CHARLES UNIVERSITY

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Bachelor's Thesis

2024 **Barbora Hluštíková**

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Estimating the Effect of the Split of Czechoslovakia: A Synthetic Control Method Analysis

Bachelor's Thesis

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Abstract

The country of Czechoslovakia split in 1993 and the two successor countries of Czech Republic and Slovakia have since chosen their own paths. The literature does not provide an extensive examination of the impact this event had on the economic trajectories on both of the countries, neither does it provide a consensus on the general effect of country secessions. To answer this question, we used the synthetic control method and created a counterfactual Czechoslovakia, the development of which we then compared to the cumulative development of the areas of the Czech Republic and Slovakia.

The results suggest that the split did not have a significant impact on the economic performance of both countries. However, we concluded that the method fails to account for the shocks coming after the treatment and unless the countries of the donor pool have the same reaction to the shock, the results will be biased. Hence why we conclude that the application of this method to cases of comparative economics provides results with limited validity and the role of external shocks in these cases must be assessed.

Abstrakt

Československo se rozdělilo v roce 1993 a obě nástupnické země, Česká republika a Slovensko, si od té doby zvolily vlastní cestu. Literatura neposkytuje rozsáhlý přehled dopadu této události na ekonomický vývoj obou zemí, stejně jako neposkytuje shodu ohledně obecného dopadu oddělení země. K zodpovězení této otázky jsme použili metodu syntetické kontroly a vytvořili jsme kontrafaktuální Československo, jehož vývoj jsme pak porovnali s kumulativním vývojem oblastí České republiky a Slovenska.

Výsledky naznačují, že rozdělení nemělo významný vliv na ekonomickou výkonnost obou zemí. Dospěli jsme však k závěru, že metoda nezohledňuje šoky přicházející po rozdělení, a pokud země dárcovské skupiny nereagují na šok stejně, budou výsledky zkreslené. Proto jsme dospěli k závěru, že použití této metody na případy srovnávací ekonomiky poskytuje výsledky s omezenou platností a že v těchto případech je třeba posoudit roli vnějších šoků.

Keywords

Czechoslovakia, Synthetic Control Method, split of Czechoslovakia

Klíčová slova

Československo, synthetic controls, rozdělení Československa

Název práce

Odhady dopadů rozdělení Československa: analýza metodou synthetic controls

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Introduction

The country of Czechoslovakia existed intermittently and in various institutional settings between the years 1918 and 1993. Its split is a subject of many debates, whether political or economic, as it happened quite abruptly and, contrary to many other cases of country secessions, peacefully. The split also followed the liberalisation of the country and happened during the period of economic transition from planned economy to market economy.

Literature does not provide a consensus on what is the effect of the split of the country. As we demonstrate, different authors arrive to contradictory conclusions when trying to answer this question. It has to be acknowledged that answering this question is fairly hard, due to the fact that different country secessions happen in different institutional settings. Moreover, it is virtually impossible to capture all the factors that might contribute the final effect of the split.

Concerning the split of Czechoslovakia, the scarce literature does not provide a consensus on the effects of the event. The sources we did found however agree that splitting the country did not have a significant long-term effect on the economic development of the two countries.

This thesis therefore asks the same question, whether the split had any significant impact on the economic trajectories of both countries. Due to poor data availability, we restricted this question on whether the sum of both countries would be better off, as obtaining comparable data for each of the countries proved to be challenging. We opted to answer this question using the synthetic control method. This method allowed us to construct a counterfactual Czechoslovakia, the development of which we then compared to the development of the area of Czech Republic and Slovakia cumulatively.

When answering the questions similar to ours, we believe that only quantitative approach does not provide the best results. Which is why we also include an extensive literature review of the effects of the splits, as well as a chapter dedicated to the historical circumstances which shaped the split and the post-split era.

We hope that this thesis may contribute to the literature concerned with the secession dividend and country splits in general.

Perhaps the most importantly however, given the results we obtained, we ask the question whether the methodology we used was appropriate. The synthetic control method has been used in similar cases, as we demonstrate in literature review, but we believe that critical approach will bring more utility than simply accepting what has already been done. Hence why we hope that this thesis will also contribute to the question, whether the SCM is an appropriate tool for comparative economics.

Lastly, we would like to highlight that when we started working on this thesis, it was shortly after the 30th anniversary of the establishment of the independent Czech Republic and Slovakia. We propose that this thesis may as well help with the reflection on the past events.

1 Literature review

This part of thesis will be split into four parts directly relevant to the question this thesis asks. The first part is concerned with the method used, as the synthetic control method is not a part of the econometrics courses curriculum and has a broad range of applications. The second part of the thesis is concerned with papers examining the secession dividend. And as this literature is not broad, the topic will be therefore extended to a question whether a country benefits from being either small or large. Thirdly, combining the two previous chapters, this thesis will review papers estimating the secession dividend using the synthetic control method. This subchapter aims to prove that the methodology chosen for answering the question this thesis asks is suitable for this problem. And lastly, a subchapter will be dedicated to the literature concerning the split of Czechoslovakia itself, to give a ground for the comparison of our results to other results.

1.1 On synthetic control method

The synthetic control method (SCM) has been proposed by Abadie and others (Abadie and Gardeazabal, 2003; Abadie, Diamond and Hainmueller, 2010, 2015) as an alternative to difference-in-differences approach proposed by Card (Ashenfelter and Card, 1984; Card, 1990) for comparative cases where exact matches are not available. Compared to difference-in-differences, which relies on one control group to estimate the effect of a treatment and requires strict assumptions (such as the common trend assumption) (Hahn and Shi, 2017), SCM constructs a counterfactual treated unit using a weighted average of multiple controls (Athey and Imbens, 2017).

In the original paper of Abadie and Gardeazabal (2004), the weight vector is set by a minimum-distance approach (e.g. by choosing such weights that the difference between the values of the treated country and the synthetic country in the pre-treatment period are minimised) with the restriction that the intercept is zero, all weights ought to be non-negative and yield a sum equal to one (Abadie and Gardeazabal, 2003). In cases where the treated unit is considered an extremity, relaxing some of these conditions can yield weights with more accurate results, using methods such as best subset regression or the least absolute shrinkage and selection operator (LASSO) (Doudchenko and Imbens, 2016). Doudchenko

and Imbens (2016) develop a framework which encompasses SCM, difference-in-differences and two more time-series related methods into one scheme. In this scheme, each of the method is defined by a set of conditions that hold.

To further test the sensitivity/robustness of the results of the synthetic control analysis and to determine whether the effect observed is indeed the effect of the treatment and not just a result of a weak model, Abadie et. al. (2003) propose a placebo test. They suggest modelling one of the control units to observe whether the effect appears there and if so, it hints that the model's predictive power may not be sufficient (Abadie and Gardeazabal, 2003). Later, Abadie et.al (2010) extend this test by creating synthetic counterparts to all units of the donor pool. They then examine those with minimal mean square predictive errors (MSPE) and estimate whether the effect observed on the initial treated unit would be observed in those units as well. In their 2015 paper, they also add a possibility of "in-time placebo", in which the treatment is synthetically set prior the original treatment time and it is observed whether the development of the synthetic country. They also suggest to exclude each country with assigned weight from the donor pool and running the SCM again to avoid biases caused by one country being in the donor pool (Abadie, Diamond and Hainmueller, 2015). Campos, Coricelli and Moretti, (2019) then propose an improvement of this test, where a random subset of the donor pool is drawn 1000 times and the SCM is performed using these restricted donor pools. Subsequent projection of the results later allows for a comparison of the results and allows to determine whether the effect could be biased by one country being present in the donor pool. The tests will be explained in greater detail in chapter 3.

