic and political body of what is now the European Union has brought economic benefits in terms of freely moving production factors. Both, workers and capital are able to cross borders freely to seek highest rents. In particular, the citizens of the euro area member states have, moreover, already accustomed themselves to the freedom that the introduction of their single currency has brought. For instance, travelling without the need to exchange currencies or issuing financial transactions across national borders is seen as an advantage that is highly appreciated (see, e.g. Ranyard, Burgoyne, Saldanha, & Routh, 2005). However, the idea of the euro has come a long way.

2.1.1 The Evolution of the European Monetary Union

After World War II, the six founding member states of the European Coal and Steel Community, the starting point of the European Union is today, signed the famous Treaty of Rome in 1957 in order to strengthen economic ties.[1] Increased cross-country economic activity was thought to be crucial in order to prevent future war outbreaks between the involved countries (Dinan, 2004). Already in 1968, the Luxembourgian minister of finance Pierre Werner proposed a single and shared currency for all European states to use. The so-called Werner Plan presented a guideline on how to establish this currency within the next ten years (Werner, 1970).[2] This thought was buried, however, with the collapse of the Bretton Woods system and, later, the oil crisis in the 1970s.

[1] The founding members consists of France, West Germany, Italy, Belgium, the Netherlands, and Luxembourg (Dinan, 2004).

[2] This guideline aimed at a parallel functioning of embodied states and sought to arrive at stronger European institutions and a centralized power over economic policies within the final stage of the plan (Werner, 1970)

Nonetheless, European economic integration has been further strengthened with the implementation of the Single Market Programme in 1985 (Scheinert, 2021).[3] Besides the elimination of high transaction costs and uncertainties in regards to exchange rate fluctuations, economic integration has additionally been seen as a preventive measure to avoid the outbreak of war by fostering political and economic interdependencies (Dinan, 2004).

Eventually, in 1992, the incumbent member states of the European partnership settled on the Maastricht Treaty to introduce a currency, namely the euro, as a common means of payment. The general idea of a common currency has been introduced to complete the European internal market which can be compared to the case of the United States (Eichengreen, 1990). The European Monetary Union, as stated in the Treaty of Europe, was implemented in three different stages. In the beginning, i.e. between 1990 and 1993, free movement of capital between member states has been implemented which paved the way to further and even deeper economic integration. Subsequently, from 1994 until the end of 1998, economic policies of the member states have been gradually harmonized and aligned. This increasing coordination of national central banks' activities has been synchronized by the European Monetary Institute which represents the forerunner of the European Central Bank (ECB, hereafter). This development led to the third and final stage that launched on January 1^{st}, 1999. The ECB in Frankfurt, Germany, took over the decision-making in the context of monetary policy for the EMU member states. At this stage, national budgetary rules became binding and members that fail to meet certain targets risk to face disciplinary measures (Scheinert, 2021).

For eligible countries that are willing to become a part of the EMU after its initiation, four distinct convergence criteria are in place (Blanke & Mangiameli, 2013). First, a country's inflation rate must not exceed the range of 1.5 percent of the three most stable countries. Thus, stable prices must be guaranteed. Second, government bonds need to verify low interest rates. Before joining the EMU, a respective country must not showcase a relatively higher interest rate in comparison to the three most stable countries within the EMU. Third, the governmental debt must not exceed 60 percent of a country's GDP in order to ensure sound state finances. Additionally, new debt be-

[3]The establishment of the European Single Market has paved the way to the creation of an internal market with the abolition of, for instance, border controls and tariffs (Froot & Rogoff, 1991).

ing issued by governments shall not exceed 3 percent of a country's annual GDP. And fourth, two years prior to becoming a member of the EMU, a country must display a stable exchange rate, hence, being a member of the exchange rate mechanism (ERM). These convergence criteria are key to ensure the success of the Stability and Growth Pact which is signed by the European member states to agree on fiscal rules. These rules require members to not exceed their budget and minimize the risk of free riders (see, e.g. Beetsma & Uhlig, 1999).

Thus, to fulfill its main objectives, monetary policy tools are applied centrally for all EMU member states by the European Central Bank in Frankfurt. In detail, the EMU embodies three main objectives (Scheinert, 2021). First, the monetary policy follows the strategy of ensuring price stability. Second, the single monetary union allows for the prevention of macroeconomic imbalances within and across member states. And, third, the EMU most notably aims at completing the project of a European single market.

To this date, 19 European Union member states shape the euro area and substituted the euro for their national currency. However, as stated in Section 1, eight other EU member states have not yet joined the EMU. Countries such as Poland, the Czech Republic, Hungary, Croatia, Romania and Bulgaria are at the verge to meet the above-mentioned criteria of convergence. Denmark is a special case since the country has chosen to opt-out and therefore continues to use its national currency as their means of payment. Lastly, Sweden holds on to its national currency, the Swedish krona. Just like Denmark, the Swedish case is special in itself and is elaborated further in the next Section 2.1.2.

2.1.2 The Swedish case

On Sunday, September 14^{th}, 2003, the Swedish population was called upon to cast their votes in regards to the question whether or not Sweden should become a member of the EMU. This unique referendum gave eligible voters the choice of three options to one simple question, i.e. "*Do you think that Sweden should introduce the euro as its official currency?*".[4] This rather simple question, however, entails drastic economic and political consequences depending on the outcome of the referendum (Vlachos & Jonung,

[4]As I describe in the end of this section, the option for the eligible voters was to either approve or disapprove of the euro or to leave their ballot paper blank (Vlachos & Jonung, 2007).

2007).

Since Sweden suffered from an economic crisis in the 1990s, a governmental report suggested to postpone the country's introduction of the euro to a later stage than 1999 (Agell, Calmfors, & Jonsson, 1996). Given the uncertainties, doubts and concerns among the population, it was decided to hold a referendum for this momentous decision.

Before the referendum was held, the expected benefits and costs have been clearly communicated and transparently discussed. Especially among economists, this was a highly debated topic. For instance, high-ranked national economists were afraid of losing the tools to individually adjust monetary policy in order to respond to country-specific and asymmetric shocks (Vlachos & Jonung, 2007). The Swedish government issued two main reports in order to stress the potential outcome and consequences of the decision by the people which is based on the economic theory of optimum currency areas (see, e.g. Agell et al., 1996).[5]

The report by Agell et al. (1996) examines the potential outcome of relinquishing monetary policy independence while adopting a common currency in terms of employment. Given the updated analysis by Calmfors et al. (2012), the authors conclude by stating five distinctive points. First, it is argued that countries like Sweden and the UK still can take advantage on dealing with individual demand shocks while staying outside the currency union given that nominal prices and wages are somewhat flexible. Second, Calmfors et al. (2012) argue that it is highly improbable for countries outside the EMU to experience any monetary policy constraints. Third, the authors suggest the possibility of substituting changes in the exchange rate with an adjustment in the national expenditure policies once a country joins the EMU and allegedly looses its monetary policy independence. However, this proposal cannot be seen as a perfect substitute (Calmfors et al., 2012). Fourth, becoming a member of the currency union leads to wage outcomes that are highly unpredictable (Calmfors et al., 2012). At the time of the report, the authors can only rely on theoretical predictions which anticipate money wages to be more rigid. Lastly, Calmfors et al. (2012) assume the EMU membership not to have an impact on structural unemployment. Overall, the article does not lead to a clear conclusion whether or not joining the EMU is beneficial due to great

[5]The so-called OCA theory is further discussed in Section 2.2

uncertainties about the development of the EMU at that time.

Also due to this uncertainty, the topic was highly-debated among Swedish citizens and researchers as either option implies different consequences for the country. Above all, deciding to become a member state of the EMU entails an irrevocably adoption of a fixed exchange rate which is imposed by the European Central Bank. Thus, the euro would have replaced the Swedish krona which was introduced in 1873. The pro-EMU campaign within the country has argued in favor of the amalgamation by emphasizing on potential overall benefits (Vlachos & Jonung, 2007). In particular, trade and competition were expected to increase. Being more integrated in the European market, Sweden could have, according to the supporters, experienced economic growth given a decreasing interest rate and an increase in national employment. Alternatively, rejecting the opportunity would imply a continuity of the status-quo. Hence, Sweden's monetary system would remain under a freely floating exchange rate. The Swedish krona would remain in place as the national currency and the Swedish central bank *Riksbank* would continue to pursue country-specific monetary policies. The latter point embodies a crucial argument of the opposing camp. The loss of the monetary policy independence has been seen like a loss of an insurance value which can be applied in case of national demand shocks (Vlachos & Jonung, 2007). Shifting power from the Swedish central bank towards the ECB in Frankfurt would imply to leave the decision-making up to order with a bank that determines one policy for all incumbent member states. In contrast to the supporters, the antagonists argued that unemployment would rather rise and reach the EMU average since policymakers would not be able to tackle the country-specific issues. In addition to this, the euro as a currency has just been introduced and there was no assurance that over time, it can develop to become a stable and reliable currency (Vlachos & Jonung, 2007). One other powerful argument of the No-voters was that a rejection of the euro at this time does not mean that Sweden could adopt the currency at a later stage, whereas joining the EMU would be complex to reverse with the risk of macroeconomic turmoil (Vlachos & Jonung, 2007). Widfeldt (2004) argues that a significant share of the euro antagonists simultaneously fear the loss of national identity by joining the common currency union. On average, this share of the population tends to be critical towards development aid, globalization, multiculturalism or migration among others (Widfeldt, 2004).

Thus, the debate within the economics profession was clearly characterized by a trade-off between monetary stabilization on the national level and efficiency gains but also fueled by cultural and national uncertainties (Vlachos & Jonung, 2007; Widfeldt, 2004). Moreover, the general public debate added to this by, for instance, discussing the issue of income inequality or an potential increase in the Swedish unemployment rate if Sweden was to join the euro area.

Receiving significant interest from the people, the turnout of the referendum amounted to 82.6 percent of the eligible population. After counting all the votes, the majority, i.e. 55.9 percent, voted to maintain the Swedish krona as the national currency and therefore not to join the EMU. On the other hand, 42 percent voted to join whereas 2 percent submitted a blank vote (Vlachos & Jonung, 2007).

2.2 Common Currency and Economic Development

The idea of creating one shared currency for several countries has been argued to be beneficial for the member states as it mitigates the transaction costs, facilitates international trade and fosters cross-country investment (Krugman, 2013; Obstfeld, 1998). Based on the theory, however, the adoption of a common currency a-priori involves addressing a trade-off for each individual country. The theoretical implication of the unification of currencies are stressed in this section by highlighting the theory on optimal currency areas.

This idea of the above-mentioned trade-off has been acknowledged first by Mundell (1961). To start with, Mundell (1961) hypothesizes that a common currency union would be favorable in coexistence with free factor mobility between the member states of that area. By acknowledging this fact, it is arguably possible for countries to adapt to a national shock fueled by, for example, inflation. Hence, labor will move from one location to where wages are higher. Thus, the overall economy can find itself in an equilibrium state in which real wages are equalized according to the theory (Mundell, 1961). Moreover, Mundell, who is the winner of the price in memory of Alfred Nobel, additionally acknowledges that one single central bank is coordinating the monetary policy for all member states. Therefore, Mundell (1961) stresses that the OCA member states should not only be relatively equal in terms of characteristics but also limited in numbers to allow for a adequate guidance of the monetary policies.

In general, the trade-off that economies face can be explained as follows. Especially with increasing international trade in an ever more globalized world, policymakers are concerned with the macroeconomic tools that are left to control a country's economic development. Three factors are generally of particular interest for policymakers to safeguard national economies (Obstfeld, 1998).

First, a government aims at stabilizing its exchange rate in a way that, for instance, import and export prices do not immensely fluctuate across time. A rather unstable exchange rate therefore impedes economic planning of agents within the national economy since the price level of a produced good cannot be adequately presumed which poses a disincentive to economic activity. Second, the interest rate is desired to be stable and controlled to secure borrowing and lending money. Third, capital is needed to move freely to obtain additional economic gains from, for instance, foreign investments. The absence of capital controls imply that there are no barriers for capital such as the conversion from one currency to another which embodies transaction costs. Money being readily convertible entails that one can expect a large financial inflow through, for example, foreign direct investment but simultaneously this can be deemed risky once money starts flowing out of the country to be invested elsewhere where expected returns are higher (see, e.g. Sheng, 2011).

