MASTERARBEIT | MASTER'S THESIS

Titel | Title

The Economic Impact of EU Integration: A Synthetic Control Study of Estonia's Accession

verfasst von | submitted by

Bálint Sipos BSc (WU)

angestrebter akademischer Grad | in partial fulfilment of the requirements for the degree of

Master of Science (MSc)

Wien | Vienna, 2026

Studienkennzahl lt. Studienblatt | Degree programme code as it appears on the student record sheet:	UA 066 913
Studienrichtung lt. Studienblatt | Degree programme as it appears on the student record sheet:	Masterstudium Applied Economics
Betreut von | Supervisor:	Univ.-Prof. Alejandro Cunat PhD

Abstract

As research about the economic effects of integration has gained traction in academic research, especially on large economic countries with geopolitical relevance, this paper focuses on a smaller less researched topic, Estonia's accession to the European Union (EU). The economic development of Estonia, which has switched from a planned economy to an open liberal economy in the early 1990s is observed from 1993 until 2019. To measure the effects of the 2004 EU accession, the synthetic control method, by Alberto Abadie, is implemented. A synthetic counterfactual is created by taking the weighted average of control units in the donor pool, which should differ only in that it has not received the EU accession treatment. The results suggest that Estonia did in fact gain positive economic growth effects from its accession. At the end of the observation period Estonia had a 14% higher real GDP per capita than its synthetic counterfactual. However, these findings should be treated with caution as they are sensitive to the inclusion of one specific donor unit.

Abstrakt

Da die wirtschaftlichen Auswirkungen der Integration in der akademischen Forschung an Bedeutung gewonnen haben, insbesondere in Bezug auf große Volkswirtschaften mit geopolitischer Relevanz, konzentriert sich diese Masterarbeit auf ein kleineres, weniger erforschtes Thema, den Beitritt Estlands zur Europäischen Union (EU). Die Masterarbeit befasst sich mit der wirtschaftliche Entwicklung Estlands, das zu Beginn der 1990er Jahre einen Übergang von der Planwirtschaft zu einer offenen liberalen Wirtschaft durchlief. Es wird der Zeitraum von 1993 bis 2019 betrachtet. Zur Ermittlung der wirtschaftlichen Auswirkungen des EU-Beitritts im Jahr 2004, wird die synthetische Kontrollmethode von Alberto Abadie angewendet. Die Erstellung des synthetischen Zwillings erfolgt durch die Bildung des gewichteten Durchschnitts der zulässigen Kontrolleinheiten. Die einzige Differenz zwischen dem synthetischen Zwilling und dem realen Vorbild, Estland, ist, dass dieser im Jahr 2004 nicht der EU beigetreten ist. Die vorliegenden Ergebnisse legen nahe, dass der Beitritt Estlands zur EU eine positive Auswirkung auf das Wirtschaftswachstum hat. Nach Abschluss des Beobachtungszeitraums hat Estland ein um 14 % höheres reales BIP pro Kopf verzeichnet, verglichen mit dem synthetischen Zwilling. Die Ergebnisse sind jedoch mit Vorsicht zu interpretieren, da sie sensibel auf die Einbeziehung einer bestimmten Kontrolleinheit reagieren.

Contents

List of Tables

List of Figures

1 Introduction

This paper sets out to analyse the economic implications of Estonia's accession to the European Union (EU). First, the state of the economy of Estonia in the period following the country's independence and prior to its accession to the European Union (EU) is examined. The present study is utilising the Synthetic Control Method (SCM) to explore the economic development of Estonia since its accession to the EU and the potential state of the economy had it not joined the EU. The SCM incorporates a pool of control units, in this case, other countries that are not directly or indirectly affected by the event of Estonia's accession to the EU, in order to explore this counterfactual state. These control units are weighted to replicate Estonia's economic performance in the pre-treatment period, this being based on selected economic variables. Subsequently, a comparative and analytical approach is taken to examine the economic performance of the synthetic Estonia and the actual country. This method facilitates the identification of the variables with the greatest influence and the establishment of a connection to EU accession.

Estonia, a small country in the Baltic region, has undergone a transformation in its political and economic perspectives. In its modern history, it has moved from being an independent country to an annexed state under the control of The Union of Soviet Socialist Republics. During this period, the country was subject to centralised communist rule as the Estonian Soviet Socialist Republic, and a planned economy was implemented. This economic and political orientation persisted until it regained independence in November 1988. Subsequently to this period, the country has moved to being a liberal social democracy with a mixed economy. In 1998, the EU initiated the formal accession negotiations with Estonia. In October 2002, the EU Commission issued a recommendation to approve the accession aspirations of the ten candidate countries. In May 2004, the European Union expanded with the accession of ten countries, including Estonia. This development marked the granted the new member states free movement of capital, people and goods within the EU's borders. However, the access of the new member states to the old member states' labour market has been restricted with the introduction of the transitional agreement for up to seven years (Ulceluse & Bender, 2022; Ulceluse & Kahanec, 2023). In December 2007, it gained membership to the Schengen Area, thus dismantling the border controls between the Schengen members. As a final step of the integration process, it became a full member of the European Monetary Union and

adopted the euro as its national currency in 2011 (Permananet Representation of Estonia to the EU, 2022).

The accession of Estonia to the European Union has had a positive impact on the Estonian economy as it has been integrated into a larger market. The elimination of tariffs and analogous restrictions has been demonstrated to enhance economic accessibility, thereby fostering a favourable environment for trade and investment. This arrangement facilitated the unrestricted flow of people, goods, services and capital between Estonia and the broader EU market, which currently encompasses 27 member states. Furthermore, it has gained free access or access at reduced costs to the markets of third countries due to Free Trade Associations (FTAs) or other such associations. An increase in Foreign Direct Investments (FDI) has been recorded as it has become more straightforward and secure to invest in the country. Estonia has also received capital from the EU itself, as it allocates financial funds to less developed (<75% of EU-27 average GDP) and transition regions (75% < 100% of EU-27 average GDP) countries of the union with the goal of decreasing inequalities between member states (European Commission, 2022; European Investment Bank, 2022, 2023).

In the contemporary, rapidly globalising world, the effective operation of an open economy is contingent upon the presence of clearly defined rules and laws that are enforceable by the judiciary. The rule of law and the independence of the judiciary are explicitly identified as one of the fundamental pillars of the EU's legal framework (Directorate-General for Communication, 2024).

Established economic theory can provide an outlook on potential results. The theories' expectations of free trade are positive, as per the neoclassical theory of comparative advantage Ricardo, (2018), which assumes that the elimination of trade barriers will result in an increase in productivity as labour and capital investments are relocated to more efficient production. This positive expectation is further amplified through the theory of scale economies, by Krugman, (1990) which introduces additional efficiencies. The hypothesis is that increased efficiency through specialisation in return may offer increased trade and thus capital for investments. The aforementioned factors contribute to the enhanced attractiveness of the new, freely accessible country as an investment prospect, particularly in the context of FDIs.

The remainder of this master's thesis is structured as follows: In the literature review, existing literature on economic integration such as EU accession is analysed. Furthermore, the findings of research covering similar economic integration events are analysed, with an examination of the advantages and shortcomings of the studies and the methods used. In chapter three, the Synthetic Control Method is introduced, along with a discussion of its initial purpose and mechanism. Furthermore, a balanced presentation of the advantages and disadvantages of the aforementioned approach is provided. Subsequently, the data and the manner in which it was prepared for the analysis are described. The sixth chapter of this text presents the results of the study. Finally, in the conclusion, the implications of the results, their comparison to past literature and economic theories, as well as the study's shortcomings, are drawn.