The SCM enhancement introducing a cross-validation technique for the weights proposed by Abadie, Diamond and Hainmueller (2015) which divides the pre-treatment period to a training and a validation period has however faced some criticism. Klößner *et al.* (2018) failed to replicate the result of Abadie et.al. (2015) when using different software packages or ordering the control units differently. They attributed this failure to the cross-validation technique used in the original paper and claimed that the technique fails to produce a unique result. This technique is however not a part in the original synthetic control method.

1.1.1 Applications of synthetic control method

The SCM has been applied to a broad spectrum of economic analyses. The pivotal papers of this method by Abadie et.al. are concerned with the effect of tobacco tax (Abadie, Diamond and Hainmueller, 2010) and the impact of terrorism in Basque country (Abadie and Gardeazabal, 2003). A large group of papers is concerned with testing of counterfactuals connected to implementation of local or macroeconomic policies – implementation of euro in different areas (Žúdel and Melioris, 2016; Addessi, Biagi and Brandano, 2019; Gabriel and Pessoa, 2020), papers concerned with liberalisation (of whole economies or labour markets) (Billmeier and Nannicini, 2013; Adhikari *et al.*, 2018; Kapás, 2023) and EU integration (Campos, Coricelli and Moretti, 2019). SCM is also used in epidemiology (Bouttell *et al.*, 2018; Bonander, Humphreys and Degli Esposti, 2021) and environmental sciences, where it has been used for example to estimate the effect of deforestation (Sills *et al.*, 2015) or how is the price of bananas affected by hurricanes in the given year (Mohan, 2017).

SCM is also used in economic history and comparative economics. In this area it has been pivoted by a paper of Abadie et.al. (2015), where the authors describe the use of this method in such cases on the case of estimating the effect of German reunification on the GDP of West Germany (Abadie, Diamond and Hainmueller, 2015). Further work in this field has been made by Gilchrist *et al.* (2023). This area is represented for example by papers concerned with the economic impact of the rule of Hugo Chavez in Chile (Grier and Maynard, 2016), examining how the Russia would have evolved if the October Revolution did not happen (Korolev, 2021). There is also a set of papers concerned with country secessions, these will be examined in greater detail in section 1.3.

To sum up, the SCM is used when an effect of a treatment is to be determined and there is a number of control units which can be used to construct the treatment unit from. This method can be used on both macro-level and micro-level data, with the macroeconomic application having the disadvantage of restricted number of control units available. Properties of the method allow it to be applied to a plethora of different research questions, due to which Athey and Imbens (2017) deem it "arguably the most important innovation in the policy evaluation literature in the last fifteen years".

1.2 On country splits and secession dividend

As Rodríguez-Pose and Stermšek (2015) conclude, the literature on this topic is quite sparse and there is no consensus on what impact a secession has on the economic trajectory of countries. There is however a body of literature predicting better results to large countries rather than to smaller countries, with regards to their ability to absorb economic shocks and withstand the subsequent economic turmoil (Read, 2004). Their economy tends to be more diversified (Streeten, 1993) and the ratio of foreign trade to the nation's GDP tends to be larger (Perkins and Syrquin, 1989). Alesina and Wacziarg (1998) also argue that the larger the country, the greater effect of the economies of scale is, making public service more available. Streeten (1993) adds that smaller countries are not fully capable of taking advantage of a large-scale production. The paper by Alesina and Wacziarg (1998) also argues that the country size and the share of government spending on GDP are in negative relationship, which is up to debate whether to be considered favourable or not. According to Mazzi, Atkins and Easter (2001), large states are generally less vulnerable than small states.

Contrary to this opinion, literature suggests that large countries can generate greater cost due to the size and complexity of administrative apparatus needed, which may annulate the positive effect of greater cultural heterogeneity these countries usually have (Streeten, 1993; Alesina *et al.*, 2003). Smaller countries may also have the advantage of being able to create more effective competition by being able to better substitute by import and better develop export due to lower transportation costs than countries with larger areas (Kuznets, 1960). Smaller countries are also more open to trade (Alesina and Wacziarg, 1998). A paper by Casella (1996) examines whether it can be determined whether large or small countries benefit from enlargement of a trade block they are a part of. In a theoretical part they conclude that in such instances small countries should see a drop in their relative cost disadvantage and should therefore be the main beneficiaries of the enlargement. However, the results of an empirical analysis were inconclusive.

Another relevant part of the discussion in relation to the question of this thesis would be, whether Czechoslovakia would be large enough to claim the benefits of a large country. Streeten (1993) considers countries with more than 10 million inhabitants large and countries with under 5 million inhabitants very small, deeming Czechoslovakia and the Czech Republic large, and Slovakia barely escaping the label of a very small country (*World*

Bank Open Data, 2024). Crowards (2002) presents a more sophisticated approach combining population, land area and income, from which both the Czech Republic and Slovakia come out as large countries.

In terms of literature on secession dividends, the research is limited probably due to the limited validity of the results and difficulties of estimation. In the paper of Rodríguez-Pose and Stermšek (2015) examining the split of Yugoslavia via regression model, it appears at first glance that there is an independence dividend observable if the control variables are only linked to the size and wealth of the region. The independence dividend also seems the greater the earlier the countries declared independence. However, when other control variables (such as sanctions and war deaths) are added into the regression, there is no statistically significant relationship that would suggest a split dividend. In this case the effect is rather attributed to the duration and the intensity of war. The authors also highlight that there might be a difference between an amicable split and a bitter one, but that the research so far has been concerned with the implications of secession rather than on how the process is managed.

Different approach is used in the paper by Brosio and Revelli (2003). The authors examine whether median voters in each region in Italy would benefit from their region splitting or whether they benefit from the integration. They come to the conclusion that only those regions with above average GDP per capita would benefit from the split even in period $t+1$, whereas in other regions despite benefiting in period t, the effect would not be lasting. Therefore, a split is only beneficial for richer regions in a country.

1.3 On independence dividend using the SCM

The literature in this area is not as extensive as policy related literature. It comes as a no surprise as the number of cases of such event is limited and it appears that it is harder to effectively estimate the effect of such event.

A paper of Reynaerts and Vanschoonbeek (2022), which relies on the SCM and semi-parametric estimation, suggests that a secession causes GDP of a region to drop by 24 % of its potential in the 10^{th} period post-secession. Authors focus on a sample of numerous countries, which allows them to make such conclusion. Due to heterogeneous results, the

authors perform a regression analysis in which they attempt to describe the factors which affect the outcome of the split. The results of this analysis suggest that the transition costs were larger in non-oil producing landlocked transition countries.

More literature can be found when examining the papers concerned with the region of former Yugoslavia. In paper by Zaman and Meunier (2019), GDP of different regions of the country is estimated (under a condition that the Yugoslav split did not happen) and compared to the actual GDP of the countries post-split. The paper suggests a positive split dividend but performs no sensitivity or robustness tests to verify the results. It also does not account for the effect of war in Yugoslavia, which seems to have affected the countries the negative way even in the long run (Kešeljević and Spruk, 2023) and to which Rodríguez-Pose and Stermšek (2015) attribute a long-term effect. Monastiriotis and Zilic (2020) examine the effect of disintegration of Montenegro and Serbia. They find that the seceding economy – Montenegro – experienced a short-term boost of GDP per capita, which they attributed to an increased volatility of the economy. In the "left behind" country – Serbia – however, a slow deterioration of the GDP per capita could be observed compared to its counterfactual. In this case, a relationship with the external shocks (fluctuations of FDI in this case) was not observed, rather it was attributed to the loss of dynamism caused by the shrinkage of internal market.