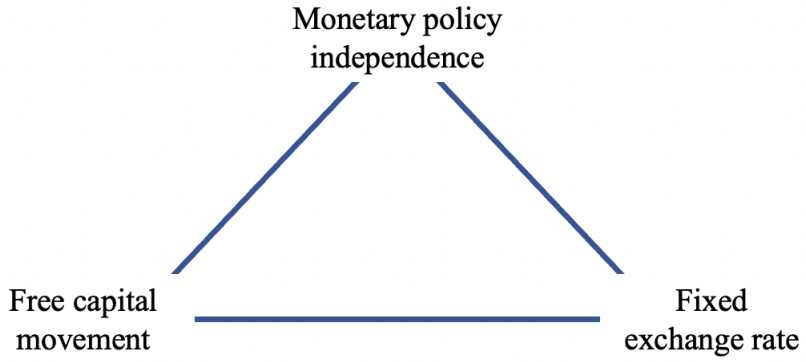


Figure 1: The Impossible Trinity
Based on Obstfeld and Taylor (2007)

Figure 1 graphically depicts these three aspects in a stylized manner. However, being able to direct all three aspects remains unfeasible for policymakers. History has shown that the three aforementioned aspects of macroeconomic theory are deemed to be incompatible with one another in the long-run (Scheinert, 2021). Together, these

tools constitute the so-called impossible trilemma (Obstfeld, 1998).[6] Therefore, each individual country faces this issue and eventually chooses an exchange rate regime by giving up one of the three aforementioned aspects. Therefore, there exists no perfect regime and individual countries must make a choice on which two out of the three aspects to hold on to.

The impossible trinity is somewhat observable in the real world. For example, the United States or Sweden enjoy a free flow of capital and independent monetary policy. However, the countries do not manage to have a fixed exchange rate. In general, a country can lower the interest rate in order to stop unemployment to rise given a domestic demand shock. If simultaneously the capital is readily convertible, capital flows out of the country and to where interest rates are higher (Obstfeld, 1998). At the same time, this affects the exchange rate automatically, hence, a fixed exchange rate is not feasible. China, on the other hand, keeps control over its exchange rate and pursues its monetary policy independently. In turn, financial flows are limited as the capital cannot move freely in and out of the country. Lastly, Hong Kong has its currency pegged to the US Dollar and therefore the country has a fixed exchange rate regime. In addition, being a financial center of the world, capital flows relatively freely in and out of Hong Kong. This implies that Hong Kong cannot follow its own monetary policy independently as the their currency reacts in correspondence to the monetary policy set in the US. Hence, a country's decision for its exchange rate regime given the impossible trinity highly depends on its individual priorities and circumstances.

Overall, the European currency area provides benefits to its members such as a lower and more stable inflation rate, lower interest rates and increasing trade (Krugman, 2013). Given the theory derived in this section, joining such currency union comes with the costs of loosing the independent monetary policy and the resulting ability to respond to domestic demand shocks immediately.

Sweden has chosen not to join the common European currency. Hence, the country enjoys its sovereignty over the monetary policy tools and a fixed exchange rate on the one hand, however, misses to appreciate capital to move freely due to existing transaction costs. Hence, Sweden has made its decision after facing the trade-off between alleged welfare gains through the adoption of a common currency and potentially in-

[6]The impossible trinity or the unholy trinity are synonyms for this concept and therefore describe the same notion throughout this thesis.

creasing trade volumes and the loss of independent monetary policy. Besides their internal economic crisis and resulting economic instability, the Swedes seemed to be relatively hesitant towards the euro project given the allegedly serious concerns raised by some economists (Krugman, 2013).

This theoretical background sheds light on the trade-off and its economic implications for a country when facing the decision to join a common currency. Undoubtedly, this perspective is purely economical and misses the intrinsic doubts of the eligible voters in the Swedish referendum, hence, other factors such as cultural identity.

2.3 Literature Review

In the following, I first discuss contributions that are related to trade before I, second, provide an overview of the discussion linked to unemployment. These contributions have either a linkage to common currencies or they employ the synthetic control method on which I specifically stress in the last part of this section. Eventually I derive hypotheses for this thesis from the underlying literature.

2.3.1 Trade

The European monetary experiment has been analyzed on a broad scale by Lane (2006). The author aims at disentangling the effects on the individual macroeconomic performances of the European Monetary Union member countries since the introduction of the euro in 1999. For instance, Lane (2006) argues, on the one hand, that a single sized monetary policy turned out to be not perfectly suitable to all underlying entities due to the interest rate that is decided centrally for all member states. On the other hand, however, trade and general market integration benefits, given the lower barriers, have already started to unfold and are expected to increase even more in the near future. With more countries unifying their currencies in the euro area, these aspects of both ends are expected to intensify even more (Lane, 2006). Lane (2006) concludes that the idea of the EU has been motivated by deepening the economic and political integration. At that time, the unknown development of the EMU in the near future is, however, seen as an uncertainty which should be taken into account by any country that considers joining the monetary union (Lane, 2006).

The literature regarding the general impacts of common currency union on economies

are rather extensive. According to Frankel and Rose (2002), trade is the driving factor of economic development which substantially increases within a currency union environment. In general, the paper aims at estimating the effects of currency unification on income per capita through trade using a two-stage approach. To conduct their analysis, the article studies more than 200 countries and constructs a data set including both economic- and geographic data. With this data, Frankel and Rose (2002) first employ a gravity model to arrive at the general beneficial effects of a unified currency. In order to create a two-stage linkage between currency unions and income per capita via trade, an instrumental variable approach is followed. In the first stage, the scholars estimate trade using a common gravity equation framework. Obtaining the estimates, this prediction of trade is then used for the second stage within an output equation as it is arguably exogenous, however, highly related to actual observed trade (Frankel & Rose, 2002). The analysis shows that a one percent increase in trade augments income per capita by one third of a percent over a twenty year period. However, Frankel and Rose (2002) emphasize on the size of potential partner countries to matter when creating or joining a common currency area. For large countries like Poland, the authors expect an increase of per capita income by a factor of five from joining the euro area. Overall, the authors find that trade has an even more beneficial effect on a country's economic development than what can be linked to macroeconomic actions by a single state such as regulating the interest rate (Frankel & Rose, 2002).

Reversely, leaving a common currency union results in the decline of economic performance. Glick and Rose (2002) investigate the economic effects on 217 countries when leaving a common currency union between 1948 and 1997. With a focus on trade on the global level, the authors find that bilateral trade flows significantly decline if a country decides to abandon a shared currency. The findings by Glick and Rose (2002) therefore imply that there is, indeed, a certain benefit to unifying ones currency with its economic partners. According to Frankel and Rose (1997a and 1997b), it is mostly countries with a close trading relationship and those with similar business cycles that create a shared currency when examining currency areas on a global level.

With a particular and single focus on trade, the first approach to assess the effects of the euro area has been conducted by Micco, Stein, and Ordoñez (2003). Four years after the establishment of the euro, the authors provide an economic analysis of the

gains from forming the EMU especially in the light of countries such as the UK, Denmark or Sweden that have not adopted the euro. Thus, Micco et al. (2003) confront the question whether or not the EMU is economically beneficial for member states. In doing so, bilateral trade flows for 22 industrialized countries are examined for the period between 1992 until 2002 and taken from the IMF Direction of Trade Statistics data set. The data is estimated in a classical way using a gravity model with country pair fixed effects. According to the authors, joining the European Monetary Union increases intra-EMU bilateral trade flows for individual countries by four to ten percent. Bilateral trade flows with countries outside the union are even found to be increasing by eight to sixteen percent. In addition to this, Micco et al. (2003) find no international trade diversion and that the national implementation of the euro yields higher trade with not only other EMU states but with the rest of the world, too.

2.3.2 Unemployment

One major contribution of this thesis is the examination of the Swedish unemployment rate. This field remains relatively scarce in the literature and providing such a comprehensive picture has, to my knowledge, not been done. In order to provide a holistic picture of the Swedish decision not to introduce the euro, I additional aim at shedding light on a allegedly downside of a currency union since an intensification of further economic integration has been the fear of the Swedish euro sceptics at the time of the referendum in 2003.

Section 2.2 emphasizes on, for instance, the critical loss of independent monetary policy. Corresponding factors such as the interest rate or inflation are not feasible to examine as the euro area represents only one common value or values with low variation for the each respective indicator. Lowering a country's unemployment rate, once being in a currency union, remains rather difficult for governments as only an expansionary governmental spending embodies a single potential instrument (see, e.g. Kahanec, 2013; Krugman, 2015). Therefore, studying the unemployment rate is arguably the most appropriate choice to mirror potential drawbacks of adopting a common currency.

Schmitt-Grohé and Uribe (2016) investigate the question of whether or not inefficiencies derive from the combination of a fixed exchange rate regime and free capital

mobility for a country's welfare level. Deriving a theoretical stochastic model, Schmitt-Grohé and Uribe (2016) hypothesize that a pegged currency may lead to national welfare losses due to an inadequate exchange rate. Applying their model to the case of Greece, the authors find that a suboptimal exchange rate, indeed, has led to large welfare costs in terms of both consumption and average unemployment levels. According to Schmitt-Grohé and Uribe (2016), after the event of a shock, wages do not fall quickly enough. With a government not being able to deflate real wages due to the constraint of being part in a fixed exchange rate regime, i.e. for instance a common currency union, these high real wages lead to a rise unemployment levels (Schmitt-Grohé & Uribe, 2016). Projecting these findings on the case of Sweden implies that giving up their floating exchange rate regime might arguably entail large welfare costs for the country.

Before the EMU was created, scholars had doubts concerning an improvement related to a decline in member states' unemployment rates. Eichengreen (1990) describes a potential development in Europe based on the experiences in the United States. As discussed in Section 2.1, the biggest intention of the common European currency was to complete the European internal market. However, Europe lacks such high degree of factor mobility as observed in the US (Eichengreen, 1990). If labor was perfectly mobile, this factor could move to where the specific skills are demanded. Hence, unemployment would theoretically be minimized towards the initial equilibrium state. Due to existing barriers of EU-internal migration such as language or culture, unemployment can arguably not be reduced (Eichengreen, 1990).[7]

2.3.3 Synthetic Control Method in Action

In general, the underlying research of this thesis tackles the case of Sweden's potential gains or losses if the country would have chosen to become a member of the European Monetary Union in 1999. This case study could traditionally be examined using methods such as the so-called Difference in Differences approach. However, the economic literature increasingly enjoys a method that finds it roots within a contribution by Abadie and Gardeazabal (2003) in which the scholars compare the actual outcome of terrorism in the Basque region to a synthetic counterfactual that is constructed using

[7] Indeed, in the years after the establishment of the EMU, member states experienced different unemployment trajectories (for more information, see House, Proebsting, & Tesar, 2018).

the weighted average of a set of comparable units.[8] For the first time within an economic context, the authors not only invent, discuss and display the method but they further enhance it within a working paper series (Abadie, 2021; Abadie, Diamond, & Hainmueller, 2010, 2015). In one of these articles (Abadie et al., 2010), the researchers additionally provide a methodological analysis by discussing the advantages such as its transparency and a safeguard against extrapolation (Abadie et al., 2010). Hence, the studies by Abadie and co-authors show that the synthetic control method is applied to different scenarios and research questions. Hence, creating a synthetic counterfactual has been the main contribution by Abadie and Gardeazabal (2003) since this novel approach received stark interest in the academic sphere afterwards.

Therefore, the synthetic control method increasingly enjoys attention from trade economists, too, since scholars can easily isolate specific effects and derive meaningful results from a comparative case study (Abadie & Gardeazabal, 2003). In assessing a substantial infrastructure project, Persson, Soegaard, and Tärneberg (2021) examine the effects of trade between Sweden, Denmark and other countries. The Øresund bridge resembles a fixed link that interconnects Denmark and Sweden. With its opening in the year 2000, the bridge was thought to boost the economic integration of the two countries with the rest of the region. And indeed, the authors find a substantial increase of 24.6 percent in bilateral goods trade. By employing their synthetic counterfactual, Persson et al. (2021) make use of four different pre-bridge country-specific characteristics that are linked to a gravity model setup, namely a country's annual log GDP level, the weighted distance between each respective country and two dummy variables that equal to one if countries share a border or are members of the EU, respectively. Their main data sources are, for instance, CEPII and the UN Comtrade database. Using aggregated trade flows in billion US Dollar as their variable of interest, the authors transparently assess the costly infrastructure project. All in all, given their analysis, the fixed link between Denmark and Sweden can be seen as beneficial for all involving countries.