2 Literature Review

The primary advantage of Estonia's accession to the EU is the elimination of restrictions on trade and the free movement of capital, people, goods and services within the EU market. These are the pillars of free trade and economic partnership between the member states of the EU. As demonstrated in the relevant studies (Chupilkin et al., 2025; Henrekson et al., 1997; in 't Veld, 2019), these are considered to be the primary beneficiaries of economic growth with regard to integration. The positive economic outcomes displayed in those studies are consistent with economic theory. Theories such as comparative advantage (Ricardo, 1817) and scale economies with increasing returns (Krugman, 1990) describe the benefits a country receives from eliminating trade barriers with its partners. In accordance with the principles of comparative advantage theory, international trade is advantageous for all participating nations, provided that each country specialises in the production of goods and services for which it possesses a comparative advantage over other countries. This concept encompasses not only the potential output that would be achieved if an equal amount of labour and capital were invested, but also the opportunity cost associated with this production (Ricardo, 1817). Consequently, the absence of trade barriers in a new market may provide a compelling incentive to transition production towards more efficient goods and services. This has been demonstrated to result in a decrease in production diversity, yet an increase in overall productivity within the country. However, product diversity does not diminish, as these can be imported from partner countries. The new trade theory's assumption of scale economies states that

efficiency is increased further since production is specialised on specific products and with increased production, knowledge is gained on how to produce more efficiently (Krugman, 1990).

One of the primary economic ramifications that a nation encounters upon acceding to a single market or an FTA is the change in GDP per capita. This assertion is corroborated by the findings of numerous studies, as demonstrated in the following paragraphs. However, early research on the potential economic effects of integration has not found any empirical evidence to support the hypothesis that integration leads to growth effects. This demonstrated that, particularly in preliminary research, the true effect of integration was ambiguous. A study was conducted to compare the growth of European Community countries of the OECD with non-European Community countries of the OECD. Using an OLS regression, the study concluded that there are no significant economic growth effects from European integration (Landau, 1995). These findings were confirmed in a study on EU integration, which did not find long-term growth effects associated with EU integration, but does not rule out level effects (Vanhoudt, 1999).

In the OLS cross-country regression on the EU and European Free Trade Association, a significant positive effect of +0.6% to +0.8% on yearly real GDP growth has been found. This positive growth is believed to be mainly driven by technology transfer. However, the robustness of these results is limited in certain respects, as they face potential endogeneity issues and the magnitude and significance of the effect are sensitive to the sample period and the units selected for the study. Thus, clear causality remains unidentified, with only a correlation being observed (Henrekson et al., 1997). Badinger (2005) employed an integration index in order to ascertain the extent to which the countries had been integrated into the global and regional markets. This approach has the advantage over the use of dummies in that it allows for a more nuanced differentiation between the integration status of different countries. Their regression results support their assumption that integration leads to significant level effects, as without integration GDP per capita would be 20% lower without any integration since 1950. However, the claim of significant effects on long-term GDP growth rates is not supported, contrary to Henrekson's result. Furthermore, the findings are not entirely robust with respect to time-specific effects (Badinger, 2005).

These studies fall within the category of the early research on the economic effects of EU accession, which suffer a robustness problem. This phenomenon can be primarily attributed to an absence of

a suitable counterfactual in these studies, as asserted by Boltho & Eichengreen (2008). Another study on the effects of EU accession by Alber, Jens et al., (2011) has identified similar positive effects on GDP growth as Henrekson's research. Nonetheless, it must be noted that these effects may not be causal as their research design does not include a clear formal identification, such as Differences-in-Differences or regressions, due to its sole reliance on comparative and descriptive research.

The present thesis is based on the work of Campos et al. (2019) and Cieślik & Turgut Burak (2024) as their works focus on integration into the European Union and its economic effects. In the study by Campos et al. (2019), which has analysed the effects of integration, by implementing the SCM, from 1973 until the 2004 enlargement. The results demonstrate a positive and significant effect on GDP growth for all member states, with the exception of Greece. The latter's economy was deemed too uncompetitive due to the underdevelopment of its industry in comparison to that of the northern member states. Their findings indicate that in the absence of EU membership, the average per capita income would be 10% lower after a decade (Campos et al., 2019). Similar to Campos et al. (2019), Cieślik & Turgut Burak (2024) conducted a study of the economic effect of EU accession. However, their research differs in that it focuses exclusively on the 2007 accession of Bulgaria and Romania. The chosen analytical method is also SCM. The findings of the study suggest that Bulgaria and Romania have witnessed positive growth effects, with an increase in their GDP per capita of 1.6% and 4.6%, respectively, as a consequence of their accession to the EU (Cieślik & Turgut Burak, 2024). However, these significant effects were only detectable after seven years of joining, thus no immediate significant effect was found.

Cuaresma et al., (2013) focused on European integration with regard human capital and education. In their research, they have employed a projection-based model to explore the influence of the improvement of human capital on income per capita convergence in Europe. They have analysed the relationship between human capital and income per capita using historical data. The projection was then calibrated with this data and the results showed a positive and significant impact of human capital on income per capita convergence. The impact is primarily delivered in the form of implementation and the creation of innovations, highlighting the importance of higher education. The positive convergence effect is more pronounced for less economically developed countries. While this effect is significant, it is not instantaneous and can thus be regarded as an investment in

the future. It is also noted that the investment in human capital alone is not sufficient to ensure catching up with the old member states (Cuaresma et al., 2013).

The findings of Cuaresma et al. (2013) fall in line with the findings of Böwer & Turrini (2010)that less developed countries with lower pre-accession income and weak institutional quality, experience the most significant GDP per capita growth rates. An increase in total factor productivity growth, which has been induced by higher FDI inflow, technology transfers and improved allocation of resources, played a vital role (Böwer & Turrini, 2010). The substantial influx of capital investments induced an overheating of the economy, which could account for higher-than-expected growth rates in the early years of the accession, but then below-average growth after the start of the financial crisis (Böwer & Turrini, 2010).

In a similar manner to Cieślik & Turgut Burak (2024), Chupilkin et al. (2025) analyse the effect of EU accession. However, their study, which utilises the synthetic control method, focuses on the new member states of the 2004 enlargement and the extent to which income convergence can be attributed to the accession bonus. The findings of the study indicated that a proportion (17%) of the observed 23% increase in GDP per capita can be ascribed to the EU bonus received by the selected countries. This is evidenced by the synthetic control unit of these countries, which exhibited a mere 6% gain during the same time period, spanning from 2003 to 2023. Furthermore, it has been asserted that this incentive was effective in 2001 and 2002, as evidenced by the increase the countries FDIs to these nations (Chupilkin et al., 2025). It can be hypothesised that the increase in FDI is attributable to the market's anticipation of the EU accession of these countries.

Despite the fact that these studies exclusively address accession to the EU, the impact is not confined to a specific geographic area or the European single market. The effect has been observed across various FTAs and customs unions. As demonstrated in the research results of Nguyen (2025) on economic integration in the Southeast Asian Nations Economic Community (AEC). Through OLS, long-term impact and panel analysis, Nguyen (2025) has found supporting evidence for Henrekson et al. (1997) results, that economic integration policies have a significant impact on economic growth. The analysis of the AEC from 1970 to 2022 reveals a long-term positive impact of FDI on GDP growth. FDI's long and short-term positive impact is derived from an increase in productivity and knowledge at domestic enterprises through spillovers and the general influx of capital, which

has a short-term positive impact on the economy. However, negative effects of integration, such as increased trade openness, have also been demonstrated, which turn out to be insignificant in the long term. This research is subject to a number of significant limitations, such as failing to consider other pertinent growth factors for instance population size or inflation into account (Nguyen, 2025).