Another bulk of literature is concerned with the splits of regions within one country but given the lack of literature on the split of countries, these papers will be mentioned as well. First case is the region splitting in Chile. When examining the impact, researchers found that the split did not have a significant effect on the sum of both regions. Using difference-in-differences, authors however conclude that the split had a negative effect on the left-behind region. When accounting for the effect of the Salmon crisis which took place in the same time period (Asche *et al.*, 2009) however, the effect does not appear to be significant suggesting that the split was not the reason for the worsened economic performance of the left behind region (Ritter Gutierrez, 2022). When similar study was conducted for the border reassignment in Brazil, the results suggested an 8.26% benefit on average for the seceding country. In this case however, the per capita intragovernmental transfers to this area increased by 66.93 %. This, along with the increased fiscal capacity of the region, might explain the mechanism of the increase of the economic performance. The

author however acknowledges that the validity of the results might be limited (Lima, 2020).

1.4 On the split of Czechoslovakia

This brief subsection will be aimed at examining the literature concerned with the split of Czechoslovakia specifically. The literature is once again sparse. One can find a bulk of literature concerned with the historical and political reasons that led to the secession, but that is not directly relevant to the main question of this thesis. Therefore only literature concerned with economic aspects of the split will be reviewed.

There is some literature describing the short-term effect of the split. Right after the split, the state budget Czech Republic ended up in a surplus and Slovak in a deficit roughly in the size of the Czech subsidy to Slovakia, that was transferred when the countries were one (Blazek, 1995). Slovakia also slowed down the pace of the economic reforms, especially the privatization, to avoid even higher losses (Blazek, 1995). Pavlinek (1995) claims that the split further sped up the growth of inequality between the two countries. However, he also adds that different approaches to privatization, the difference of flows of FDI and the loss of demand for Slovak-produced weapons may have played a role in the post-split dynamics. Studies of both Pavlinek (1995) and Blazek (1995) are however purely observational and are not based on any models, and are produced within a really short timespan after the split.

In terms of the literature estimating the long-term effect of the split, Reynaerts and Vanschoonbeek (2022) conclude that the split had no effect on the economic trajectories of the countries. Similarly, the Advisory Council for National Transition (2013) mentions that the split did not have a significant effect on the trajectories of both the Czech Republic and Slovakia. This source however does not provide any methodology neither does it provide any source for this claim.

Lastly, Fidrmuc, Horvath and Fidrmuc (1999) provide an analysis of the split (more specifically by the disintegration of the post-split monetary union) by examining whether Czechoslovakia could be considered an optimum currency area (OCA). They argue that the Czech Republic and Slovakia were vulnerable to asymmetric shocks and therefore not an OCA.

2 Economic-historical context

This chapter will explore some of the specifics of economies of both successive countries, as well as shocks economies of these countries experienced. The aim of this chapter is to provide a contextual support to the analysis, as in this case, we strongly believe that interpreting the results correctly may rely on understanding the economic-historical occurrences that were happening. We believe that ignoring these would result in narrow-minded interpretation of the results. The chapter will be divided into several sections, each of which will be exploring different aspect of what ought to be considered when interpreting the results.

2.1 Economies of Czechoslovakia, Czechia and Slovakia in context

This chapter aims to explore the economic position of the countries in comparison to the other countries of the donor pool. This chapter also looks at the economies of the Czech Republic and Slovakia after the split and examines their development. As by looking at the curve of their GDP per capita, which is the main variable of interest in this analysis, one can notice some areas which are harder to fit in the final analysis. This section aims to explore these and discuss whether these shocks were global or regional, or whether they were country specific.

First, we want to briefly describe the circumstances of the split, with focus on the institutional aspects. The signs of quarrels between the two nations appeared right after the Velvet revolution. The "hyphen war" was a manifestation of Slovaks' yearning for sovereignty, resulting to the new country becoming a federation (Rychlík, 2018). Rychlík (2018) also stresses that the first federal government (led by Slovak Marian Čalfa) and the Czech government were strongly opposing the idea of splitting the country. However, the situation changed after the elections in 1992. The winner in Slovakia was a party led by Vladimír Mečiar, who was a proponent of transforming the country to confederation. This was not favourable in the eyes of the winners of the Czech elections, and therefore an agreement on splitting the countries was reached relatively quickly (Blazek, 1995). Blazek

(1995) also highlights that the split was done in line with the constitution, with slight advantages for the new Czech Republic. Koyame-Marsh (2011) Highlights that Czechia inherited majority of the medium-sized industries, which were engaged in efficient trade with the neighbouring European Union. Slovakia on the other hand inherited majority of the army-oriented and heavy industry. Koyame-Marsh however points out that excluding this factor, the environment for economic transition was similar in both countries.

After the split, there was an aim to maintain a monetary union. These efforts however failed and the union disintegrated in February of 1993 (Fidrmuc, Horvath and Fidrmuc, 1999). The means of privatisation also differed in both countries – Czechia resorted to coupon privatisation on large scale. This allowed Czechia to privatise fast and brought explosive inflow of FDI, but did not ensure the most effective distribution of property rights (Koyame-Marsh, 2011). After the split, Slovakia halted the coupon privatisation which had been employed during the time of the federation (Blazek, 1995) and later resorted rather to selling the companied to foreign investors and to management and employee buy-outs (Koyame-Marsh, 2011).

Czech Republic also employed a fixed exchange rate policy and maintained a relatively fixed narrow band of exchange regime up until 1995. The continuing liberalisation of capital account and a positive fiscal position led to increased inflow of volatile capital. This led to an increase of domestic inflation and therefore to appreciation of real exchange rate and a rise of current account deficit (Horvath, 1999).

From February 1996, the central bank loosened the peg, which in eventually led to even larger deficit of current account. During the same time, the Czech government faced a crisis, which eventually led to early elections and a subsequent creation of the Opposition agreement (Kopeček, 2012). Combination of these factors and a possible spillover effects from a crisis in South-East Asia in 1997 and later Russia in 1998 then led to a currency crisis, during which the interest rates reached 17 per cent (Horvath, 1999; Dědek, 2000). Koyame-Marsh (2011) however concludes that the crisis had no long-term effects on the financial markets.

Slovakia also faced the spill-over effects from the Russian crisis, which caused the companies and households to speculate against the currency, which Slovakian central bank maintained pegged. Due to the speculations, it later decided to let the currency float, which

in turn collapsed the entire industrial sector, spiking the unemployment up to 18 per cent and halting the economic growth (Koyame-Marsh, 2011).

Both countries subsequently joined the European Union in 2004, after which Slovakia experienced a rapid growth, reaching up to 10.8 % of per-capita GDP annual growth (*World Bank Open Data*, 2024).