The trade effects of a country by synthetically joining the European Monetary Union have been assessed by Saia (2017). In his contribution, the scholar focuses on the United Kingdom as the country of interest. Using the synthetic control method, Saia

[8] I further discuss the methodological details and advantages of the synthetic control method to the traditional approaches in Section 3.

(2017) estimates a 16.9 percentage increase in the UK trade flows to the euro area, if the country would have joined in 1999. Using trade data from the IMF DOTS (Marini, Dippelsman, & Stanger, 2018), the author uses the average of a country pair's annual bilateral trade flow. To constitute the model, five pre-euro country pair characteristics are observed in order to minimize the distance between the truly observed trade flow and its respective synthetic counterfactual.[9] In general, the research question and the model employed are closely related to the focus area of this thesis. Therefore, a fragment of the empirical strategy that I follow in this paper resembles the model by Saia (2017) which is further explained in Section 3. However, by solely focusing on trade effects, the author neglects essential reasons for a country not to join a currency union. Even though the author acknowledges this drawback, the literature remains scarce in a proper evaluation of this issue under discussion. Hence, one needs to elaborate on both the potential gains and potential losses of taking such a drastic economic decision.

Moreover, examining unemployment has been done likewise within the synthetic control method context by a few scholars. As stated in Section 2.3.2, applying this technique to the context of unemployment, however, remains scarce. For instance, Stricker and Baruffini (2020), focus on unemployment rate on the canton-level in Switzerland and whether or not it is affected by the revision of the Swiss law of unemployment insurance. The authors investigate the policy change in relation to the Swiss unemployment insurance law with a focus on the Tircino region in the year 2011. Overall, the pre- and post period examined span from 1994 to 2016 and, given the treatment in 2011, the authors find a reduction in Tircino's unemployment rate. However, the figure was still 1.8 percent higher compared to the weighted average of the cantons in the donor pool. Hence, the limitation of the maximum insurance period for unemployed persons helped to reduce the Swiss unemployment rate (Stricker & Baruffini, 2020). To precisely construct the model, several predictor variables are utilized in order to investigate a canton's unemployment rate. For instance, employment growth, poverty index, the percent of social aid, percent of high-school graduates, unemployment share natives, unemployment share foreigners or the percent of third sector firms

[9] The unit characteristics applied by Saia (2017) encompass the values of bilateral trade flows, the sum of the log GDP values of two trading countries, the log distance between country i and j, a contiguity dummy that takes the value one if a country pair shares the same land border and a language dummy that indicates whether a country's language is spoken by at least nine percent by the trading partner's population.

are employed in order to compute the unit weights for the synthetic control method.

Aside from Stricker and Baruffini (2020), the synthetic control method has been employed to investigate labor market shocks by Eren and Ozbeklik (2016), too. The scholars study the effects of a so-called right-to-work labor law in Oklahoma, United States, on labor market outcomes. Even though the overarching topic is not related to currency unions as such, technical details related to the underlying model presented are insightful in order to amplify my model regarding the unemployment analysis. The authors use several unit characteristic variables that differ from the ones used by Stricker and Baruffini (2020). Compared to the aforementioned study, Eren and Ozbeklik (2016) predict their synthetic trajectory using the log of population, log of income per capita, log of the land size unit or the urbanization rate. Overall, the authors find the labor law not to have an effect on outcomes such as employment or average wages.

After reviewing the academic literature in the context of the underlying research question, I hypothesize that joining the EMU would have brought benefits for Sweden in terms of the expansion of trade. Hence, Sweden joining the euro is therefore expected to fuel the country's bilateral trade flows. In regards to the development of the Swedish unemployment rate in the light of a synthetic adoption of the euro, the literature remains relatively scarce. Thus, hypothesizing the Swedish outcome of the unemployment rate remains rather difficult. Given the discussed literature above, the synthetic unemployment could be expected, on the one hand, to increase given the governmental loss of monetary policy. On the other hand, however, the increase in bilateral trade flows can also fuel the creation of jobs. Depending on the outcome of the units in the donor pool, their characteristics and weights to mimic Sweden, the empirical outcome in Section 4 will shed lights on this dichotomy.

In general, the underlying research presents a gap in the existing literature. The contribution of this thesis rests in illuminating both sides, i.e. the stand of the euro advocates and euro sceptics, respectively. In doing so, I subsequently scrutinize the synthetic bilateral trade flows and the hypothetical unemployment rate, respectively, in order to assess the Swedish decision not to join the European Monetary Union in 1999.

3 Methodology

This section elaborates on the synthetic control method applied in order to answer the aforementioned research question. After elaborating on the general design of the model and its advantages compared to other comparative case study approaches in Section 3.1, the data applied is presented in Section 3.2. The case specific empirical designs of the trade and unemployment analysis are outlined in Section 3.3 and Section 3.4, respectively.

3.1 Empirical Design

By conducting a comparative case study empirically, researchers often encounter a real world scenario in which a specific treatment affects a specific unit of interest. To assess the effect of this treatment, the treated unit is compared to another unit, namely the control group, which has not experienced this intervention. This control units acts as the so-called counterfactual of the unit of interest to which it is compared to later in the post-treatment period. Several conditions and requirements, however, must hold to meaningfully compare the two units under discussion. For instance, both the treatment and control group must develop in a parallel trend during the pre-treatment period (Huntington-Klein et al., 2021). In doing so, researchers are able to compare potentially diverging development pathways based on a specific intervention, treatment or shock. This so-called Difference in Differences approach can therefore only be employed once the setting is favorable. However, several concerns arise. First, the control group consists of only one control unit which aims at mimicking the unit of interest in the pre-treatment period. In reality, however, finding a counterfactual unit that experienced such parallel trend to the treatment group is challenging. Second, choosing only one counterfactual unit yields a questionable outcome in terms of general representation. Moreover, in the context of traditional comparative case studies, the claim of inference is rather difficult for several reasons according to Abadie et al. (2015). Most importantly, due to the absence of randomization and usually a small sample size, the significance of these conventional comparative case study approaches are dubious. However, since the synthetic control method is estimating its counterfactual based on a weighted average of units within the donor pool, the method automatically evades

these issues (Abadie et al., 2010). In this thesis, I aim to analyze the economic effects for Sweden when becoming a part of a currency union consisting of several countries, notably the EMU. Hence, it is not guaranteed that only one country imitates the potential development of the country under hypothetical treatment (Persson et al., 2021). Third, the selection of one unit out of a variety of suitable units often leads to an arbitrary an nontransparent procedure within the estimation process (Saia, 2017).

In recent years, the synthetic control method gained ground in economic research initiated by the contribution of Abadie and Gardeazabal (2003). The aforementioned selection bias can be circumvented since the counterfactual is constructed in a transparent and rational manner. When constructed properly, an algorithm puts weights on several control units that are not affected by assumption by the treatment (Abadie et al., 2010). These weights are set depending on the pre-treatment unit characteristics that are compared to the treatment unit which I further explain below. Hence, I subsequently employ, adapted from Abadie and Gardeazabal (2003), Abadie et al. (2010, 2015) and Abadie (2021), the synthetic control method given its above-mentioned advantages to address comparative case studies.

Following Abadie et al. (2015), assume that there are $C + 1$ units of which $c = 1$ represents the unit of interest, namely the so-called treated unit.[10] The treatment in the case of this presented research resembles not to adopt the European common currency, i.e. the euro. Furthermore, the units $c = 2$ to $c = C + 1$ embody potential comparison units. These comparison units constitute the so-called donor pool. For the synthetic control model to present meaningful outcomes, it is important for the elements within the donor pool to experience similar structural processes (Abadie et al., 2015).[11]

Moreover, assume that the data available spans across the period $T = T_0 + T_1$ which consists of pre-treatment periods, T_0 (with $T_0 > 0$), and post-treatment periods, T_1 (with $T_1 > 0$) with the shock occuring in $T_0 + 1$. By assumption, the unit of interest is exposed to the treatment during the periods $T_0 + 1, ..., T$. A crucial assumption has to be made being that the treatment itself has no effect on the pre-treatment periods ($t < T_0 + 1$). The overarching objective of the synthetic control method and, thus, of this study is to measure the treatment effect on a post-treatment outcome. Consequently,

[10] Given the aim of this thesis, the units generally symbolize countries with Sweden resembling the country of interest.

[11] The underlying structural process represents the adoption of the euro. The constructed donor pool is described in more detail in Section 3.2.

applying this method requires a longitudinal data set that covers a relatively long pre-treatment period. This allows for a more precise matching process of the units within the donor pool that later combined create the synthetic counterfactual. Abadie et al. (2015) argue that a longer pre-treatment period additionally circumvents measuring concerns such as potential heterogeneity. Intuitively, the counterfactual is constructed only by those comparison units that resemble the unit of interest the closest, i.e. the so-called synthetic control units. Hence, it is assumed that the country of interest and these specific comparison units produce similar trajectories over time.

The matching process of the units within the donor pool on the unit of interest are calculated by an algorithm-driven procedure that draws on pre-intervention unit characteristics. As stated above, one advantage of the synthetic control method rests in the combination of the comparison units that form the counterfactual. In this way, the characteristics of the unit of interest can be best approximated instead of comparing the treatment unit to one single non-treated unit as it is done, for instance, in the Difference-in-Differences approach. The synthetic control, i.e. the counterfactual, is computed as the average of the comparison units within the donor pool weighted by their pre-treatment characteristics. Hence, assume a $(C \times 1)$ vector to embody the synthetic controls which is combined with a vector of weights $\boldsymbol{W} = (w_2, ...w_{C+1})'$, where the weights are chosen in a non-negative fashion ($\sum_{c=2}^{C+1} w_c = 1$, and $w_c = [0, 1]$).

Assume to let the $(k \times 1)$ vector $\boldsymbol{X}_1$ entail the unit of interest's characteristics within the pre-treatment period. The unit characteristics of the donor pool's units are captured by the $(k \times C)$ matrix $\boldsymbol{X}_0$. After obtaining the pre-treatment unit characteristics, the optimal synthetic control can be calculated according to Equation 1, following Abadie et al. (2015).

$$W^* = \sum_{m=1}^{k} (X_{1m} - X_{0m}W)^2, \tag{1}$$

where the subscript m describes the m-th variable of a specific unit characteristic for the treated vector and non-treated matrix, respectively ($m = 1, ..., k$).

Furthermore, take Y_{ct} as the outcome variable of interest for unit c at time t. Consider further the $(T_1 \times 1)$ vector $\boldsymbol{Y_1}$, i.e. $\boldsymbol{Y}_1 = (Y_{1T_0+1}, ..., Y_{1T})'$. This vector incorporates the outcome values for the treatment unit in the post-treatment period. In a similar fashion, the $(T_1 \times C)$ matrix $\boldsymbol{Y}_0$ depicts the post-treatment values for all $c + 1$ units.

The effect of the intervention can subsequently be calculated as the difference between the two resulting observations (Δ^{rs}) in the post-treatment period ($t \geq T_0 + 1$). These observations are derived from both, the actual data and the constructed synthetic development using the weighted average of the units within the donor pool derived from Equation 1.

$$\Delta^{rs} = Y_{1t} - \sum_{c=2}^{C+1} w_c^* Y_{ct} \tag{2}$$

To arrive at a general assessment of the Swedish decision not to join the euro, one of this article's contribution is to not only look at one hypothetical outcome but to inform about the realization of the Swedish hopes and fears concerning the adoption of the euro. Hence, I aim at assessing whether or not joining the EMU would have led to an increase or decrease in the bilateral trade flows and the Swedish unemployment rate.

3.2 Data Description

In order to pursue with the analysis stated above, I consult several data sources to construct a wealthy data set which is elaborated in the following.