The significance of human capital and FDI for convergence, which is emphasised by the aforementioned studies (Cuaresma et al., 2013; Nguyen, 2025) are in line with the earlier findings of Kutan & Yigit (2009) on the 2004 EU enlargement. The regression analysis of the panel data revealed that an enhancement in productivity is attributable to an increase in foreign direct investment (FDI), exports, and human capital. Within the paradigm of human capital, higher education assumes a pivotal role, while extant data indicates that R&D exerts no discernible influence. However, this may be attributable to the low expenditure levels of the observed countries (Kutan & Yigit, 2009). Imports affect productivity growth negatively, as their high cost does not result in an equivalent increase in efficiency. The subsequent reliance on domestic intermediaries leads to a lower transfer of knowledge (Kutan & Yigit, 2009).

As displayed by previous research, it is anticipated that a significant increase in GDP per capita will be observed, due to the effects of an increase in FDI and TFP within the treated unit in comparison to the synthetic counterfactual. The literature aligns with the aforementioned neoclassical and new trade theories.

3 Methodology

The method used in this thesis is the Synthetic Control Method (SCM). This methodology was created to assess the economic cost of the intra-state conflict in the Basque Country by Abadie & Gardeazabal (2003). In this study, the researchers employed an analytical approach to assess the economic impact of the terrorist attacks. They measured the economic variables of the Basque region prior to the attacks and then replicated the findings by taking the weighted average of the other regions in Spain, which constitutes the donor pool. This replica is the synthetic Basque region. The selection of weights is undertaken with the objective of minimising the discrepancy between the Basque region and the synthetic counterfactual for the designated variables prior to the terrorist attacks. In a subsequent step, the development of the economic variables was analysed to

determine how these variables had changed over the years for the Basque region and the synthetic counterfactual after the commencement of the attacks. Utilising this information, statistical inferences can be drawn on the impact of attacks on the Basque region's economy. This is due to the fact that the real and synthetic regions differ solely in terms of whether they are treated, have experienced attacks, or remain unaffected. The underlying reason behind the creation of this methodology refers to the premise that the combination of donor units possesses the capacity to replicate the designated characteristics of the treated unit with greater efficacy than any individual donor unit (Abadie & Gardeazabal, 2003).

3.1 SCM Usage

This methodology, developed for the analysis of the impact of events, policies and analogous interventions, has gained popularity within academic circles. It has been named as the most important innovation in the policy evaluation literature in the last 15 years" by Athey & Imbens (2017). Examples of its usage are the impact of tightening immigration policy on the population of Hispanic noncitizens Bohn et al. (2014), changes in taxation and its effect on migration, on the example of football stars (Kleven et al., 2013), or research on the impact of organised crime (Mastrobuoni & Pinotti, 2015). Moreover, as displayed in the literature review, it has been employed in research concerning economic accession to a customs union.

3.2 Formal Requirements

The following requirements are necessary for the correct usage of this model, as outlined by the inventors Abadie et al. (2011), as it has been employed in various research studies (Abadie et al., 2011, 2015; Abadie & Gardeazabal, 2003). The first requirement is that a strict differentiation between treated and untreated units is possible. The distinction is made on the basis that only treated units receive the treatment which may lead to changes in their characteristics. The treatment can take different forms, such as the implementation of a specific policy or, as illustrated in the aforementioned example, the occurrence of terrorist attacks. Thus, we have $J + 1$ units, of which one is the treated unit, assume it is the first one, $j = 1$. Consequently, units starting with $j = 2$ up to $J + 1$ are untreated. The outcome Y is observed for each unit j for each period t over the time

span of T years, $t = 1,2,3,\ldots,T_0$ represents the pre-treatment period, and $t = T_0 + 1,\ldots,T$ represents the post-treatment period. Thus, $T_0 + 1$ marks the year in which the treatment occurs. Each unit j has k predictors written as X_{kj} and an outcome variable. The predictors may also include the outcome variable, Y_{kj}, in the pre-treatment period. In an optimal world, the difference in the outcome variable between the treated unit and its counterpart, which is identical except for the absence of treatment, could be measured. The following formula is proposed for the measurement of the aforementioned scenario:

$$\tau_{1t} = Y_{1t}^{I} - Y_{1t}^{N} \qquad (1)$$

However, as this is impossible, a synthetic version of the treated unit must be created. A blind combination of untreated units does not replicate how the treated unit would have evolved if it had not been treated. In order to create a synthetic version which matches the treated unit in the pre-treatment period, weights must be introduced. The weights assigned to the untreated units are restricted to be non-negative and their sum is required to equal one, to avoid extrapolation. However, this has the effect that only a small number of donor pool units have a positive weight and contribute to creating the synthetic counterfactual. The synthetic unit can be expressed as follows:

$$\hat{Y}_{1t}^{N} = \sum_{j=2}^{J+1} w_j Y_{jt} \quad (2)$$

Rewriting (1) to compute the difference between the synthetic and treated unit:

$$\tau_{1t} = Y_{1t}^{I} - \hat{Y}_{1t}^{N} \qquad (3)$$

The following list outlines the key requirements of the SCM, according to Abadie, Diamond and Hainmueller (Abadie, 2021; Abadie et al., 2015):

- The donor units should share similarities with the treated unit to be able to closely match it in the pretreatment period. Without similarities, the difficulty of properly matching the treated unit in the pretreatment period is raised. In the event of an inadequate fit, the synthetic unit

is unable to match the treated unit effectively during the pretreatment period, thereby model's informative value about the treatment effect is weak.

- The donor pool must be large enough and completely unaffected by treatment. Thus, it must not be directly or indirectly affected by spillovers.
- The donor pool must not experience any substantial idiosyncratic shocks to the outcome variable, if the treated unit would not have subject to such a shock in the absence of the treatment.
- Structural breaks should be avoided in the pre-treatment period as the accuracy of the model suffers. These structural breaks may be large global crises, such as the oil crisis of the 1970s.
- The outcome variable is needed for each period t within the time span T. The treated unit must not undergo any other major events during the time span in question. Otherwise, the problem arises in which the treated unit differs in two perspectives from the synthetic one, thus, the observed change cannot be assigned without doubt to the treatment in question.
- There should not be an anticipation of the treatment which affects the outcome variable before the actual treatment.
- The pre-treatment period must be sufficiently long to collect enough data on all units, otherwise, the tracking of the treated unit's trajectory may not be precise enough. This has an effect on the fit of the synthetic control unit.
- It is essential to establish a sufficiently long time horizon in order to accurately observe and measure the effect of the treatment.

3.3 Advantages and Disadvantages of SCM

One of the main advantages of SCM compared to the more frequently used linear regression is that it has no extrapolation, as the weights are restricted to being nonnegative and their sum is restricted to equal 1. Regressions allow weights to assume negative values, thus the counterfactual can use negative values of a unit within the control pool. Abadie (2021) asserts that the consequence of extrapolation is the establishment of a perfect fit, even in instances where the units subjected to

treatment and the control units are entirely dissimilar. Furthermore, in the context of extrapolation, the observed baseline trend is expected to persist throughout the entire period under consideration. This suggests that, in the absence of any restrictions, the model may exhibit a high degree of sensitivity to structural breaks occurring in the post-treatment period (Parker et al., 2011).