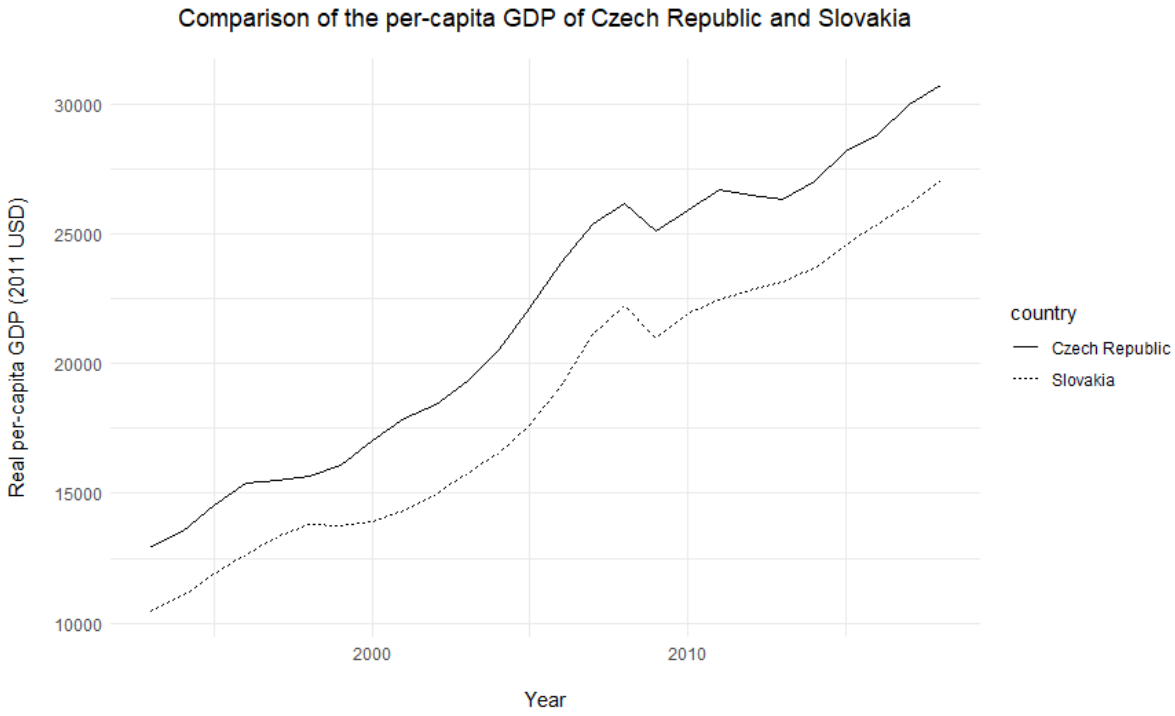

Figure 1: Evolution of the Czech and Slovak per-capita GDP after the split. Source: Maddison Historical Statistic

2.2 Transformation – an idiosyncratic shock?

In this brief sub-section, we aim to briefly describe a shock which started pre-split, but which continued to affect the economy simultaneously with the secession – the economic transformation into market capitalism.

Compared to Hungary, the transformation in former Czechoslovakia was more of an abrupt shock, compared to a more gradual process (Adam, 1993) due to multiple political reasons. After the liberalisation in 1989, Czechoslovakia also implemented different means of transformation compared to the two countries. These differences are described by Kornai (2000): the approach that Czechoslovakia and a newly existing Russian federation

chose prioritised fast elimination of state ownership, which led them to mostly resorting to voucher privatisation or manager take-overs, which did not lead to the optimum distribution of property rights (the Russian scheme "loans for shares" could be mentioned in connection (Treisman, 2010)). The other transformation strategy is described as "organic" by Kornai (2000). Key aims of this strategy were creating a solid institutional environment, which would assure optimal and secure distribution of property rights. In terms of means of privatization, the most common one was a sale to outsiders with a commitment to invest to the company required.

The result of this "shock treatment" kind of transformation was a deeper recession and improper distribution of property rights, as Adam (1993) and Kornai (2000) agree on. Kornai (2000) however highlights that despite adopting this "shock treatment", which might have worsened the economic performance of the country, Czechoslovak government also resorted to more radical macroeconomic adjustments, which in turn helped to stabilised the economy. Kornai compares it to Hungary, where these measures were not implemented immediately, which led to Hungary almost financially collapsing in 1995.

Regarding Poland, authors do not agree whether its approach was considered a shock treatment or an organic transformation (Sachs (1992) deems it the premier, whereas Kornai (2000) deems it the latter). Poland adopted the Balcerowicz plan, which encompassed a set of 11 guiding acts to transform the planned economy into a market one. This in led to the decrease of inflation in the span of few years. It was however paid by the price of increased unemployment which affected mainly those with the lowest income (Garland, 2015). Kornai (2008) provides additional numbers supporting the growth of inequality: out of 8 post-communist countries he looks at, Poland experienced the second highest growth of Gini index. However, in the year 1990, Poland was at the verge of hyperinflation, with the 1990 average inflation reaching 585.8 per cent, which was not the case of neither Hungary nor Czechoslovakia (Pujol, 1998).

What is worth pointing out however is that Poland experienced a brisque restart of the economy and in years 1995-1999 experienced a rapid growth (Balcerowicz 2000). This is in a stark contrast with Hungary's experience, which was described prior.

2.3 Summary

With this subsection, we wanted to acknowledge that we are aware of a limitation that this thesis has. During the period of the split, another shock was happening, and this shock was handled differently in different countries. The recovery happened at different speed, depending on the type of reaction that the government chose. Also, since plenty of countries undergoing economic transformation were seceding, we have a limited sample of these countries in the donor pool.

3 The data and methodology

The data needed to perform the testing proved to be one of the main difficulties of this thesis. In this section, the process of obtaining the final dataset will be explained in detail along with explanation of some obstacles that were faced due to estimating a country which used unconventional variables in its statistical reports for an extensive period of time.

3.1 Data reporting in Czechoslovakia

Due to the nature of political system in former Czechoslovakia, Czechoslovak Statistical Office reported the data on Czechoslovak economy in variables incomparable with variables reported by international organizations or statistical offices of countries out of the Eastern Block. One such example would be that Czechoslovakia did not report Gross Domestic Product as its main indicator of the state of the economy. Rather it used Gross Social Product (Mička, Čáp and Bondyová, 1985).

Gross Social Product accounts for intermediate consumption and due to ideological reasons, it does not account for non-productive consumption: transport, education etc. In socialist countries, the price-making was done on state level and therefore the goods were not sold for their market prices. For these reasons, it is almost impossible to transform GSP and GDP and vice versa (Michal, 1994).

Due to factual/ideological reasons, Czechoslovakia also did not report unemployment (Večerník, 1993; Tomková, 2009) (as being unemployed was a criminal offence (Červenka, 2003)). If one wanted to model this indicator, they would have to rely on the data from time period 1990-1992 as a pre-treatment period. This would not only be insufficient for predictive purposes for the reason of short time dimension, but also any conclusions drawn from this sample would not be trustworthy, as during this period, Czechoslovakia was undergoing economic transformation which is a significant shock for the economy (Brada, 1991; Dyba and Svejnar, 1994; Ham, Svejnar and Terrell, 1998).

Second issue that Czechoslovak data face is the general lack of credibility and transparency associated with all reported data coming from planned economy. Moreover, the exchange rate pluralism was employed, therefore exchange rates differed based on

whether the country was trading in free capitalist market or within the Council for Mutual Economic Assistance (COMECON) (Wagener, 2023). Therefore, even trying to align the data obtained from the Czechoslovak Statistical Yearbooks to data obtained by different sources (by converting the data to one currency or to one base year) would yield uncertain results (if it would even be plausible). Hence, after a careful consideration, it was decided that in this thesis, data provided by the Statistical Yearbooks would not be used for the SCM analysis and each indicator would be taken from a source with unified methodology. The data however was obtained, examined and used for the purpose of the contextual analysis in chapter 2.