Overall, the data scrutinized spans from 1980 until 2019. However, since data on unemployment rates becomes relatively more scarce in the early 1980s, I restrict the second analysis to the period between 1983 and 2019. The year 1999 resembles the treatment period, hence, the year in which Sweden would have adopted the euro. I take 1999 as the intervention year since the EMU member states in the constructed data set adopted the euro all at once at this point in time, even though Section 2.1.2 stresses that due to the economic crisis in the early 1990s, the country was by that time not fully recovered. Therefore, one could argue that the year 2003 or even 2005/2006 are more suitable.[12] However, by testing these different treatment years on the data, the effect vanishes because an increasing trade effect for the member countries came into place right after the adoption of the common European currency.

As described in the previous Section 3.1, conducting the synthetic control methodology requires a donor pool from which a synthetic counterfactual can be constructed

[12] According to Vlachos and Jonung (2007), with a positive outcome of the referendum towards the euro, it would have taken two to three more years before the euro would have been introduced in Sweden.

and therefore a country's synthetic development studied. The most suited donor pool consists of units that did not experience the examined intervention, treatment or shock. In the case of the underlying research question, the donor pool, thus, consists of the European countries that indeed have adopted the euro as their national currency at the time of its introduction in 1999. Hence, the donor pool embodies Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain.[13]

In the context of the trade analysis, I utilize bilateral trade data taken from the International Monetary Fund (IMF) Direction of Trade Statistics (DOTS) (see, e.g. Marini et al., 2018). For every observed country, I utilize a country's import and export data in order to create the main variable of interest, namely the bilateral trade flows. The annual data available is described by the DOTS database to represent the total value of merchandise exports and imports. In accordance with Saia (2017), I generate the main variable of interest by taking the average of summed trade flows between partner country i and the respective reporter country j for each year t. This allows to obtain one data observation for one country pair at one point in time. In addition to this, I add the lag values of bilateral trade flows for the year 1980, 1990 and 1999 to the model in order to aim at a more precise matching outcome. Due to the setup of the method, these country characteristics are averaged over the pre-euro period as pointed out in Section 3.1.

As discussed in Section 3.1, the synthetic control method demands predictor variables for the matching process of the different units. Regarding the trade exercise, I augment the model by using the sum of the natural log values of each unit pair's real GDP levels following Saia (2017). The GDP values are taken from the latest 10.0 version of the Penn World Table database provided by Feenstra et al. (2015) and are expressed in million 2017 US$ at chained PPPs. As stressed in Section 2, the literature makes use of country-specific characteristics that resemble a gravity model specification which was famously introduced by Tinbergen (1962). To further account for this, for instance, Persson et al. (2021) use the population-weighted distance of the most populated cities in kilometer between country i and country j as one of the predictor variables.[14] Be-

[13]Due to data restrictions, Belgium and Luxembourg are observed as one single country unit within the context of the trade analysis, following, among others, the methodology by Saia (2017) or Persson et al. (2021). The countries' ISO codes are displayed in Table A.1 in the Appendix A.1.

[14]When measuring the effects of bilateral trade flows between Sweden and the EMU, I use Brussels,

sides the weighted distance variable, Persson et al. (2021) apply two indicator variables that account for contiguity and a shared common language. I follow this technique by Persson et al. (2021) and add another variable that indicate whether a country pair shares religious tendencies by utilizing the data from the Centre d'Études Prospectives et d'Informations Internationales (CEPII).[15]

The data set for Sweden's development in terms of unemployment differs from the trade analysis for two reasons. First, I look at the unemployment rate as the percentage of the total labor force of each individual country. Thus, the data set does not include country pairs. Second, given the literature mentioned in Section 2.3, such exercise demands a different setup of predictor variables. The main variable of interest embodies the registered unemployment rate of country c at time t. In this case, this data is taken from the World Bank Indicators data base. However, since unemployment data becomes scarce back in time for some observed countries, I supplement the World Bank data using annual registered unemployment data from the data base by the Federal Reserve Economic Data (FRED) which is, however, not seasonally adjusted.

Just like for the trade analysis, I employ several country characteristics that aim at minimizing the difference between the actual and synthetic outcome during the pre-intervention period. In doing so, I take advantage of the Penn World Table version 10.0 by Feenstra et al. (2015) and extract data on the amount of people employed. Subsequently, I calculate the annual employment growth rate for Sweden and the countries within the donor pool following the methodology by Stricker and Baruffini (2020). Moreover, I extract the output-side real GDP at chained PPPs data from the Penn World Table. Using chained PPP data and taking the natural log values allows for a comparison of a country's relative productive capacities across both space and time (Feenstra et al., 2015). Furthermore, information on a country's human capital is accounted for by including the corresponding index taken from the Penn World Table, too. This index measures the average years of schooling within a respective country and combines this information with an assumed rate of return to education (Feenstra et al., 2015). The same data source additionally provides statistics on each country's population size. Using this to further augment the matching exercise of the model, I take the natural

hence Belgium, as the geographical center of Europe to calculate the distance.

[15]This data describes the religious proximity using the country pairs' shares of Catholics, Protestants and Muslims. The index is bounded between 0 and 1 and higher for those country pairs that share a relatively high ratio of one common religious majority (see Disdier & Mayer, 2007).

log value of this variable (see, e.g. Eren & Ozbeklik, 2016). Further following the approach by Eren and Ozbeklik (2016), the model embodies the percentage of males of the total population, a country's urbanization rate and the natural log of a country's adjusted net income per capita value in constant 2015 US$. The three latter variables describe data obtained from the World Bank Indicators data base. Just like for the trade analysis, I also include lagged values of the registered unemployment rate. Since the data is available for 1983 onwards, I include the lagged values for the years 1983, 1989 and the average of the overall pre-treatment period to improve the fitting for creating the counterfactual.

Table 1: Country Characteristics Summary Statistics

Variable	*Observations*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Bilateral trade	2,640	26,852.12	62,686.36	27.375	598,370
Unemployment rate (%)	444	0.083	0.042	0.015	0.261
		Trade			
Sum of log GDP	2,640	24.635	4.095	15.554	30.165
Weighted distance (km)	2,640	1,299.719	671.857	0	3,383.273
Contiguity	2,640	0.227	0.419	0	1
Common language	2,640	0.152	0.359	0	1
Common religion index	2,640	0.468	0.324	0.002	1
		Unemployment			
Employment growth (%)	444	0.009	0.018	-0.071	0.065
Log population	444	2.52	1.401	-1.007	4.425
Log GDP	444	12.959	1.357	9.175	15.268
Human capital index	444	2.964	0.377	1.743	3.675
Male (% of population)	444	0.489	0.006	0.473	0.505
Urbanization rate (%)	444	0.748	0.123	0.442	0.980
Log income per capita	444	10.222	0.371	8.921	11.231

Notes: The data set related to the trade analysis covers 65 country pairs and spans from 1980 until 2019. The data set in the context of the unemployment rate embodies besides Sweden 11 countries and spans from 1983 until 2019.

The above-mentioned data employed in the models are summarized and presented in Table 1. Focusing first on the data employed in the synthetic control model that aims at disentangling potential trade gains or losses, several detailed data characteristics stand out. In regards to the distance measured in kilometers and weighted

by population between the underlying countries, the country pair that is located the furthest apart from one to another is Finland and Portugal with a weighted distance amounting to 3,383.27 kilometers. On the other extreme, the Netherlands and Belgium-Luxembourg are the closest units with a distance of 160.93 kilometers. By construction, the lowest value, however, amounts to zero kilometers which specifies the unit pair of the EMU and Belgium-Luxembourg with Belgium being the center of Europe. As for the common religion index, both country pairs Spain and Ireland and Spain and Portugal demonstrate the highest values, notably 0.92 and 0.91, respectively. Sweden, in contrast, has less similar religious ties to any other unit in the donor pool. The closest affinity in the context of Swedish religious habits is observed with Finland. The index amounts to 0.64. Even though the value is still higher than the mean (0.36), it remains at a relatively modest level when comparing all units to one another. As stated above, the common language variable embodies an indicator variable and takes the value 1 if at least 9 percent of the partner country share the language with the population of the reporter country, vice versa. With the Swedish language being relatively country-specific, the data does not show any country counterpart that shares the same language with the Scandinavian country. The specific case of Sweden and the lack of proper comparison units risk to impair the matching process of the model. The lack of, for instance, Denmark and Norway in my sample may pose an additional drawback which I, however, discuss further in Section 5.

Several differences stand out when contemplating the variables that are incorporated in the unemployment analysis. For instance, the overall number of observations are significantly smaller compared to the first analysis. The reason for this lies in the setup of the sample. As discussed above, the unemployment data set consists of single countries and no country pairs and spans from 1983 until 2019. For instance, the lowest employment growth of the data set is observed in Ireland in the year 2009 as a result of the global Financial Crisis. In 1998 and 1999 it is, however, also Ireland that displays the highest growth rates in the data set. The reason for this is most likely due to the boom of the ICT revolution and the re-settlement of multinational firms to Ireland which created substantial job opportunities (Oulton, 2012). The observed human capital index is highest for Germany in the year 2019 (3.675) and recorded lowest for Portugal in the beginning of the observed period in 1983. Overall, the raw data shows

an increase in human capital for all country units over all the years observed. The same trend holds for the rate of urbanization. The most urbanized country is Belgium with a urbanization rate of 98.04 percent in 2019. The lowest value in the data set is observed for Portugal and amounts to 44.26 percent in 1983. The Swedish urbanization rate amounts to 87.71 percent in the year 2019.

3.3 Measuring Bilateral Trade Flows

By assessing the bilateral trade flows between Sweden and the European Monetary Union, I use the previously presented model and adjust it to the specific data set.

To start with, in Section 3.1, I define the $(C \times 1)$ vector to contain country units with European states mentioned in Section 3.2. In the context of the underlying analysis on trade, the vector now incorporates country pairs. The donor pool is further extended in a way that annual observations for the European Monetary Union are observed. This incorporates the aggregated trade flows between Sweden and all underlying ten European country units that have adopted the euro in 1999. Even during the post-intervention period, I restrict the data to the sum of these ten countries even though other European countries continuously adopted the euro. Adding newly joined countries over time such as Greece, the Baltic states or others to the annual EMU observation would distort the model outcome. Considering predictor variables such as the population-weighted distance in kilometers, the contiguity dummy, common language indicator variable or the common religion index, I choose Belgium-Luxembourg as the unit that represents the EMU with Brussels being both the political and geographical centre of Europe.

Let $Y^{r,trade}_{SWE-EMU,t}$ be the outcome variable of interest in context of the trade analysis (i.e. bilateral trade flows averaged of the two-way export values) at time t which is observed in reality, notably with Sweden not adopting the euro. Similarly, $Y^{s,trade}_{SWE-EMU,t}$ resembles the trade's synthetic counterfactual that is obtained from the average weighted country pair units within the donor pool. By comparing the actual- with the counterfactual data (following Equation 2), I can derive the trade gains or losses of Sweden not adopting the European currency in percentage terms using the following Equation 3.

$$\Delta^{rs,trade}_{SWE-EMU,1999-2019} = \frac{\sum_{t=1999}^{2019}(Y^{s,trade}_{SWE-EMU,t} - Y^{r,trade}_{SWE-EMU,t})}{\sum_{t=1999}^{2019}(Y^{r,trade}_{SWE-EMU,t})} \tag{3}$$

Consequently, I assume that the bilateral trade flows between the European Monetary Union and Sweden have not been affected before the introduction of the euro in 1999 in correspondence with the theory. I test this crucial assumption below by conducting a placebo analysis in Section 4.3 since various other macroeconomic factors might impinge on the countries' trade flows.