An increased transparency is another benefit, as it is clearly visible which unit has positive weights and what role these units play in the synthetic control unit. This allows easier interpretation of the validity of the model. Moreover, it shows if there is an overreliance in the synthetic control unit on one unit in the donor pool, which may occur as a downside of SCM, due to no extrapolation and the synthetic unit being the weighted average of the donor pool. This overreliance can result in the synthetic unit exhibiting heightened sensitivity (Abadie, 2021).

The method itself incorporates a safeguard against specification searches, as it relies exclusively on pre-treatment data to create the synthetic control unit. Thus, the synthetic control unit may be created even before post-treatment results exist, restricting the option of searching for specification in the post-treatment data (Abadie, 2021). This attribute of the method allows the model to be used in the analysis of randomised control trials (Olken, 2015).

Other downsides of this method are the high amount of data, pre- and potentially post-treatment period, which is required to be able to create a good fit for the synthetic unit and be able to measure the treatment effect. The fit of the model is determined by how closely the weighted average of the donor pool can match the treated unit (Abadie, 2021).

3.4 Application of Requirements

The aforementioned criteria are applied and tailored to this thesis topic of Estonia's EU accession. With regard to the analysis, these steps are executed in the statistical software program "R". The “R” package “synth” created by Abadie et al. (2010) will be used to construct the model:

The data obtained for all units $j = 1,2,3,\ldots,J+1$, where $j = 1$ represents Estonia, with the treatment being EU accession. The remaining units $j = 2,3,4,\ldots,J+1$ constitute the donor pool, representing untreated countries which are used in the creation of the synthetic Estonia.

Data is collected for all time periods T, 1993-2019. We define the time dimension such that $t = 1993, 1994, \ldots, 2003$ represents the pre-treatment period, and $t \geq T_0 = 2004, 2005, \ldots, 2019$ represents the post-treatment period. Treatment occurred in 2004 $= T_0$.

Y_{it}^N denotes the outcome of Estonia that would be observed without treatment.

Y_{it}^I denotes the outcome for Estonia, if treated. The treatment effect is therefore defined as:

$$\tau_{1t} = Y_{1t}^I - Y_{1t}^N \quad (1)$$

Since the counterfactual outcome Y_{1t}^N, Estonia's economic trajectory had it not joined the European Union, is not observed a synthetic Estonia is constructed using SCM.

Synthetic Control Definition

The synthetic control is a weighted average of the donor units:

$$\hat{Y}_{1t}^N = \sum_{j=2}^{J+1} w_j Y_{jt} \quad (2)$$

where the weights satisfy:

$$w_j \geq 0 \text{ and } \sum_{j=2}^{J+1} w_j = 1 \quad (3)$$

The vector is written as:

$$W = (w_2, w_3, w_4, \ldots, w_{J+1}) \quad (4)$$

and is chosen to minimise the pre-treatment distance between the treated unit and the synthetic control.

Predictor Matching

X_1 is a $(k \times 1)$ vector of pre-treatment characteristics (predictors) for Estonia, and X_0 be the corresponding $(k \times J)$ matrix of the same characteristics for the donor pool.

The optimal synthetic control weights $W*$ are obtained by solving

$$W* = argmin(X_1 - X_0 W)'V(X_1 - X_0 W \quad (8)$$

Subject to $(w_j \geq 0)$ and $P_j w_j = 1$, where V assigns relative importance to the predictors. The resulting synthetic control outcome (both pre- and post-treatment) is then given by:

$$\hat{Y}_{1t}^N = \sum_{j=2}^{J+1} w_j Y_{jt} \quad (9)$$

Treatment Effect Estimation

For each post-treatment period $t > 2003$, the estimated treatment effect is computed as follows:

$$\tau_{1t} = Y_{1t}^I - \hat{Y}_{1t}^N \quad (10)$$

To create a synthetic Estonia with a good fit that resembles the actual country well, we need to filter the potential countries of the donor pool. This filtering is done by implementing the key requirements from (Abadie, 2021), as mentioned above. These are then adapted to fit this specific case. Thus, the final restrictions are:

a) The countries from the donor pool must not be affected by the treatment, accession of Estonia to the EU, in any direct or indirect way. This includes any spillover effects.
b) The countries from the donor pool must not have undergone the same treatment or experience a similar treatment in the timeframe.
c) The countries from the donor pool must not be too dissimilar from the treatment country, otherwise, it leads to interpolation bias.
d) There should not be an anticipation of the treatment which affects the variables before the actual treatment. An illustration of this phenomenon is evident in the escalation of foreign

direct investment prior to the implementation of policies, such as the reduction of trade barriers.

e) The countries from the donor pool must not suffer from large idiosyncratic shocks before the treatment, as this affects the fit. The donor units must also not experience any substantial idiosyncratic shocks after the treatment period, if the treated unit would not have experienced such shocks without the treatment.
f) Countries from the donor pool must be removed if they do not have enough data on the predictors or all the data of the outcome variable, as the SCM cannot be used in these cases.

4 Data

To analyse the effect EU accession has on Estonia's economy, data on key economic variables are needed to be able to analyse the state of the economy pre- and post-treatment. Thus, the following were selected as predictor and outcome variables for this study.

Outcome Variable (Y_{it}):

- Real GDP per capita

Predictor Variables (X_0, X_1):

- Human Capital (based on years of schooling and returns to education)
- Total Factor Productivity (Purchasing Power Parities, US=1)
- Unemployment in % (ILO measurement)
- Trade Openness, sum of exports and imports (%GDP)
- Industry share (%GDP)
- Foreign Direct Investments net outflows (%GDP)
- Foreign Direct Investments net inflows (%GDP)
- Real GDP per capita
- Inflation (consumer prices index) annual changes in %

Real GDP per capita has been selected as the outcome variable because it is a widely accepted economic indicator for measuring a country's average prosperity, accounting for inflation, making it useful for comparing different countries. In the pre-treatment period, real GDP per capita has also been included as a predictor, as this allows for the measurement of not only direct changes in other metrics but also those that influence the outcome variable and are not explicitly listed as predictors (Abadie et al., 2015).

The predictors, apart from real GDP per capita, have been selected on the basis that they reflect key aspects of the economy and are most likely to change following Estonia's accession to the EU. Human Capital and Total Factor Productivity have been selected as they are representative of an increase in innovative findings and their implementation. Trade openness and FDI inflows and outflows are included as these factors indicate the opening of a new market for Estonia to export to and import from, and also to invest in and receive investments from. Inflation is incorporated into the assessment to evaluate the behaviour of the consumer price index prior to accession and its subsequent variation in the post-treatment period, as it is likely to be affected by the implementation of the euro as the official currency (Özdeşer, 2020; Stipić, 2023).

The data for the outcome and predictor variables are sourced from Feenstra, Robert C. et al. (2025) and World Bank Group (2025). In instances where a high number of missing values for variables was observed in certain countries, additional data sources were utilised to address the missing values. The data on inflation was sourced from the Internal Monetary Fund (IMF, 2025) while data on Trade openness was taken from the United Nations (2025) in order to fill the gaps.

Of the potential donor units, 12 countries have met the requirements (Application of Requirements) to be included in the donor pool. Assumptions a) and b) are the most restrictive, as they exclude countries that potentially exhibit the greatest similarity to the treatment unit.

Donor pool countries:

- Australia
- Bolivia
- Colombia
- Costa Rica
- India
- Kazakhstan
- Lao People's DR
- New Zealand
- Panama
- Paraguay
- Singapore
- Uruguay

The time period under consideration in this thesis is from 1993 to 2019. As Estonia's EU accession was in 2004, this provides 10 years of pre-treatment data. The pre-treatment time frame has been selected on the basis that data from for countries being a part the Union of Soviet Socialist Republics were deemed unreliable and the definitions of key variables were too divergent from the western counterparts (Allen, 1995). Regarding post-treatment time frame, 2019 was chosen as the final year, as this was the last year before the COVID-19 Pandemic, which caused economic disturbance across the world. Moreover, by choosing 2019 as the final year, it is avoided to have two significant structural breaks within the observed time period. The 15 years of post-treatment is a reasonable timeframe to gather economic data on the potential effect on EU accession, as evidenced by research with a similar timeframe and topic (Campos et al., 2019; Cieślik & Turgut Burak, 2024).