3.2 The data sources

For the purpose of the analysis, a collection of historical economic data needed to be obtained. This proved to be quite a challenging task, as resources of Czechoslovak data were not extensive, and their trustworthiness needed to be assessed. This led to several possible sources being discarded and only a few possible data sources were used. As mentioned in the section prior, it was decided that for the final dataset the data from the Statistical Yearbooks issued by the Czechoslovak Statistical Office would not be used, as they would be virtually inconvertible. Hence for the final datasets, the following sources have been used.

3.2.1 Maddison Historical Statistics

Maddison Historical Statistic is a database of historical data provided by researchers of University of Groningen, building on the work of Angus Maddison (Bolt and van Zanden, 2024). Namely on his book The World Economy: Historical Statistics, where Maddison estimates the economic development in different world regions and provides extensive estimates of GDP (Maddison, 2003). For this thesis, data from the 2020 version were used, as it was the latest publicized version during writing of this thesis.

3.2.2 CEPII TRADHIST

TRADHIST is a database containing data on history of trade provided by *Centre d'Études Prospectives et d'Informations Internationales* (CEPII). Originally aimed at exploring the history of globalisation, it contains an extensive account of bilateral trade

between years 1827 and 2014 (Fouquin and Hugot, 2016).

3.2.3 International Trade Data (SITC, Rev. 2)

This dataset provided by the Harvard Growth Lab provides an impressively large account of trade flow data classified by the Standard International Trade Classification (SITC). This classification provides information about which commodities were traded specifically and groups them into large categories defined by numerical code, which is very useful for the purposes of the analysis. The dataset covers years from 1962 to 2020 (The Growth Lab at Harvard University, 2023).

3.3 Methodology: The synthetic control method

As the main tool for the model, the Synthetic Control Method has been chosen. As this method is not in the curriculum of undergraduate econometrics courses and uses some specific terminology crucial for the analysis, I will briefly explain the functioning of the method in this section. I will also describe the tests performed, as they are specific for the method. For the sake of brevity, the method will not be described by the full set of mathematical derivations, as that would also bring little own contribution, but rather by explaining the intuition behind it.

As mentioned in the section 1.1, this method has been pivoted by Abadie and Gardeazabal (2003) as an alternative to the difference-in-differences approach. Unlike the latter mentioned, the SCM does not rely on the common trend assumption and therefore can be applied to wider variety of cases.

The core of the SCM could be described as such: over a time period T, we observe a set of $J+1$ units. One of these units undergoes a treatment during this period. The question one asks is "What if the treated unit did not undergo the treatment? Did the treatment have any effect?" Analogically, that one unit could be the only one not undergoing the treatment and the question could be asked accordingly. Crucial however is that the unit of interest is the only unit undergoing/not undergoing the treatment. For each of these units (including the treated one), we also observe a set of K characteristics in each of the pre-treatment periods.

The way the SCM tries to answer the question asked is by constructing a counterfactual

unit composed of the units which did undergo the treatment. For this reason, the set of *J* units is called a *donor pool*, and the *K* characteristics are called *predictors*. The way it does so, is by assigning weights to the units of the donor pool and weights to each of the predictor such that the sum of the weighted units minimizes the difference between the treated unit in the pre-intervention period and the counterfactual unit in the same period. See the following derivation for clearer demonstration (notation used is the same as (Abadie and Gardeazabal, 2003) for clarity):

Introducing the variables stepping into the derivation process:

$J = (1, \dots, j, j+1)$ ... $Set\ of\ all\ units\ including\ the\ treated\ one$

$K = (1, \dots, k)$ ... $Set\ of\ predictors$

$W = (1, \dots, j, j+1)$ ... $Vector\ of\ weights\ of\ the\ donor\ units$

$X_0 = (K \times J)$ ... $Matrix\ containing\ predictors\ for\ the\ J\ possible\ control\ regions$

V ... $A\ diagonal\ matrix\ \ symbolizing\ the\ weight\ of\ each\ predictor$

$Y_1 = (T \times 1)$ ... $Real\ values\ of\ output\ variable\ of\ the\ treated\ unit$

$Y_0 = (T \times J)$ ... $The\ output\ variables\ of\ all\ the\ control\ units$

The aim of this method is to create a synthetic unit, that would best resemble the treated unit on all the predictor variables. We are specifically concerned with one output variable, which then does not step into the minimisation process. This is achieved by creating a weighted average of the output variable of the donor units. The weights of each of the units are chosen such that the difference between the actual values and the synthetic values is minimized on each predictor. Mathematically:

$$Vector\ of\ weights\ W\ chosen\ such\ as\ it\ minimizes: (X_1 - X_0W)'V(X_1 - X_0W)$$

Then, the synthetic values are obtained the following way:

$$Synthetic\ predictors\ of\ the\ treated\ unit\ before\ the\ treatment: X_1^* = X_0W^*$$

$$The\ predicted\ variable\ of\ the\ synthetic\ treated\ unit: Y_1^* = Y_0W^*$$

3.3.1 The time-placebo test

This test proposed by Abadie, Diamond and Hainmueller (2015) aims to test the

overall goodness of fit of the model. In this test, the treatment is artificially set reasonably prior the time of the actual treatment. The SCM is then run with the optimization period restricted to the period before the artificial treatment. Then the development of the synthetic unit is compared to the development of the actual unit.

3.3.2 The in-space placebo test

In this test, the treatment is reassigned to a country from the donor pool. In practice it means, that we model a country from the donor pool based on the same time period as the treated unit. As the treatment did not happen in this unit, the synthetic output should match the real data for given unit. Otherwise, this test aims to model the robustness of the model.

3.3.3 The "leave one out" test

This test aims to determine how much are the results of the analysis determined by the composition of the donor pool. During this test, we look at the units determined by the SCM to be the donors and then one-by-one eliminate them from the donor pool. Then we run the SCM with the restricted donor pool and compare the results to the original results. This test however does not suggest a solution if a difference between the synthetic units occurs.

3.3.4 Significance test

As classical OLS inference cannot be used in SCM, Abadie, Diamond and Hainmueller (2015) propose a different approach for obtaining significance of the result. They run the SCM on all units of the donor pool. Then they obtain the ratios of post-intervention and pre-intervention RMSPE and put them into descending order. The p-value is then obtained the following way:

$$p = \frac{rank\ of\ the\ treated\ unit}{size\ of\ the\ donor\ pool + 1}$$

The intuition behind this value is that if one did a random sample of size from the donor units and the treated unit, the chance of obtaining a ratio this high would be the p. Therefore, the effect of the treatment would be deemed significant if it was unusually large compared to the rest of the placebo effects.

4 Analysis and results

To introduce the results of the analysis, it must be stressed that the application of SCM on macroeconomic level has its limitations, such numerous country specific shocks or different reactions to global shocks, which can be to such extend observed on for example regional levels. Another big limitation of this analysis is the composition of the donor pool. Czechoslovakia (and the latter the Czech and Slovak Republics) experienced a shock of economic transformation during the period of interest (Dyba and Svejnar, 1994). Other countries experiencing similar shocks however did not pass the criteria to be included in the donor pool, because a lot of them were also experiencing secessions.

4.1 The choice of predictors

The choice of predictors was severely limited by the variables available. Following the papers of Monastiriotis and Zilic (2020), Abadie, Diamond and Hainmueller, (2015) and Reynaerts and Vanschoonbeek (2022), the aim was to choose the predictors which would describe the growth and the composition of the economy. But given the specifics of Czechoslovak economy, we had to discard some of the predictors that were used in the prior mentioned papers. For example Abadie, Diamond and Hainmueller (2015) use share of industry on GDP as one of the predictors. As we do not have these values for Czechoslovakia, we had to rely on the sources we have and try to obtain similar predictors from them. Hence in the analysis, we relied on the SITC classification of exported and imported goods and used share of goods classified as "raw materials" on the entire bulk of export and import. Similarly, we used the shares of goods classified as "machinery and transport" on export and import. The aim of these two predictors was to describe the industrial focus of the economy – whether it was focused on heavy industry and export of raw materials, or whether it was more concerned with refined machinery and manufacturing industry.