Following Abadie et al. (2015); Saia (2017) and Persson et al. (2021), I make use of the advantages of the synthetic control method by observing all incumbent country pairs that are part of the EMU in 1999. With this method, the computed algorithm selects country pair units that most closely resemble the structure of the Swedish-EMU trade relations (Abadie et al., 2010). To estimate the potential trade gains or losses, Equation 3 can be adjusted by adding the index i which resembles the counterfactual country pairs in the donor pool ($i = 1, ..., n$).

$$\hat{\Delta}^{rs}_{SWE-EMU,1999-2019} = \frac{\sum_{t=1999}^{2019}(Y^{S}_{SWE-EMU,t} - \sum_{i=1}^{n} w_i Y_{i,t})}{\sum_{t=1999}^{2019} w_i Y_{i,t}} \tag{4}$$

The subtrahend in the fraction's numerator of Equation 4 depicts the weighted composition of the donor pool's country pairs after the treatment occurred in 1999. These weights are chosen within the matching process in accordance with the country pairs' characteristics in the pre-intervention period. Furthermore, the method is designed in a way so that a weighted average of the control group's outcome matches the treated group in the pre-treatment period. Moreover, the weights are chosen in a non-negative fashion which implies that $\sum_{i=1}^{n} w_i = 1$, and $w_i = [0, 1]$ for each i-th European Monetary Union country pair as stated in Section 3.1.

In general, the country characteristics related to trade are linked to the renowned gravity approach following Tinbergen (1962) as discussed in Section 3.2 (see Table 1 for trade-related unit characteristics).[16]

[16]In addition to those predictor variables listed in Table 1, I employ lagged values of bilateral trade flows being the main variable of interest. In doing so, the model incorporates the average of the annual bilateral trade flows from 1980 until 1998, the bilateral trade flows observed in the year 1980, i.e. the first year observed in the data set, and the year 1990.

3.4 Measuring Unemployment

In order to present an overall picture and to properly assess the Swedish decision not to adopt the common European currency, I additionally shed light on the potential outcomes for the national unemployment rate. In doing so, I draw the link to the discussion at the time of the country's referendum in 2003 as stressed in Section 2.1.2.

The empirical setting slightly differs from the trade context for three reasons. First, this analysis does not capture European country pairs compared to the previously presented trade framework. With the unemployment rate as the main variable of interest, only single countries are observed. Thus, the donor pool consists of eleven country units whereas Sweden remains the treatment unit.[17] Second, since I am focusing on a different variable of interest, namely the registered unemployment rate, the synthetic control method requires adequate predictor variables. Thus, I discard the unit characteristics previously used for the trade analysis and incorporate unemployment related predictor variables as described in Section 3.2. Third, as the registered unemployment rate is already displayed in percentage terms, I chose not to emphasize on the changes in percentage terms as performed in Equation 4 but to emphasize on the average difference of unemployment rate between the real and synthetic outcome, $\bar{\Delta}^{rs,unemployment}_{SWE,1999-2019}$, in the post-treatment period.

Following the general procedure derived in Section 3.1 I arrive at the estimated synthetic counterfactual outcome $Y^{s,unemployment}_{SWE,t}$ at time t for the Swedish unemployment rate.[18] Again, this is composed of the weighted average of the donor pool units following Equation 1.

Thus, I subsequently compare the unemployment rate that Sweden would have experienced if the country of interest would have adopted the euro in 1999 with the actual unemployment rate of the country and display the difference as the average across the underlying period.

$$\bar{\Delta}^{rs,unemployment}_{SWE,1999-2019} = \frac{1}{\sum_{i=1999}^{2019} t_i}(Y^{s,unemployment}_{SWE,t} - \sum_{i=1}^{n} w_i Y_{i,t}) \tag{5}$$

Note that given the lack of data for the unemployment rate and for crucial predictor

[17] Recall that Belgium and Luxembourg can now in this context be observed as two individual units compared to the previous trade analysis given the data availability.

[18] Recall that the index t in this context refers to the post-treatment period which spans from 1999 to 2019.

variables, the pre-treatment period spans from 1983 until 1998. The loss of three years, however, is arguably not impeding the quality of the model's prediction given that the presented pre-treatment period still amounts to 16 instead of 19 years. Moreover, as mentioned above, the predictor variables differ from those employed in the trade analysis as described in Section 3.2 and are based on the corresponding literature as stressed in Section 2.3. This alters the $(k \times 1)$ vector $\boldsymbol{X}_1$ and the $(k \times C)$ matrix $\boldsymbol{X}_0$ that encompass the pre-treatment unit characteristics of the variable of interest and the units within the donor pool, respectively, in comparison to the trade analysis. Thus, as presented in Table 1, I employ the unemployment-related predictor variables in order to allow for an adequate matching process.

4 Empirical Results

As the core of this paper, this section elaborates on the results that aim to answer the research question related to Sweden's economic development as an outcome if the country would have adopted the euro in 1999. First, I display the derived insights for the bilateral trade flows between Sweden and the European Monetary Union in Section 4.1. Section 4.2 presents the corresponding outcome for the Swedish unemployment rate and, thereafter, the results are checked within a placebo analysis in Section 4.3.

4.1 Synthetic Trade of Sweden

To start with, the results of the trade analysis are supporting the hypothesis stated at the end of Section 2.3. Figure 2 sheds light on the potential bilateral trade flows between Sweden and the EMU if Sweden would have adopted the euro in 1999. These synthetic trade flows are depicted by the red dotted line whereas the solid blue line represents the actual trade flows between the two entities under discussion.

The main variable of interest, bilateral trade flows in million US$, is depicted on the y-axis and the years examined are displayed on the x-axis. In more detail, the Figure 2 shows some distinctive characteristics. First, the development within the pre-treatment period indicates a relatively successful matching process of the applied model. Second, the lines that express the actual and synthetic bilateral trade flows of Sweden and the EMU, respectively, diverge with the introduction of the treatment,

namely the euro, in 1999 which is indicated by the vertical dotted line. Third, and most importantly, these two lines diverge in a way that the synthetic bilateral trade flows exceed the actual observations across the entire post-treatment period. Moreover, the difference between these lines is increasing over time from year to year with a few exceptions. This implies that the trade gains from joining the EMU would have gradually unfolded over time. Thus, it can be concluded that Sweden would have gained from higher bilateral trade flows if the country would have adopted the euro in 1999. To be precise, the model suggests a 13.47 percent increase in bilateral trade flows using Equation 4. This percentage figure translates into an increase in Swedish trade flows by 205.379 billion US$.[19] In the most recent year observed alone, i.e. 2019, the bilateral trade flows would have been 17.62 percent higher which signifies a difference of the actual and synthetic development by 16,372.33 million US$. Therefore, the results are in line with the findings for the UK as shown by Saia (2017). The corresponding unit weights that are derived from Equation 1 are transparently displayed for each country pair in Table A.2 in the Appendix A.1. According to Table A.2, the Swedish counterfactual consists of a weighted combination of three country pairs, namely EMU-Finland, EMU-Netherlands and France-Netherlands.

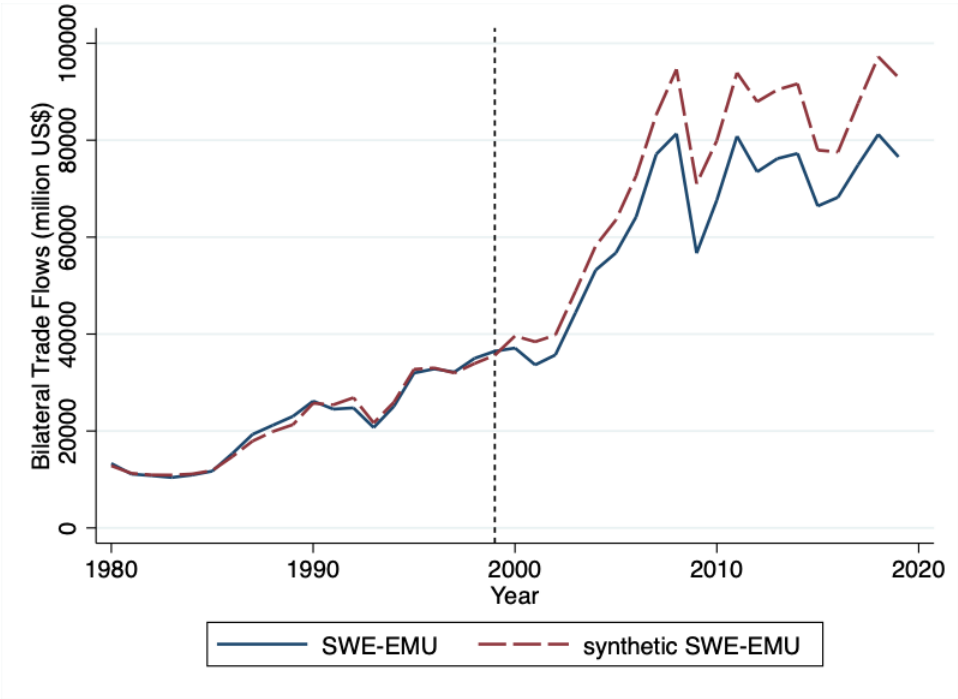


Figure 2: Actual and synthetic Swedish Bilateral Trade Flows

[19]Consult Table 2 for more detailed information on the findings.

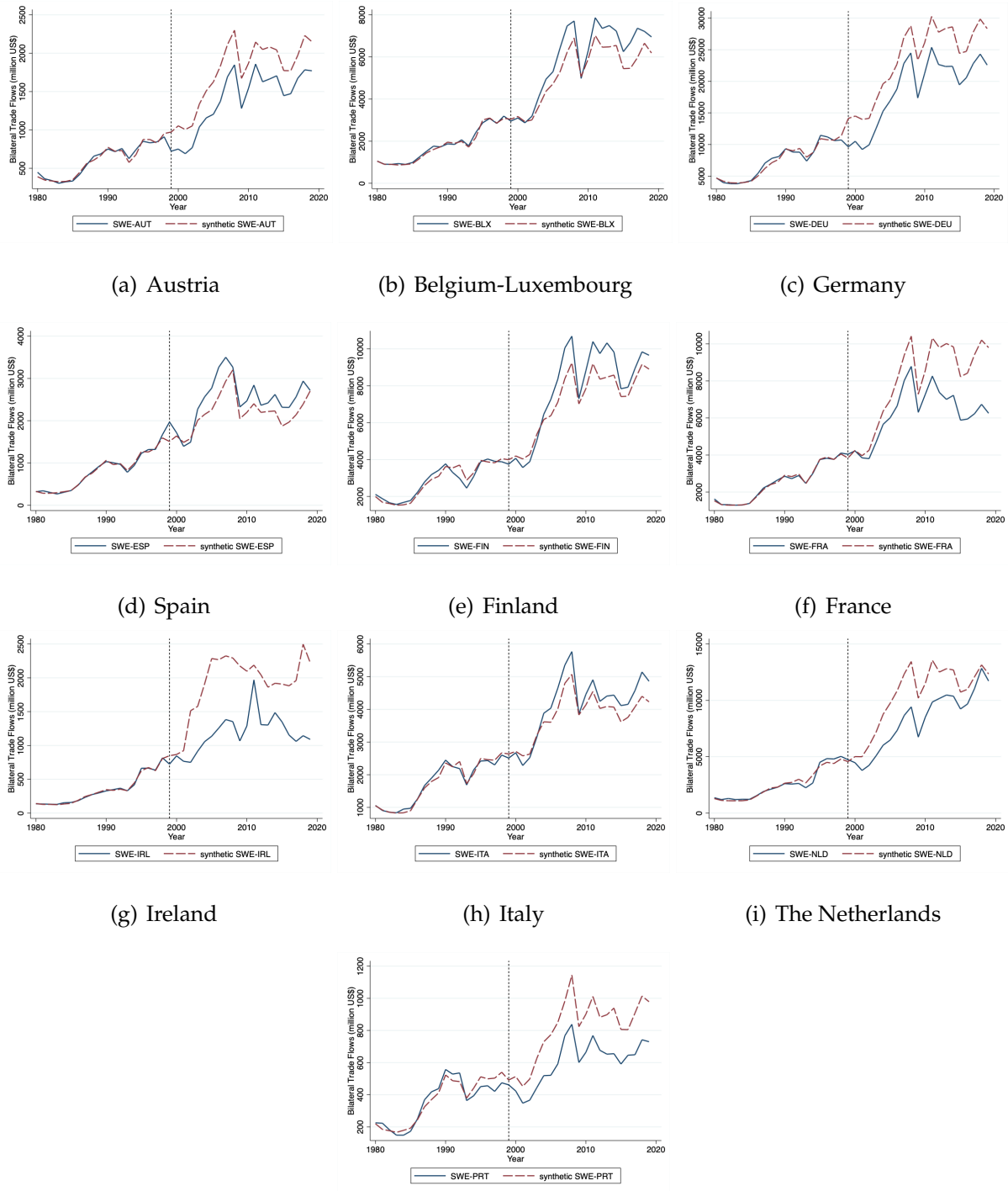
So far, the presented results only encompass estimates of the counterfactual trajectory of Sweden if the country would have adopted the euro in 1999. In the Appendix A.1, Table A.3 displays the difference between the actual and synthetic outcome shown in Figure 2 for each year of the post-treatment period. Moreover, these estimates are presented alongside with their corresponding p-values which decrease in size over time. The p-values are derived by iteratively running the algorithm for each donor pool unit (Cunningham, 2021). Hence, the null hypothesis, being that Sweden would have not experienced trade gains to the presented extent, can be rejected at around the 10 percent level.