5 Results

After cleaning the data and establishing the definitive donor pool, the synthetic version of Estonia is generated. Table 1 displays all countries in the donor pool with non-negligible positive weights assigned, which collectively form the synthetic Estonia. Of the 21 countries, eight are used in the synthesis, which primarily depends on five: Singapore (24%), India (20%), Panama (18.9%), Lao People's DR (15.3%) and Bolivia (12.2%). These countries account for approximately 90% of the weights used to construct the synthetic Estonia. This reliance on a small number of countries can be attributed to the utilisation of the SCM (Abadie, 2021), as previously mentioned. The following four countries have been assigned a weight below 10%: Kazakhstan (6%), Australia (2%), Paraguay (0.8%), Costa Rica (0.5%) and Uruguay (0.3%). All other countries have been assigned weights very close to zero, and are therefore deemed negligible.

Donor Countries	**Synthetic Control Weights**
0.020	Australia
0.122	Bolivia
0.000	Colimbia

0.005	Costa Rica
0.200	India
0.060	Kazakhstan
0.153	Lao People's DR
0.000	New Zealand
0.189	Panama
0.008	Paraguay
0.240	Singapore
0.003	Uruguay

Table 1: Donor countries' weights for synthetic counterfactual

Table 2 shows the predictive power of each predictor in relation to the outcome variable, real GDP per capita (USD), which was used to create the synthetic Estonia. Real GDP per capita has the highest predictive power at 77.7%, followed by trade (%GDP) at 10.9%. The lowest predictive power is assigned to unemployment (0%) and human capital (0%) and FDI net outflows (0%). The other predictors have each a low predictive power industry share (1.2%), FDI net inflows (3.2%), Total Factor Productivity (3.3%), and inflation (3.8%).

Predictors	**Predictive Power**
Hc	0
TFP	0.033
Trade	0.109
Unemployment	0
FDI net in	0.032
FDI net out	0
Rgdpe/capita	0.777
Inflation	0.038
Industry share	0.012

Table 2: Predictors Predictive Powers

Table 3 displays the fit of the synthetic Estonia. The mean of each variable during the pre-accession period of Estonia is compared to synthetic Estonia and the whole donor pool. In general, synthetic

Estonia bears a strong resemblance to the real Estonia, as the pre-treatment means of each predictor are closely aligned. However, unemployment is a notable exception, with a substantially lower rate observed in the synthetic version compared to actual data from Estonia. This phenomenon can be attributed to the observation that the majority of countries in the donor pool, particularly those with higher assigned weights, have not experienced a surge in unemployment, with the exception of the 2007/08 financial crisis.

Predictors	**Estonia**	**Synthetic Estonia**	**Sample Mean**
Human Capital	3.174	2.265	2.472
Total Factor Productivity (PPP, US=1)	0.544	0.546	0.599
Trade Openness (%GDP)	136.674	136.453	88.150
Unemployment in % (ILO measurement)	10.267	5.208	7.032
FDI net inflows (%GDP)	6.448	6.464	4.275
FDI net outflows (%GDP)	1.610	2.263	0.982
Real GDP per Capita	13823.303	13824.540	14620.421
Inflation in %	20.550	20.722	27.414
Industry share (%GDP)	25.665	25.726	26.666

Table 3: Comparison Prediction Table before Treatment

The subsequent two figures illustrate the development of real GDP per capita in Estonia over the years, with the treatment of EU accession in 2004 and of the synthetic version. As demonstrated in Figure 1, a trajectory of almost identical characteristics is displayed in the pre-treatment period. Following the accession, there is a marginal decline in real GDP per capita in Estonia when compared to its synthetic counterpart. However, it is evident that Estonia's real GDP per capita growth outperformed its synthetic counterpart with a significant margin in the two years preceding the financial crisis of 2007/08. This discrepancy in growth leads to a divergence in real GDP per capita, reaching a peak temporarily in 2007/2008. The financial crisis had a significant impact on Estonia, leading to negative growth and stagnation up until 2010. The synthetic counterpart exhibited a comparatively modest negative growth trajectory until 2009, at which point it began to demonstrate positive growth. From 2009 to 2011, the synthetic counterpart exhibited a growth trajectory that outpaced that of Estonia. The economic downturn resulting from the financial crisis was more pronounced in Estonia than in its synthetic counterpart, a phenomenon that can be attributed to

the economy overheating in the early years of accession (Böwer & Turrini, 2010). Thereafter, Estonia experienced a period of substantial economic growth that persisted until 2012. This growth trajectory subsequently decelerated, continuing until 2015. Since 2016, there has been a marked increase in Estonia's real GDP per capita in comparison to its synthetic counterpart. Consequently, at the end of the observed time period, a substantial disparity emerges between Estonia and its synthetic counterpart, with Estonia demonstrating a higher real GDP per capita than its synthetic counterpart.

Estonia's real GDP per capita in 2019 is 43,262.34 USD, which is approximately 13.3% higher than that of its synthetic counterpart, 38,166.39 USD. On average, Estonia's real GDP per capita has grown about 318.50 USD higher per annum than its synthetic counterpart. Moreover, the average real GDP per capita growth rate is also higher for Estonia, 5.7%, when compared to synthetic Estonia, 5%.

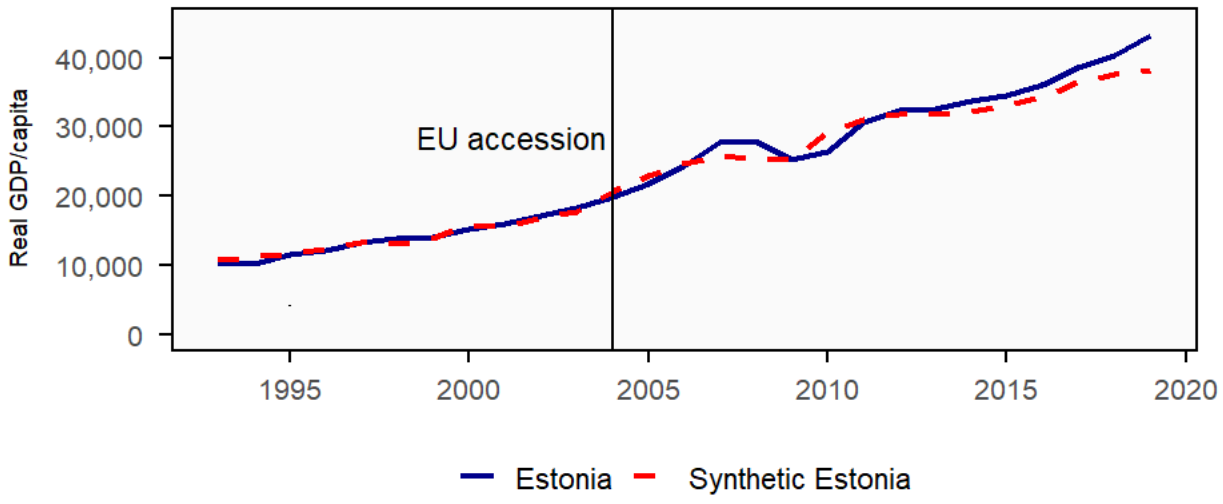

Figure 1: Real GDP per Capita Comparison - Estonia vs. Synthetic Estonia

The disparities in the trajectory and magnitude of positive and negative growth are more evident in Figure 2, which illustrates the gaps between synthetic Estonia and the actual Estonia. In this figure, the synthetic version is designated as the baseline, indicated by the red horizontal line. This figure displays that the synthetic Estonia can match the actual country well in the pre-treatment period, as Estonia oscillation around its counterpart is minimal. The start of the divergence can be traced back to 2006.