As the indicators of economic and market possibilities of each country, we also included two indicators reporting these values. First, we use the Economic Complexity Index, which signifies how complex their export basket. This index allows to some degree predict the development possibilities of a country. We also use the Complexity Outlook

Index as a predictor. This variable is based on the distance between the products that a country is currently making and those that it is not, weighted by the complexity of the products it is not making, allowing for prediction of subsequent growth (Hausmann *et al.*, 2013).

As an indicator of openness of a country, we opted for the ratio of total value of export divided by the gross domestic product.

Compared to Reynaerts and Vanschoonbeek (2022), we opted to leave out battle deaths as a predictor, as that is not relevant for Czechoslovakia (compared to for example former Yugoslavia). We also decided not to use education levels, as the Czechoslovak schooling system was different than in the majority of donor countries (e.g. bachelor level degrees did not exist in former Czechoslovakia until 1990 (Hendrichová, 1991)).

Following the paper of Kaul *et al.* (2015), we do not include the entire pre-intervention GDP per capita as a predictor value, as that would render the other predictor variables insignificant. However, a restricted number of lagged values is permitted, hence why we include four lagged values of the observed variable. McClelland and Gault (2017) even recommend using a few lags that follow the trend pre-intervention, as they suggest that including the lagged values may help overcome the omitted variable bias.

The following table presents the predictors, their sources and the time periods for which they were obtained, as well as descriptive statistics used.

Predictor	Time period	Source
Population	1970-1992	Maddison Historical Statistic
Openness	1970-1992	Maddison Historical Statistic, CEPII Tradhist
SITC ECI	1970-1992	Harvard Growth Lab
SITC COI	1970-1992	Harvard Growth Lab
Share of raw materials on export	1970-1992	Harvard Growth Lab
Share of raw materials on import	1970-1992	Harvard Growth Lab
Share of machinery and transport on export	1970-1992	Harvard Growth Lab
Share of machinery and transport on import	1970-1992	Harvard Growth Lab
GDP per capita 1975	1975	Maddison Historical Statistic
GDP per capita 1980	1980	Maddison Historical Statistic
GDP per capita 1985	1985	Maddison Historical Statistic
GDP per capita 1992	1992	Maddison Historical Statistic

Table 1: The predictors used in the main analysis, time span over which the observations were collected and their sources.

4.2 The choice of donor countries

When choosing the donor pool, we decided to "trust the method" and we did not curate the countries admissible for the donor pool. We eliminated countries which underwent the same treatment in the observation period (a set of seceding countries with the date of secession is provided in Reynaerts and Vanschoonbeek (2022)), but we did not select the countries based on what we believed may be the best donors. This approach is used in some cases of application of the SCM (for example in Zaman and Meunier (2019)), but we opted

for including as many control units as possible to avoid any forms of personal bias.

We were therefore left with a set of 103 countries. Regarding the possible spillover effect, we did not find any literature concerned with such topic. But given the turbulent nature of the time of the split, the peaceful way it has been it has been realised in and the fact, that no more splits occurred in the near area after the split of Czechoslovakia, we assumed that the split did not have any significant spillover effect on the countries included in the donor pool.

4.3 The SCM analysis

As the output variable, we decided to observe GDP per capita, as we are concerned with the economic performance of the countries. The post-split GDP per capita of "treated" Czechoslovakia was calculated as GDP per capita in the area of current Czech Republic and Slovakia – by summing up the gross domestic product of both countries and dividing it by the sum of population of both countries. This way, we determine whether the sum of both countries would be better-off.

Regarding the possible effect the split could possibly have pre-treatment, after examination of the historical circumstances, we determined that the effect could possibly be observed only in the last months of the year 1992 and therefore we could include the year in the pre-treatment period.

Concerning the other tail of the pre-treatment observation period, we decided only to use data from 1970 forwards. Before the year 1970, Czechoslovakia was still performing some radical transformations of the economy and the years 1968 and 1969 were heavily affected by the Prague Spring and the subsequent occupation by the armies of the Warsaw Pact (Goodman, 1969; Černá, 2019). Starting with this year also allows us to maintain a larger donor pool, as the observation period will not include the decolonisation of Africa for example.

We conducted this analysis using the Synth package by Abadie, Diamond and Hainmueller (2011) in the R environment, as this package provides the best insight into the functioning of the analysis. For its simplicity, it is also best suited for majority of the tasks of this analysis. Out of all the packages we tested, we concluded that this package was also

able to minimise the deviation of the trajectories of the synthetic and the treated units in the pre-treatment minimisation period, and therefore provide the most accurate results post-treatment.

The results of the primary analysis were the following. We were able to fit the pre-treatment synthetic Czechoslovakia accurately until year 1991. The fit slightly diverges in 1992, but this is the best fit we were able to obtain, given the restricted donor pool which contains a limited number of units undergoing economic transformation.

We observe that the synthetic country does not diverge significantly from the trajectory the "treated" Czechoslovakia follows after the split. We however observe that this synthetic country would take longer to recover from the transformation recession, which would then be followed by faster growth. One possible explanation might be the presence of Hungary and the size of its contribution in the donor pool. As mentioned in chapter 2.2, Hungary experienced longer recession due to the lack of radical macroeconomic measures implemented.

Czech Republic also experienced the currency crisis mentioned in chapter 2.1. This manifested as an abrupt halt of growth after 1995. This might imply that the crisis could have been the outcome of the split. This crisis was however specific to the Czech Republic only, which also might be the reason why the fitted synthetic country and the treated do not align in this period of time.

Towards the end of the observation period, the trajectories of both countries align again, suggesting that whatever effect might be observed, its duration would only be temporary. However, the Great Recession of 2008 and 2009 was a significant shock and the results after this event might not be accurate.