4.1.1 Swedish Bilateral Trade Flows with single EMU members

As discussed above, Figure 2 shows the main results of interest regarding the bilateral trade flows between the aggregated EMU and Sweden. However, the method allows for a breakdown of the presented aggregated data since the constructed data set embodies trade flows between individual country pairs, too. Hence by disaggregating, Figure 3 provides the synthetic outcomes for the bilateral trade flows of Sweden with individual EMU member states if Sweden would have adopted the euro in 1999. The Figure 3 presents an important outcome. Not all country pair exercises result in higher synthetic bilateral trade values after the introduction of the euro for Sweden which states an outcome that differs from the case of the UK (Saia, 2017). For the Swedish trade with countries such as Belgium-Luxembourg, Spain, Finland and Italy, the synthetic control results in a lower amount of bilateral trade flows compared to the actual outcome observed in reality. According to the model, the bilateral trade flows between Sweden and, for instance, Finland would be 9.232 percent lower compared to the post-treatment values found in the actual data which corresponds to a monetary value of 13.835 billion US$.

This finding seems puzzling since economic theory predicts increasing trade once the trading partners share a common currency. However, I argue that these peculiar country pair-specific outcomes are suffering from one shared concern. Investigating the respective figures that show lower synthetic outcomes, the pre-treatment period does not accurately mimic the actual bilateral trade flows. This is a sign that the underlying model is not able to carry out a perfectly fitting matching process. I further

stress this issue subsequently in Section 5.1.



(a) Austria (b) Belgium-Luxembourg (c) Germany

(d) Spain (e) Finland (f) France

(g) Ireland (h) Italy (i) The Netherlands

(j) Portugal

Figure 3: Bilateral Trade Flows between Sweden and EMU member states

Moreover, Figure 3 shows that for most country pairs the potential trade gain of Sweden would have been substantially large. This holds especially for relatively large trading partner economies such as Germany, France or Ireland. Albeit also Austria, the

Netherlands and Portugal display significant trade gains, too. Looking at, for example, the bilateral trade flows between Sweden and Ireland, the synthetic outcome suggests a 38.35 percent higher trade volume across the post-treatment period which translates into 15.175 billion US$.[20]

Thus, the individual country pair analysis reveals important insights for trading with particular trading partners. This should be considered by policymakers depending on the goods and their level of Swedish dependency that are traded with the respective partners. However, given the research question of this thesis, the trade analysis of Sweden with the aggregated EMU remains to be of key interest.

4.2 Synthetic Unemployment Rate of Sweden

In this section, I present the results of the synthetic control method for the unemployment rate in Sweden following the empirical design stressed in Section 3.4. The underlying unit weights derived from Equation 1 are presented in Table A.5 in the Appendix A.1 transparently.

Figure 4 exhibits the synthetic development of the registered Swedish unemployment rate if the country would have adopted the euro in 1999. The results show some distinctive features. The graph shows a lower counterfactual trajectory, indicated by the dashed red line, right after the occurrence of the treatment in 1999. Hence, in the first years after the introduction the model implies that Sweden would have recorded a lower registered unemployment rate if the country was to adopt the European currency. However, with the European Debt Crisis (approximately between 2011 and 2015), the synthetic trajectory moves towards the actual data that, at the same time, shows a decreasing unemployment rate, shown by the solid blue line. Eventually, this results in a synthetic unemployment rate that exceeds the actual Swedish figures. However, the EMU member states encounter a rebound to pre-crisis unemployment levels. Given the weighted average of the donor pool, this would have arguably applied to Sweden, too. Instead, the actual data reveals an increase of Swedish registered unemployment. Hence, being a member state of the EMU would have arguably been beneficial for Sweden in the long-run.

For the whole post-treatment period, the unemployment rate in Sweden would

[20] Detailed results for all the presented country pairs shown in Figure 3 are presented in Table A.4.

have been 0.674 percentage points lower in total compared to the actual outcome. This implies that 1.315 million more workers in Sweden would have been employed in an occupation during this period. In 2019 alone, the last year observed in the data set, the unemployment rate in Sweden would have been 0.799 percentage points lower compared to the actual outcome in which Sweden has evidently not adopted the euro. Speaking in terms of the amount of persons, Sweden would have registered 80,234 people less in 2019 if the country was to adopt the euro in 1999.

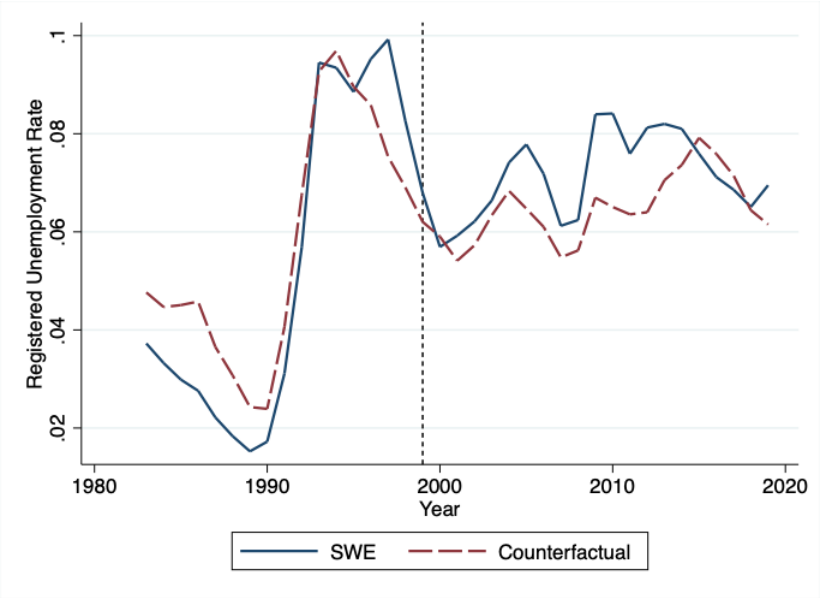


Figure 4: Actual and synthetic Swedish Unemployment Rate

As it is clearly visible in Figure 4, the pre-treatment period does not satisfactorily match the actual unemployment rate of Sweden over time. Therefore, it needs to be acknowledged that the predictive power of the model is not optimal (Abadie et al., 2010). This caveat is further discussed in Section 5.

Overall, Table 2 summarizes and presents the outcomes of the empirical analysis in a comprehensive manner. Besides presenting the general gains and losses for the overall post-treatment period, I additionally provide two sub-periods that are defined around the Financial Crisis in 2008. Thus, it is possible to detect, for example, a stronger increase in bilateral trade flows after the end of the Financial Crisis. Not only the recovery of European economies but also an alleged end of an adjustment period might explain this steeper increase (15.69 percent from 2009 to 2019 compared to 9.83 percent from 1999 to 2008).

Table 2: Differences of main Synthetic Control Model Outcomes

Δ *Synthetic - Actual*	*Period*		
	1999-2019	*1999-2008*	*2009-2019*
Bilateral Trade Flows (%)	13.469	9.826	15.685
Bilateral Trade Flows (million US$)	205,378.76	56,660.94	148,717.82
Average Unemployment Rate (ppt.)	-0.674	-0.591	-0.748
Unemployment (number of persons)	-1,315,566	-534,715	-780,850

Notes: The bilateral trade flow figures are compiled as the difference between the actual and synthetic outcome displayed in percentage terms. The change in the unemployment rate is calculate as the difference between the mean values of the specific period for the treated and synthetic outcome, respectively. Displaying the resulting figures in terms of number of persons is done by using the annual population size of Sweden. Note that the findings related to the unemployment analysis suffer from high p-values.

4.3 Placebo Analysis

Given the assessment of a comparative case study, the question of the method's statistical inference, however, remains. Whether or not the previously derived effects of this study can be properly linked to the treatment and not to other unobserved factors is therefore discussed in this section.

The synthetic control method allows for conducting falsification exercises, namely a placebo analysis. Subsequently, I conduct a placebo analysis that artificially and arbitrarily re-assigns the year of the treatment to 1990. Choosing this treatment period allows for the model to still rely on a relatively large pre-treatment period. According to Abadie et al. (2015), the placebo exercise should not reveal an outcome that is similar to the main outcome presented in Section 4.1 and Section 4.2 in terms of magnitude. In case the placebo outcome shows no or lower effects from the arbitrarily assigned treatment period, the confidence in the originally derived model can be consolidated. Hence, the initially estimated results can be considered reliable if the trade and unemployment effect for Sweden is unusually large compared to the placebo exercise outcomes in relative terms (Abadie et al., 2015). In this case, the presented outcome can be attributed to the treatment being the introduction of the euro. In other words, if the placebo trajectories show inference for the actual model, Figure 2 or Figure 4 present an estimated effect that can be related to the fact that Sweden did not adopt the euro,

hence the treatment, and is not caused by a low predictive power of the model.

The performed placebo analysis reveals that only the analysis of bilateral trade flows presents a sound outcome whereas the unemployment rate suffers from high p-values. I first start with the falsification exercise of the trade analysis. Figure 5 shows the placebo in-time outcome with an arbitrarily assigned treatment year in 1990 instead of 1999.[21] The setup of this falsification exercise is comparable to the main analysis, however, the lagged values of the main variable of interest differ to a small extent. I apply the bilateral trade flow values for the years 1980, 1985 and the annual average across the total pre-treatment period. The presented Figure 5 displays some distinctive characteristics that are crucial for the inference of the outcome shown in Figure 2.