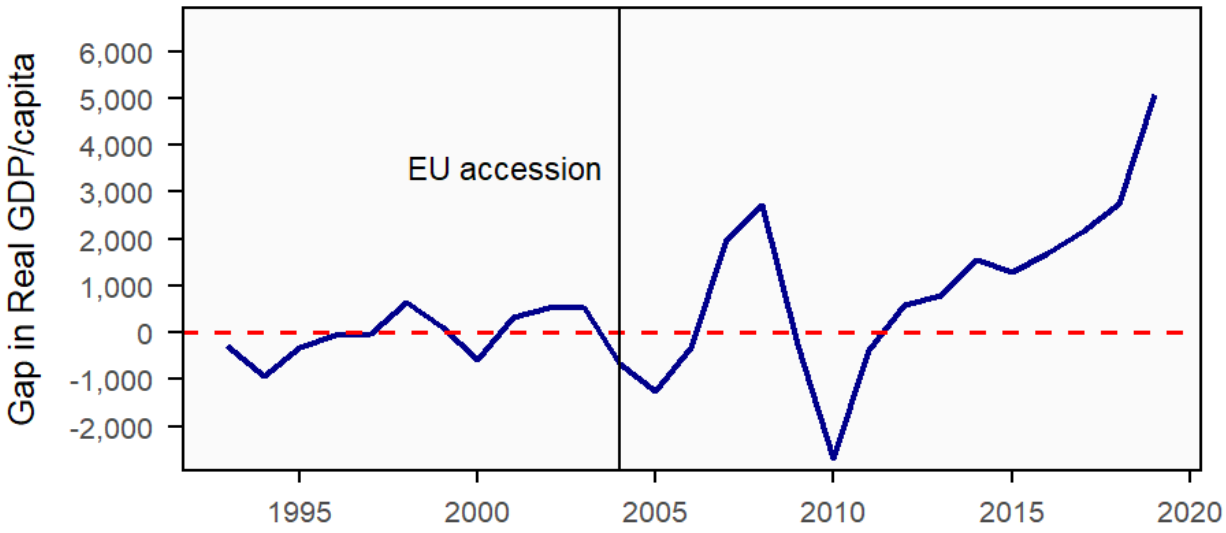

Figure 2: Gaps in Real GDP per Capita between Estonia and Synthetic Estonia

6 Statistical Inference

Although the results presented are consistent with the extant literature, displayed above, additional steps are required in order to enhance the credibility of the results. This is due to the fact that these results could also display only correlations. The objective of this thesis is to provide information on the causal economic effects of Estonia's EU accession. To this end, the results are subjected to rigorous testing in regard to their robustness and their time sensitivity.

6.1 In-time Placebo Test

An in-time placebo test is conducted, whereby the date of Estonia's EU accession is moved to 1999, which is five years before the actual accession date. This date was selected as negotiations concerning EU accession commenced in late 1998. Consequently, 1999 is the first complete year when any market anticipations could be observed. When re-estimating the model for this new accession date, the results provide an insight whether there was any anticipation effect. The results of the original model and the in-time placebo are then compared. Should the results indicate substantial growth effects for the placebo test, then the outcomes of the original model would be discredited, as the model would demonstrate significant growth disparities even before the

treatment, which should be the sole discrepancy between the actual and the synthetic country. However, in the absence of any substantial positive growth effects that are visible for the in-time placebo test, the results would appear to be credible.

Figures 3 and 4 provide a visual representation of the outcomes observed in the placebo test. Figure 3 displays the comparison of real GDP per capita of the treated country, Estonia, and its synthetic counterpart. Synthetic Estonia exhibits a good fit in the pre-treatment period as it oscillates around the values of its real-world counterpart. A positive growth trend for real GDP per capita is also evident for the pre-treatment period for both countries. In the post-treatment period, the growth rate remains positive, albeit a higher constant rate, for both countries. Furthermore, there is no significant difference visible between the treated and the synthetic country, as the synthetic country persists oscillating around the treated country.

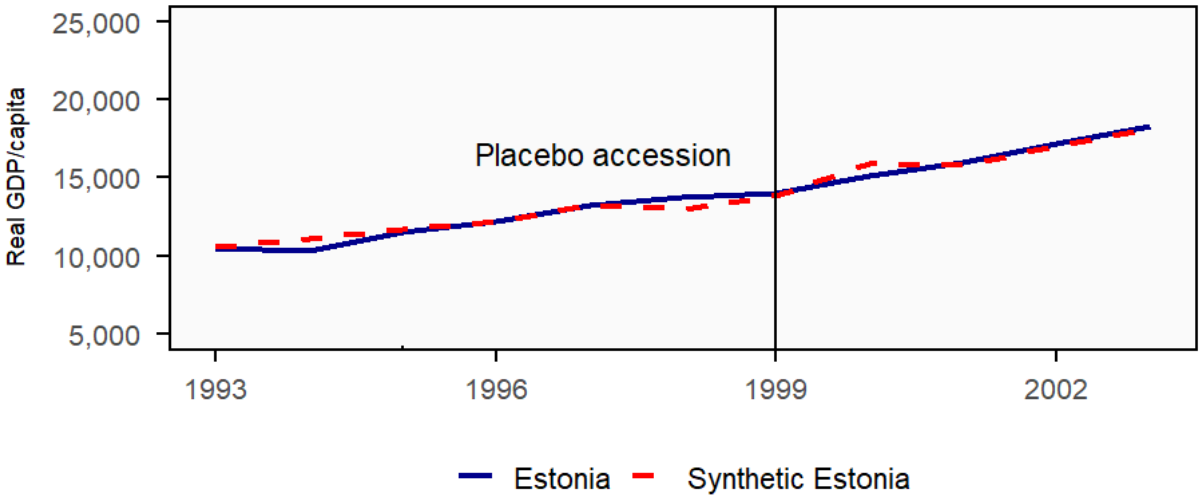

Figure 3: In-time Placebo test (Real GDP per capita)

Figure 4 displays the gap in real GDP per capita between the treated and the synthetic country. This graph enables a more detailed analysis of the developmental trajectories of both nations. It is shown how closely the synthetic country is aligned with the treated. Only minor oscillations are visible. Thus, no significant growth effects were observed in the in-time placebo test. Consequently, it can be argued, that the results from the original model are credible and driven by causality and not coincidence.