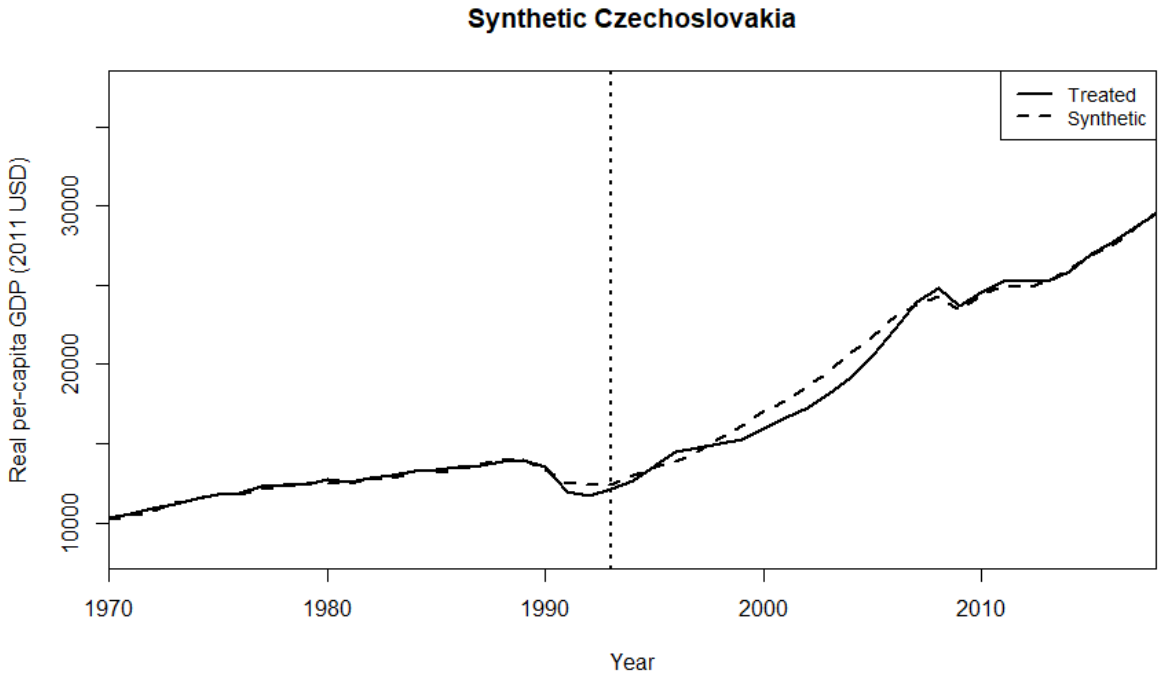

Figure 2: The results of the synthetic control method analysis performed for Czechoslovakia, the pre-treatment period being 1970-1992 without curating the possible donor countries.

Regarding other countries present in the donor pool, we do not observe any discrepancies with what would be expected to be found in the donor pool. Lastly, even though the lagged values of per-capita GDP were added as predictors, the distribution of weights to each predictor was not distorted by this and the weights were distributed relatively evenly (the lagged values of GDP per capita were not assigned the largest shares of weight).

Donor countries	**Weight**
Hungary	0.677
Poland	0.132
Sweden	0.189
China	0.001

Table 2: The donor countries and weights assigned to them from the results of the primary analysis.

The precise estimates can be found in Appendix A. For the reasons mentioned in the discussion however, we do not consider them to be vital for the analysis.

4.3.1 In-time placebo

Regarding the in-time placebo, there are no guidelines on when the artificial treatment should be placed. We therefore opted for testing multiple scenarios set reasonably apart and for each instance, we use at least two lags of per-capita GDP as predictors, adjusted so that these would fit into the pre-treatment period.

All three scenarios presented share several features: due to the fact that the transformation recession is not accounted for in the pre-treatment period, we fail to fit the period between after the year 1989 accurately. The closer the artificial treatment is set to the year of actual treatment, the closer fit we get. All three scenarios however converge and closely follow the path the synthetic country takes after the year 2008.

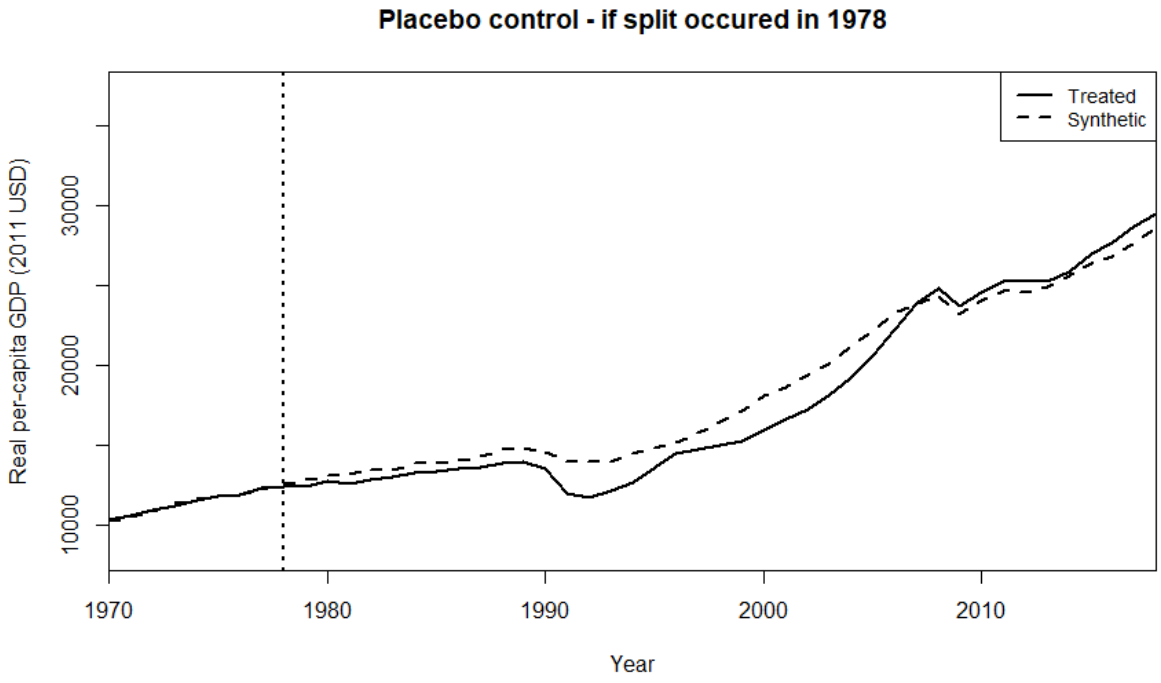

Figure 3: In-time placebo of Czechoslovakia, the pre-treatment optimisation period is restricted to years 1970-1977.

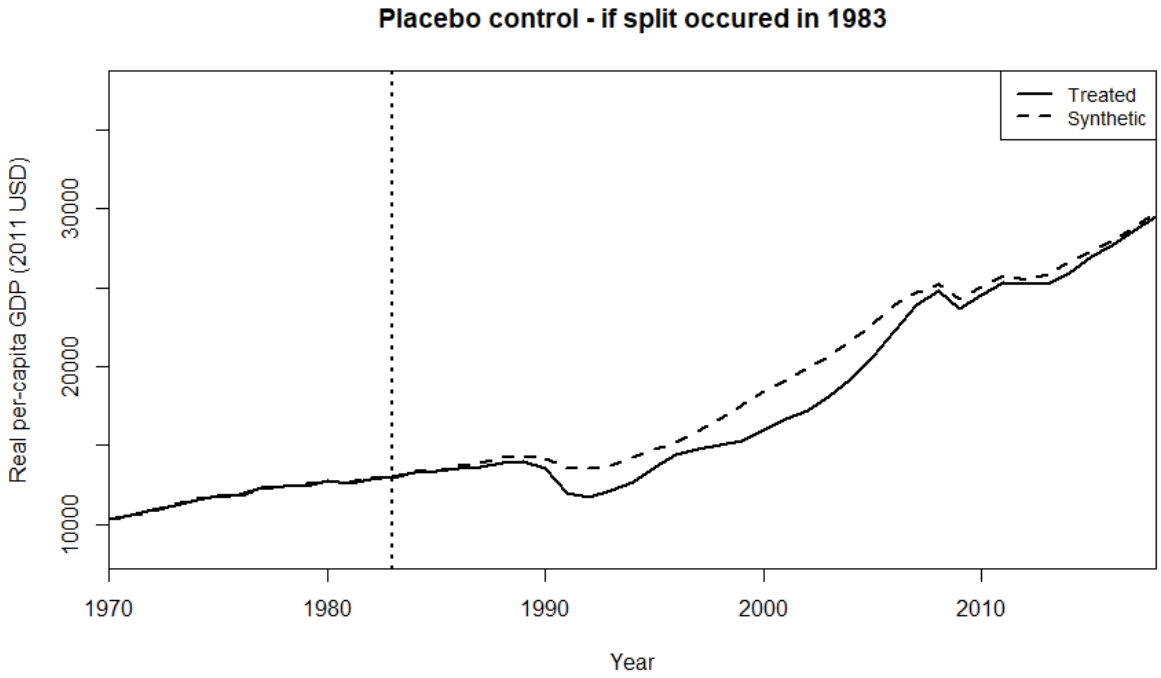

Figure 4: In-time placebo of Czechoslovakia, the pre-treatment optimisation period is restricted to years 1970-1982.