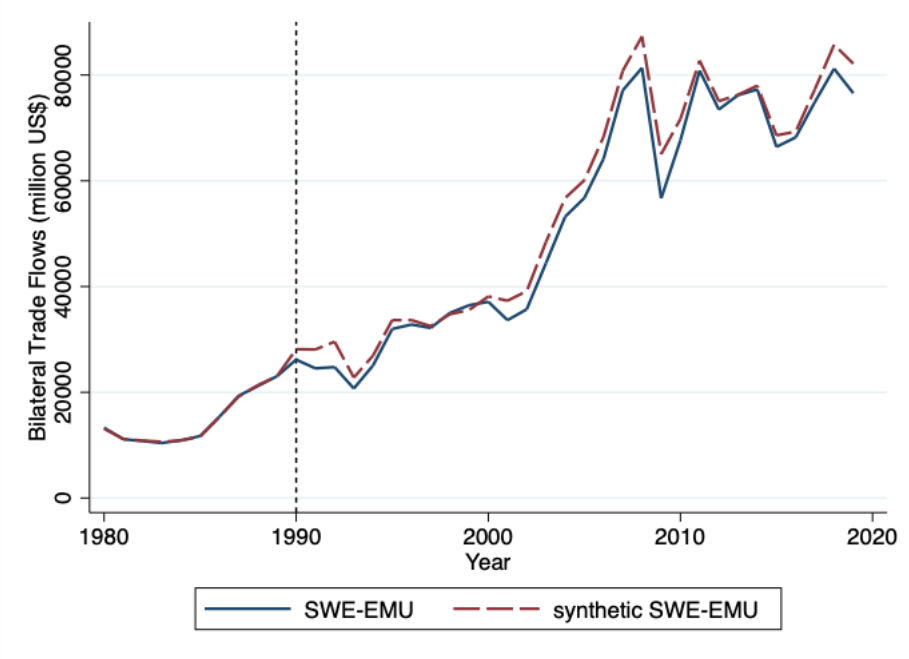


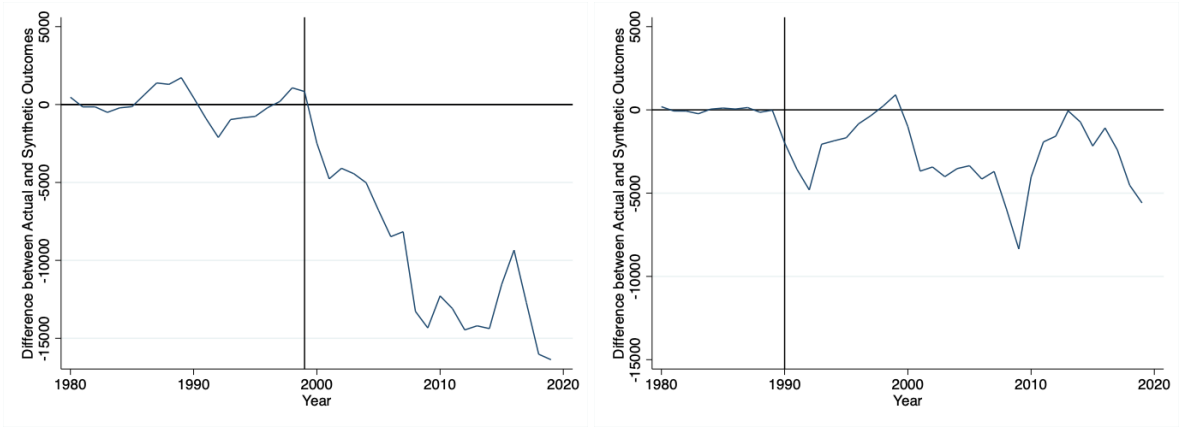
Figure 5: In-time Placebo Exercise of Trade Analysis

First, the pre-treatment period is characterized by the two lines, namely the actual bilateral trade flows of Sweden and the EMU and the synthetic counterfactual, that follow the same trajectory. The fitting of the model in the pre-treatment period has been arguably successful. Second, the post-treatment period is tailored by the two outcomes that follow a similar trajectory to a relatively equal extent. This finding is of crucial importance since, even though some divergence of the lines is present, the difference is significantly lower compared to the described outcome in Figure 2. For

[21] The counterfactual is constructed by the algorithm-driven model using BLX-SWE (0.048), DEU-NLD (0.167), EMU-FIN (0.604) and EMU-ITA (0.181) as the corresponding unit weights.

example, the synthetic bilateral trade flows between Sweden and the EMU would have been 4.912 percent higher (compared to 13.469 percent) over the whole post-treatment period. This amount yields a hypothetically higher bilateral trade flow worth 81,244.28 million US$.

This difference is graphically illustrated in a more clear fashion by Figure 6. The figure compares the differences between the main outcome on the left panel and the placebo outcome on the right panel of the trade analysis. Thus, I argue that the outcome of the method concerning the bilateral trade flows, as shown in Section 4.1, can be assumed to describe a significant and robust finding.



(a) Main Outcome (b) Placebo Exercise

Figure 6: Trade Placebo Comparison

Subsequently, I apply the same concept to the unemployment analysis. As already stated in Section 4.2, the model that generates a synthetic counterfactual for Sweden suffers from several concerns. On the one hand, the pre-treatment period does not correctly mimic the trajectory of the actual Swedish unemployment data. The model therefore encounters difficulties to properly construct a fitting counterfactual which is arguably driven by the economic crisis in Sweden in the 1990s and the lack of certain country units in the donor pool such as Denmark and Norway. On the other hand, the presented p-values are very large which additionally indicates a weak predictive power of the model (see Table A.6). Thus, the falsification exercise is assumed to provide an outcome that is not confirming the finding of the main outcome.

Figure 7 shows the outcome for the unemployment placebo exercise. The setup for this test equals the main unemployment analysis, however, with the treatment period

being arbitrarily assigned to the year 1990 and a small adjustment of the predictor variables. To further strengthen the predictive power of the model, I now use the lagged unemployment rates of the year 1983, 1989 and the annual average of all the pre-treatment unemployment rates. As shown in Table A.5, the falsification exercise is constructed with the placebo weights on Austria, Finland and Luxembourg. By examining the figure, it stands out the the registered unemployment rate in Sweden would have been much lower compared to the actual outcome. Thus, putting this into the context of the main finding, the initially found outcome for the introduction of the euro cannot be seen as the determinant for the development of the synthetic unemployment rate in Sweden. I already expect this given the relatively high p-values reported in Table A.6.

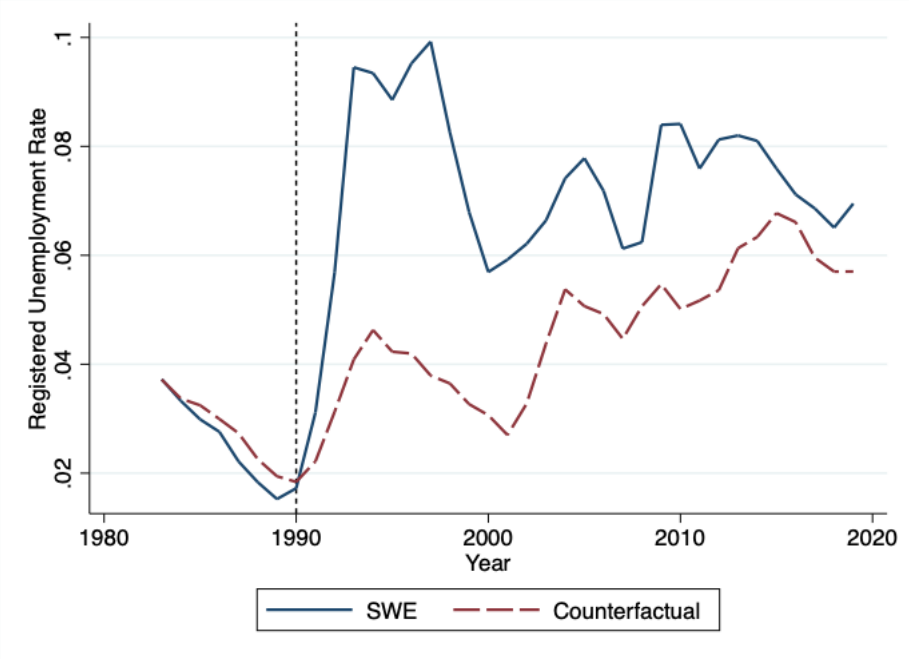


Figure 7: In-time Placebo Exercise of Unemployment Analysis

As stated above, the placebo exercise confirms that only the trade analysis resembles a sound outcome. I argue, however, that even though the unemployment rate analysis does not show any significant outcome, the picture drawn may still hint towards a pro-euro direction. The specific findings and the drawbacks of the empirical part of this thesis are discussed in more detail in the following Section 5.

5 Discussion

The results presented in the previous Section 4 provide the ground for a more profound discussion. Thus, the aim of this section is twofold. First, it focuses on a thorough examination of the stressed results. Second, Section 5.1 elaborates on crucial limitations and shortcomings of the applied model that need to be taken into account and hint to future research.

The results derived in the previous Section 4 show a clear pro-euro indication in the light of the underlying research question if one was to believe in the presented method. On the one hand, bilateral trade flows between Sweden and the European Monetary Union would have increased and, on the other hand, the registered unemployment rate would have been lower in the synthetic scenario if Sweden would have adopted the European currency in 1999. Thus, the hypothesis derived in Section 2 in regards to trade is supported by the empirical analysis. Hence, the Swedish decision not to join the currency union can be seen as a lost chance from both, an employment and a trade perspective. In general, the resulting Figure 2 of the trade exercise showcases a good fit of the model. The trade effect being assumed to be initiated by the introduction of the euro is further underlined by the falsification exercise performed in Section 4.3.

Moreover, the outcome shown in Figure 3 seems puzzling as the vast majority of the literature finds clear evidence that a common currency enhances bilateral trade flows. However, a change in trade patterns can be the result of joining a currency union since increased competition yields such adjustment processes. Hence, policymakers should bear in mind the goods that are imported from and exported to those trading partners that would have shown lower bilateral trade flows a-posteriori.

On the contrary, the outcome of the unemployment analysis is not as straight forward since it does not demonstrate a clear and sound finding. In general, however, a lower unemployment rate can be expected from adopting a common currency as this might yield the creation of jobs. Given the increased competition to which the Swedish economy would have been exposed to, one has to acknowledge the potential risks for specific skill groups or industries as this competition might lead to fragmented losses given that particular goods might be preferably imported from abroad. The results, thus, must be viewed with caution. However, the post-treatment outcome of the synthetic unemployment rate hints to the fact that the monetary policy decided by the

ECB would have been suitable to the Swedish example.

Based on the findings of this thesis, one could easily argue that the Swedish decision not to adopt the euro has resulted in missing the chance for further national development. Both, bilateral trade and the Swedish unemployment rate show an advantageous outcome if the country would have adopted the euro. However, it is important to acknowledge that the underlying study purely focuses on economic factors and does not account for other crucial aspects such as cultural identity. Hence, holding on to the national currency can be seen as a preventive act to loosening a part of the Swedish cultural identity (Weßels, 2007). Moreover, the euro sceptics have posed a strong argument that Sweden still has the possibility to joining the monetary union in the future (see Section 2.1.2). Even though the monetary policy decided in Frankfurt would have borne beneficial effects for Sweden's economy according to the data, this is not guaranteed to be the case in the future, too. Lastly, the presented findings are difficult to generalize as the model is explicitly constructed for the Swedish case. Hence, the outcome for both analyses might differ in the context of a different country unit of interest. However, this thesis again confirms the beneficial impact on economic welfare from joining a common currency union and, thus, supports the view of, among others, Saia (2017) or Frankel and Rose (2002). Therefore, all the above-mentioned aspects are important to be taken into account by policymakers if the question for Sweden about joining the EMU appears once more on the horizon.

The discussion of Sweden to join the European Monetary Union seems to have ceased to exist as a debated topic of the discourse after the referendum in 2003. At the latest with the beginning of the Financial Crisis in 2008 and then amplified by the European Debt Crisis in 2012, the desire to still join a multinational currency union has faded. However, the results of this thesis show that adopting the euro is worth considering. Since the euro has itself proven to be a relatively competitive and secure currency on the global market, at least this initial concern can be ruled out. Nowadays, with a strengthening of a European or Western alliance and the submission of Sweden's formal application to the North Atlantic Treaty Organization (NATO) on May 18^{th}, 2022, the discourse on becoming even more integrated can be reconsidered. This thesis offers an incentive for such revival of the discussion. In the light of potential cultural fears of abandoning the national currency, several solutions can be considered that are

supporting the transitional process. For instance, the European Union offers the option of the so-called big bang scenario with phasing-out to countries that are willing to join the EMU after its establishment (Fidrmuc, 2003). In this scenario, a gradual transition from the incumbent currency and the euro is expected. This provides some leeway to businesses and consumers for slowly phasing out of their national currency. Greece, for example, enjoyed this transition period for one year after the adoption of the euro in 2001 (Malaby, 2003). By avoiding a drastic shift over night from one currency to the other, discrepancies and doubts can be minimized and therefore potentially be applied to the Swedish case, too. Moreover, member state candidates can inform their citizens before the transition takes place. Most member states distribute starter packs for citizens to familiarize themselves with the new currency (Malaby, 2003).

5.1 Research Limitations

Even though the performed analyses offer interesting insights, it is important to acknowledge that the underlying research suffers from distinct limitations which pave the way for future research in this field.

As discussed above, the unemployment Figure 4 does not demonstrate an accurate match in the pre-treatment period. One can argue that there are many more underlying factors that are not captured by the model during the pre-intervention period. Given the national economic crisis in Sweden in the beginning of the 1990s, it is difficult for the algorithm-driven model to create a proper counterfactual since the units in the donor pool do not experience such shock to the same extent. Once the Swedish economy has acclimate before the treatment, I argue that the synthetic and actual observations mirror the reality in a more reliable manner. Hence, the post-treatment period can be seen as relatively credible in terms of the potential development of the Swedish unemployment rate if the country would have adopted the euro in 1999.