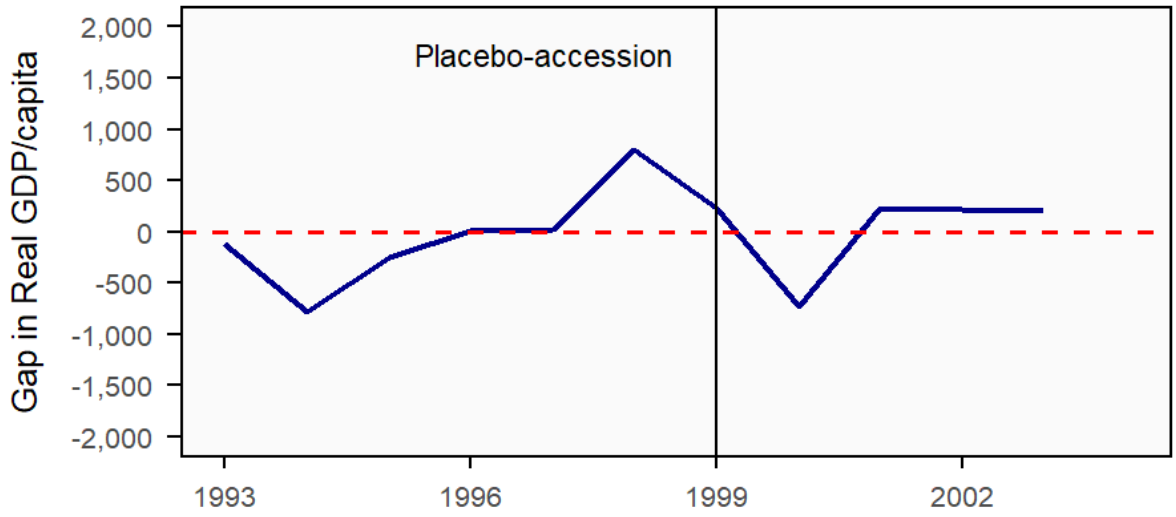

Figure 4: Gaps between Estonia and the synthetic counterpart (in-time Placebo test)

6.2 Robustness Test

To assess the robustness of the results, the Leave-One-Out (LOO) test is used. The objective of this test is to evaluate the robustness of the synthetic Estonia. The LOO test is performed by creating multiple new synthetic versions of Estonia. These versions are generated by removing one country from the donor pool and assigning weighted averages to the remaining countries to achieve the best fit. Then, the previously removed country is added back to the donor pool, and another is removed instead. This process is repeated iteratively until all the original donor pool countries have been removed once. The findings demonstrate the developmental trajectory of a synthetic Estonia in the absence of a particular donor nation.

Figure 5 displays the outcome of the LOO test. The trajectory of the treated Estonia is depicted in blue, while the original synthetic version is indicated in red. The different synthetic LOO versions of Estonia are displayed by multiple green lines, where one country of the donor pool is removed. Overall, all LOO versions of synthetic Estonia follow the path of the treated country closely in the pre-treatment period, with one exception. This specific LOO synthetic version starts to deviate from all other versions, including the original synthetic, at the end of the pre-treatment period. The outlier is synthetic version in which Singapore is excluded from the donor pool. In this instance, the LOO synthetic diverges from the others from the year 2000 until 2015.

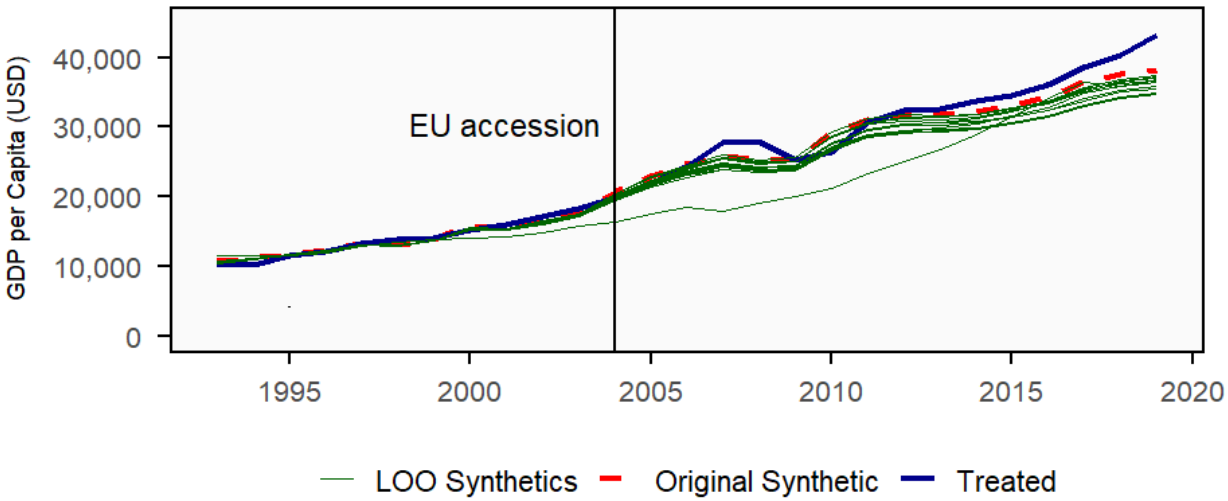

Figure 5: Robustness Check: Leave-One-Out

Singapore's contribution to the original synthetic version of Estonia is significant, with a weight of 23.2%. This result underscores the significance of Singapore's role in facilitating the good fit of the synthetic version. This importance of Singapore as a high weighted donor unit is due to its importance as the main counterbalance to the units which in part are significantly less developed in certain aspects when compared to Estonia. to the However, as demonstrated in Figure 5, there is an overreliance on Singapore in the donor pool to create a synthetic with a good fit, which does not deviate from the treated country in the pre-treatment period.

7 Conclusion

The results of this thesis demonstrate that Estonia has significantly benefited economically from its accession to the European Union. A comparison of the real GDP per capita of Estonia and its synthetic counterpart reveals a discrepancy of 5,316 USD by the end of the observation period, in 2019, which is approximately 14%. This result aligns with the literature found on this topic, as Cieślik & Turgut Burak (2024)have found a similar level for Bulgaria. The finding demonstrates that economic integration has a positive effect on the country's economic output. Moreover, an analysis of economic development reveals no sudden increase in real GDP per capita, but rather consistent, sustained growth. This finding suggests the absence of a level effect, but rather, a consistent positive effect on GDP growth.

However, this result must be considered with a degree of caution, as an overreliance on Singapore, which has a weight of 23.5% in the synthetic counterpart, has been detected when conducting the LOO robustness test.

In the course of the research, certain restrictions were encountered, which may have an effect on the model's fit. The pre-treatment period was found to be shorter than that observed for most applications of SCM at the national level. The reduced pre-treatment period can be attributed to the lack of reliable data from credible sources regarding the treatment country. As Estonia was part of the Soviet Union until 1991, data on its economic activity before 1993 were less abundant and reliable in comparison to its western counterparts. Moreover, some countries which have experienced similar economic, political and social developments have no data in the PWT dataset, which is the source for three key variables. It is recommended that future research focuses on the mechanisms through which this economic development is influenced in the new member states or on the differences in the effects for smaller, less developed and more developed new member states.

8 List of References

Abadie, A. (2021). Using Synthetic Controls: Feasibility, Data Requirements, and Methodological Aspects. *Journal of Economic Literature*, *59*(2), 391–425. https://doi.org/10.1257/jel.20191450

Abadie, A., Diamond, A., & Hainmueller, J. (2010). Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program. *Journal of the American Statistical Association*, *105*(490), 493–505.

Abadie, A., Diamond, A., & Hainmueller, J. (2011). Synth: An R Package for Synthetic Control Methods in Comparative Case Studies. *Journal of Statistical Software*, *42*, 1–17. https://doi.org/10.18637/jss.v042.i13

Abadie, A., Diamond, A., & Hainmueller, J. (2015). Comparative Politics and the Synthetic Control Method. *American Journal of Political Science*, *59*(2), 495–510. https://doi.org/10.1111/ajps.12116

Abadie, A., & Gardeazabal, J. (2003). The Economic Costs of Conflict: A Case Study of the Basque Country. *American Economic Review*, *93*(1), 113–132. https://doi.org/10.1257/000282803321455188

Alber, Jens, Holtmann, Anne Christine, & Marquardt, Susanne. (2011). Are There Visible Accession Effects? Comparing Some Key Indicators of the Trajectories of Central and Eastern European Countries Inside and Outside the EU since the 1990s. *Czech Sociological Review*, *47*(3), 473–506.

Allen, E. (1995, September 18). *The Validity of Soviet Economic Statistics*. Central Intelligence Agency.

Athey, S., & Imbens, G. W. (2017). The State of Applied Econometrics: Causality and Policy Evaluation. *Journal of Economic Perspectives*, *31*(2), 3–32. https://doi.org/10.1257/jep.31.2.3

Badinger, H. (2005). Growth Effects of Economic Integration: Evidence from the EU Member States. *Review of World Economics*, *141*(1), 50–78. https://doi.org/10.1007/s10290-005-0015-y

Bohn, S., Lofstrom, M., & Raphael, S. (2014). Did the 2007 Legal Arizona Workers Act Reduce the State's Unauthorized Immigrant Population? *The Review of Economics and Statistics*, *96*(2), 258–269.

Boltho, A., & Eichengreen, B. (2008). The Economic Impact of European Integration. *Centre for Economic Policy Research*.

Böwer, U., & Turrini, A. (2010). EU Accession: A Road to Fast-track Convergence? *Comparative Economic Studies*, *52*(2), 181–205. https://doi.org/10.1057/ces.2010.7

Campos, N. F., Coricelli, F., & Moretti, L. (2019). Institutional integration and economic growth in Europe. *Journal of Monetary Economics*, *103*, 88–104. https://doi.org/10.1016/j.jmoneco.2018.08.001

Chupilkin, M., Kóczán, Z., & Plekhanov, A. (2025). 20 years of EU Membership: What Explains the Accession Bonus? *Financial and Economic Review*, *24*(1), 52–73. https://doi.org/10.33893/FER.24.1.52

Cieślik, A., & Turgut Burak, M. (2024). The growth effects of Bulgaria and Romania's EU accession: A synthetic control method examination. *Entrepreneurial Business and Economics Review*, *13*(1), 155–167. https://doi.org/10.15678/EBER.2025.130109

Cuaresma, J. C., Havettová, M., & Lábaj, M. (2013). Income convergence prospects in Europe: Assessing the role of human capital dynamics. *Economic Systems*, *37*(4), 493–507. https://doi.org/10.1016/j.ecosys.2013.02.004

Directorate-General for Communication. (2024, October 15). *What is the rule of law? - European Commission*. https://commission.europa.eu/strategy-and-policy/policies/justice-and-fundamental-rights/upholding-rule-law/rule-law/what-rule-law_en

European Commission. (2022, July 18). *EU Cohesion Policy: €3.5 billion for Estonia's economic and social development and green transition in 2021-2027 [Press-release]*. https://ec.europa.eu/commission/presscorner/api/files/document/print/en/ip_22_4531/IP_22_4531_EN.pdf

European Investment Bank. (2022, January). *The European Investment Bank in Estonia*. https://www.eib.org/files/publications/the_eib_in_estonia_en.pdf

European Investment Bank. (2023, May). *Cohesion and regional development Overview 2023*. 8.

Feenstra, Robert C., Robert Inklaar, & Marcel P. Timmer. (2025). The Next Generation of the Penn World Table. *Americen Economic Review*, *105(10)*, 3150–3182, available for download at www.ggdc.net/pwt

Henrekson, M., Torstensson, J., & Torstensson, R. (1997). Growth effects of European integration. *European Economic Review*, *41*(8), 1537–1557. https://doi.org/10.1016/S0014-2921(97)00063-9

IMF. (2025). *World Economic Outlook* [Data set]. https://www.imf.org/external/datamapper/PCPIPCH@WEO

in ’t Veld, J. (2019). The economic benefits of the EU Single Market in goods and services. *Journal of Policy Modeling*, *41*(5), 803–818. https://doi.org/10.1016/j.jpolmod.2019.06.004

Kleven, H. J., Landais, C., & Saez, E. (2013). Taxation and International Migration of Superstars: Evidence from the European Football Market. *American Economic Review*, *103*(5), 1892–1924. https://doi.org/10.1257/aer.103.5.1892

Krugman, P. (1990). Increasing Returns and Economic Geography. *Journal of Political Economy*, *99*(3). https://doi.org/10.3386/w3275

Kutan, A. M., & Yigit, T. M. (2009). European integration, productivity growth and real convergence: Evidence from the new member states. *Economic Systems*, *33*(2), 127–137. https://doi.org/10.1016/j.ecosys.2009.03.002

Landau, D. (1995). The contribution of the European Common Market to the growth of its member countries: An empirical test. *Review of World Economics*, *131*(4), 774–782. https://doi.org/10.1007/BF02707941

Mastrobuoni, G., & Pinotti, P. (2015). Legal Status and the Criminal Activity of Immigrants. *American Economic Journal: Applied Economics*, *7*(2), 175–206. https://doi.org/10.1257/app.20140039

Nguyen, C. V. (2025). The Role of Economic Integration Policies in Increasing Economic Growth in Selected Southeast Asian Countries. *Journal of Risk and Financial Management*, *18*(5), Article 5. https://doi.org/10.3390/jrfm18050229

Olken, B. A. (2015). Promises and Perils of Pre-analysis Plans. *Journal of Economic Perspectives*, *29*(3), 61–80. https://doi.org/10.1257/jep.29.3.61

Özdeşer, H. (2020). Analysis of the Economic Impacts of the Euro, the Efficiency of the Euro in the Optimum Currency Area, and the Place of the Euro in Global Economics. *European Review*, *28*(2), 258–275.

Parker, R. I., Vannest, K. J., Davis, J. L., & Sauber, S. B. (2011). Combining Nonoverlap and Trend for Single-Case Research: Tau-U. *Behavior Therapy*, *42*(2), 284–299. https://doi.org/10.1016/j.beth.2010.08.006

Permananet Representation of Estonia to the EU. (2022, February). *Estonia's EU Accession Timeline*. Estalnd. https://european-union.europa.eu/principles-countries-history/eu-countries/estonia_de

Ricardo, D. (1817). Foreign Trade. In *On The Principles of Political Economy and Taxation* (2610302). Charles River Editors. https://research.ebsco.com/linkprocessor/plink?id=be98bff3-b02e-3a26-be71-0b864a6e6880

Stipić, V. V. (2023). Impact of the Introduction of the Euro on Inflation and the Standard of Living of the Citizens of the Republic of Croatia. *BH Ekonomski Forum*, *19*(1), 55–71.

Ulceluse, M., & Bender, F. (2022). Two-tier EU citizenship: Disposable Eastern European workers during the COVID-19 pandemic. *Organization*, *29*(3), 449–459. https://doi.org/10.1177/13505084211061229

Ulceluse, M., & Kahanec, M. (2023). Eastward enlargements of the European Union, transitional arrangements and self-employment. *Journal of Population Economics*, *36*(2), 719–742. https://doi.org/10.1007/s00148-022-00904-2

United Nations. (2025). *UN Comtrade* [Data set]. https://comtradeplus.un.org/TradeFlow

Vanhoudt, P. (1999). Did the European unification induce economic growth? In search of scale effects and persistent changes. *Weltwirtschaftliches Archiv*, *135*(2), 193–220. https://doi.org/10.1007/BF02707252

World Bank Group. (2025). *World Development Indicators | DataBank* [Data set]. https://databank.worldbank.org/reports.aspx?source=2&series=SL.UEM.TOTL.ZS&country=#advancedDownloadOptions