Furthermore, the examined pre-treatment period suffers from the lack of coherent unemployment data. In order to conduct the analysis, I have to rely on different sources (see Section 3.2) and discard the earliest three years compared to the trade analysis. Thus, the results need to be interpreted cautiously since sourcing the raw data from different data bases might come along with slightly different measurement approaches. By consulting and testing a more accurate data source for the unemploy-

ment data or using various predictor variables, the model might showcase a better fit in the pre-treatment period.

Moreover, allegedly perfect matching control country units such as Norway, Iceland or Denmark are not part of the sample. Evidently, Finland has adopted the euro as the only Scandinavian country. With the Scandinavian countries sharing a lot of characteristics, the lack of these countries, as a result, makes the matching process for Sweden rather difficult. Including other Scandinavian countries could therefore produce an overall fitting and estimation process in a more precise manner.

There are rather few limitations in regards to the trade analysis. The model is constructed as previously done by the literature and the falsification exercise seems to underline the exhibited outcome. However, the analysis is not able to provide an in-depth overview on the sector level or even for certain Swedish products that are specifically affected from an increasingly integrated market.

Lastly, the setup of the data set only allows for one falsification exercise, namely the in-time placebo test. Given that the donor pool examined in the underlying analysis solely consists of country units that have experienced the treatment, i.e. the actual adoption of the euro, a placebo in-space is not feasible to conduct. For this exercise, the data set would need to embody country units that are not exposed to the treatment just like Sweden. It is not feasible to artificially put a treatment on a country unit which actually has undergone this treatment already. Thus, having the analysis assessed by only one placebo exercise may not suffices to be a very stable model.

6 Concluding Remarks

What would have been the effects on Sweden's economic development if the country would have adopted the euro in 1999? The economic literature generally agrees that joining a currency union is beneficial for a country since sharing one single currency facilitates trade due to the mitigation of barriers such as transaction costs (Baldwin, 2006). However, the theory on optimal currency areas emphasizes on the drawbacks of a common currency union that is the loss of monetary policy independence for the incumbent member states since the decision-making is outsourced to one central bank for all incumbent member states.

Particularly the Swedish case, indeed, is highly interesting as the country held a referendum on joining the European Monetary Union in 2003. The Swedish discourse during the time of the referendum can be summarized by the Swedish euro-supporters arguing in favor of, for instance, potential gains from trade for the national economy and the opposition stressing the loss of policy independence and therefore, for instance, potentially rising unemployment rates. Evidently, the Swedish population has eventually decided not to adopt the euro. Given these reasons and the Swedish historical background, this thesis aims at tackling the above-mentioned research question.

I confront the presented comparative case study using the novel and transparent synthetic control method adapted from Abadie and Gardeazabal (2003) and Abadie et al. (2010, 2015). By computing a counterfactual of Sweden using a weighted average of individual comparison units within the donor pool, I make use of the method's advantages that outperform traditional approaches to comparative case studies.

In the empirical analysis, I arrive at two distinctive findings for both, the Swedish bilateral trade flows and the Swedish unemployment rate. Bilateral trade flows between Sweden and EMU would have increased by 13.47 percent. Simultaneously, the Swedish unemployment rate would have been 2.15 percentage points lower in 2019 compared to the actual data of that same year. Especially the outcome of the latter analysis should be handled with caution as the underlying model is not able to fully match two trajectories in the pre-treatment period. Overall, the results of the trade analysis are strengthened by conducting an in-time placebo exercise, whereas the unemployment study suffers from certain limitations given the Swedish economic crisis in the 1990s and the lack of crucial comparison units. In general, the aforementioned research question can be answered in a way that Sweden would have experienced further economic development given the hypothetical gains of being a member of the European Monetary Union. This holds especially for the long-run after the European economies have been adjusted to the new common currency and have recovered from the Financial Crisis. This finding, however, is purely based on economic arguments and neglects cultural factors such as national identity.

Finally, my contribution to the literature provides several incentives for future research. The level of the p-values, especially the large values of the unemployment analysis, raise the concern regarding the model's significance. I believe that with an

extension of the data set and by consulting additional predictor variables, the predictive power of the model can be augmented. Moreover, the construction of the data set does not allow for an analysis of Sweden's potential bilateral trade flows with the rest of the world. Trade of member states with countries outside a respective currency area have been found to increase, too (Micco et al., 2003; Saia, 2017). This caveat provides room for future research to assess the potential gains or losses of Sweden from not joining the euro more precisely on a global scale. Hence, further future research lies in the extension of my underlying homogeneous data set by including countries outside the EMU.

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A Appendix

A.1 Additional Tables

Table A.1: List of Country Codes

Country	*ISO code*
Austria	AUT
Belgium	BEL
Belgium-Luxembourg	BLX
Finland	FIN
France	FRA
Germany	DEU
Ireland	IRL
Italy	ITA
Luxembourg	LUX
The Netherlands	NLD
Portugal	PRT
Spain	ESP

Notes: Country codes represent the ISO3 codes. Belgium and Luxembourg are considered as one country unit due to data constraints within the trade analysis. However, for the assessment of Sweden's synthetic unemployment rate, the data are available for both countries individually.

Table A.2: Unit weights of Bilateral Trade Analysis

Unit	*Weight*	*Unit*	*Weight*	*Unit*	*Weight*
AUTBLX	0.000	DEUESP	0.000	ESPSWE	0.000
AUTDEU	0.000	DEUFIN	0.000	FINFRA	0.000
AUTEMU	0.000	DEUFRA	0.000	FINIRL	0.000
AUTESP	0.000	DEUIRL	0.000	FINITA	0.000
AUTFIN	0.000	DEUITA	0.000	FINNLD	0.000
AUTFRA	0.000	DEUNLD	0.000	FINPRT	0.000
AUTIRL	0.000	DEUPRT	0.000	FINSWE	0.000
AUTITA	0.000	DEUSWE	0.000	FRAIRL	0.000
AUTNLD	0.000	EMUESP	0.000	FRAITA	0.000
AUTPRT	0.000	EMUFIN	0.762	FRANLD	0.010
AUTSWE	0.000	EMUFRA	0.000	FRAPRT	0.000
BLXDEU	0.000	EMUIRL	0.000	FRASWE	0.000
BLXEMU	0.000	EMUITA	0.000	IRLITA	0.000
BLXESP	0.000	EMUNLD	0.227	IRLPRT	0.000
BLXFRA	0.000	EMUSWE	0.000	IRLSWE	0.000
BLXIRL	0.000	ESPFIN	0.000	ITANLD	0.000
BLXITA	0.000	ESPFRA	0.000	ITAPRT	0.000
BLXNLD	0.000	ESPIRL	0.000	ITASWE	0.000
BLXPRT	0.000	ESPITA	0.000	NLDPRT	0.000
BLXSWE	0.000	ESPNLD	0.000	NLDSWE	0.000
DEUEMU	0.000	ESPPRT	0.000	PRTSWE	0.000

Notes: The unit codes resemble the country pairs and are constructed with the corresponding ISO codes of the respective trading partners (see Table A.1. The data spans from 1980 until 2019 and embodies 66 country pair units.

Table A.3: Estimates and p-values of Trade Analysis

Year	*Estimates*	*p-values*
1999	836.0709	0.312
2000	-2,483.053	0.171
2001	-4,769.788	0.093
2002	-4,091.785	0.109
2003	-4,438.303	0.109
2004	-5,019.991	0.125
2005	-6,782.307	0.141
2006	-8,477.229	0.109
2007	-8,160.375	0.109
2008	-13,274.18	0.093
2009	-14,334.56	0.078
2010	-12,279.56	0.125
2011	-13,089.71	0.156
2012	-14,461.16	0.140
2013	-14,199.2	0.156
2014	-14,375.88	0.140
2015	-11,534.73	0.125
2016	-9,343.691	0.140
2017	-12,706.57	0.109
2018	-16,020.43	0.093
2019	-16,372.33	0.093

Notes: The estimates show the difference in bilateral trade flows between the actual and synthetic outcome. The estimated values are displayed in million US$.

Table A.4: Outcomes and Unit weights of individual Bilateral Trade Analysis

	Swedish Trading Partner		
	AUT	*BLX*	*DEU**
Δ^{rs} BLT (%)	20.463	-11.996	20.476
Δ^{rs} BLT (million US$)	7,481.558	-13,257.4	100,714.9
Unit weights	AUT-FIN (0.935)	BLX-FIN (0.177)	AUT-FRA (0.010)
	DEU-NLD (0.007)	BLX-NLD (0.019)	AUT-NLD (0.081)
	FIN-SWE (0.058)	FRA-NLD (0.018)	DEU-ESP (0.037)
		FRA-SWE (0.276)	DEU-ITA (0.006)
		IRL-SWE (0.37)	FRA-NLD (0.657)
		NLD-SWE (0.141)	ITA-SWE (0.143)
	ESP	*FIN*	*FRA*
Δ^{rs} BLT (%)	-14.001	-9.232	20.952
Δ^{rs} BLT (million US$)	-6,399.612	-13,835.611	34,511.21
Unit weights	AUT-ESP (0.081)	AUT-SWE (0.892)	BLX-NLD (0.037)
	DEU-PRT (0.038)	DEU-NLD (0.024)	BLX-SWE (0.412)
	ESP-FIN (0.098)	FRA-ITA (0.084)	DEU-NLD (0.017)
	ESP-PRT (0.012)		FIN-ITA (0.317)
	FIN-ITA (0.771)		ITA-SWE (0.157)
			NLD-SWE (0.060)
	IRL	*ITA*	*NLD*
Δ^{rs} BLT (%)	38.346	-7.953	20.699
Δ^{rs} BLT (million US$)	15,175.679	-6,334.643	44,605.31
Unit weights	AUT-FIN (0.393)	DEU-ITA (0.025)	BLX-IRL (0.123)
	BLX-FIN (0.080)	FIN-FRA (0.507)	BLX-NLD (0.047)
	BLX-IRL (0.129)	FRA-ITA (0.020)	BLX-SWE (0.652)
	FIN-IRL (0.368)	PRT-SWE (0.448)	ESP-PRT (0.177)
	IRL-NLD (0.029)		
	PRT		
Δ^{rs} BLT (%)	25.684		
Δ^{rs} BLT (million US$)	4,373.96		
Unit weights	AUT-SWE (0.221)		
	DEU-NLD (0.001)		
	FIN-PRT (0.725)		
	ITA-SWE (0.053)		

** The country pairs AUT-SWE, BLX-SWE, DEU-IRL, ESP-ITA, FRA-SWE and ITA-NLD additionally put weight to the Sweden-Germany counterfactual which, however, amount to not more than 0.005 each.*

Table A.5: Unit weights of Unemployment Analysis

Unit	*Weight*	*Placebo weight*
AUT	0.059	0.012
BEL	0.000	0.000
DEU	0.420	0.000
ESP	0.000	0.000
FIN	0.268	0.108
FRA	0.000	0.000
IRL	0.000	0.000
ITA	0.000	0.000
LUX	0.252	0.880
NLD	0.000	0.000
PRT	0.000	0.000

Notes: The data sets spans from 1983 to 2019 and entails twelve country units in the donor pool with Sweden being the unit of interest. The main unemployment analysis sets the treatment period to 1999, whereas in the placebo exercise, the treatment is arbitrarily assigned to 1990.

Table A.6: Estimates and p-values of Unemployment Analysis

Year	*Estimates*	*p-values*
1999	0.865	0.727
2000	0.161	1.000
2001	0.504	0.909
2002	0.226	1.000
2003	-0.125	1.000
2004	0.023	1.000
2005	-0.048	1.000
2006	-0.104	1.000
2007	-0.254	0.909
2008	0.343	0.9090
2009	1.854	0.455
2010	2.405	0.364
2011	2.088	0.455
2012	2.679	0.364
2013	2.243	0.545
2014	2.265	0.545
2015	1.685	0.545
2016	1.427	0.545
2017	1.641	0.364
2018	1.769	0.273
2019	2.448	0.273

Notes: The estimates show the difference in the registered unemployment rate between the actual and the synthetic outcome. The estimate values are displayed in percentage points.