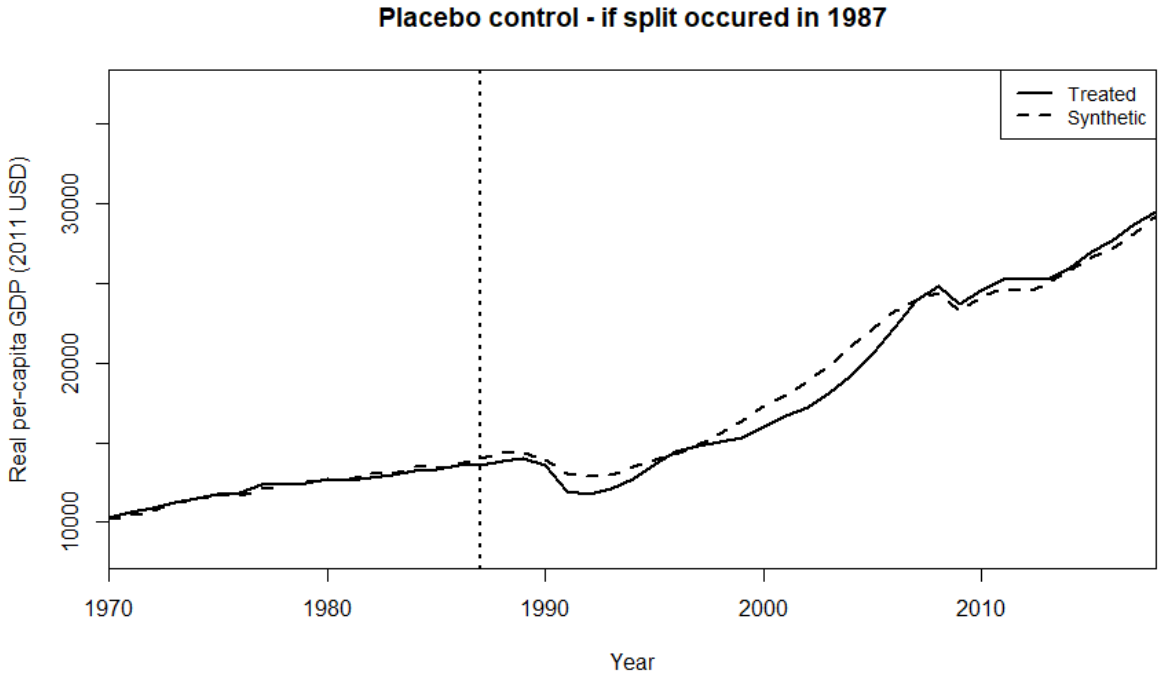

Figure 5: The in-time placebo of Czechoslovakia, the pre-treatment optimisation period is restricted to 1970-1986.

When observing the placebo set into year 1987, we see that despite omitting the period of transformation recession, we are able to obtain a fit similar to the one we obtain when performing the primary analysis. This supports the position we present, which is that due to the idiosyncratic shock which was economic transformation of the Eastern bloc and due to the limited data available, we might not be able to get unbiased results.

However, none of the models we present suggest that the split caused a significant change of economic trajectory of sum of both countries. In terms of the possible effect of the idiosyncratic shock which is economic transformation, we believe that including the lagged variable of GDP per capita helps to minimize the bias that could possibly occur (as McClelland and Gault (2017) suggest).

4.3.2 The "leave-one-out" analysis

The aim of this analysis is to determine the sensitivity of the result to the composition of the donor pool. In order to avoid lagged per-capita being assigned the majority of weight of all predictors when downsizing the donor pool, we restricted the number of lags to three. This way, we obtained results where the distribution of predictor weights was even.

The only country causing a more prominent deviation of the result when excluded from the donor pool is Hungary, which is the main donor in the primary analysis. As described in chapter 2.2, the recovery after the transformation recession in Hungary took longer and was shallower than in Poland, which comes out as the main donor in the case when Hungary is omitted. This explains why Czechoslovakia recovers much faster from the transformation recession in this case.

Having Poland as the main donor also causes the synthetic Czechoslovakia to recover more quickly after the recession in 2009. However, both Czech Republic and Slovakia recovered at similar speed as Hungary did. It is therefore unclear which path would synthetic Czechoslovakia take, whether being a large country would help to absorb the shock or whether the recovery would be similar.

However, this discrepancy comes after multiple exogenous shocks. If we only observe the period until 2009, we are able to explain faster recovery post-split with the contribution of Poland's sharp growth. After this initial shock, we observe approximately the same rate of growth.

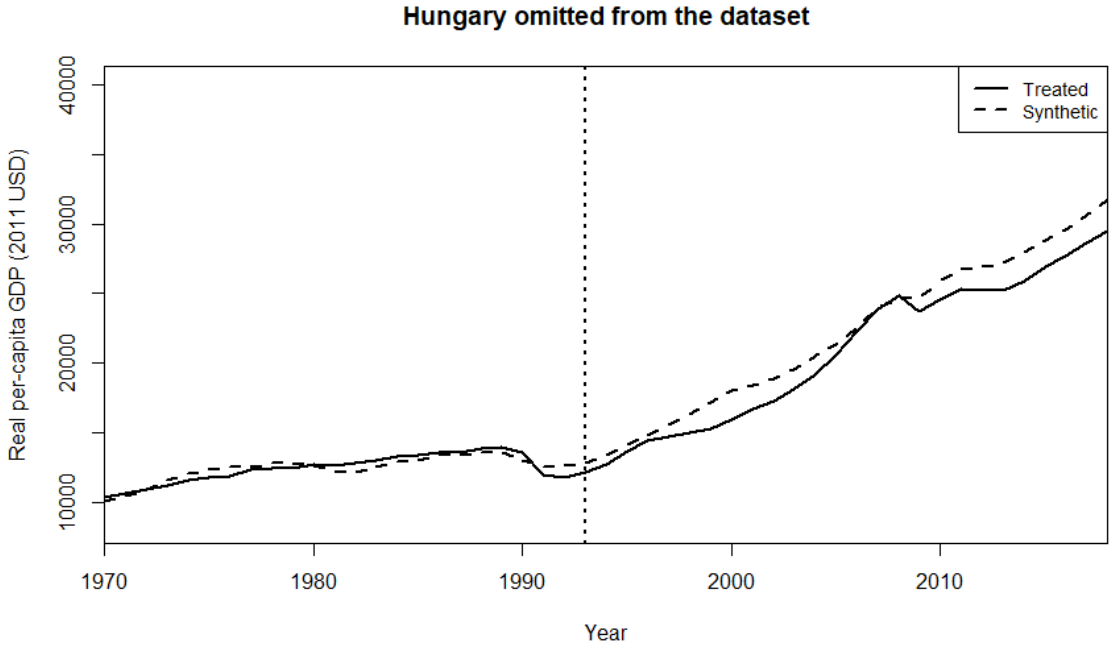

Figure 6: Synthetic Czechoslovakia, optimisation period set to 1970-1992 and Hungary is omitted from the dataset.

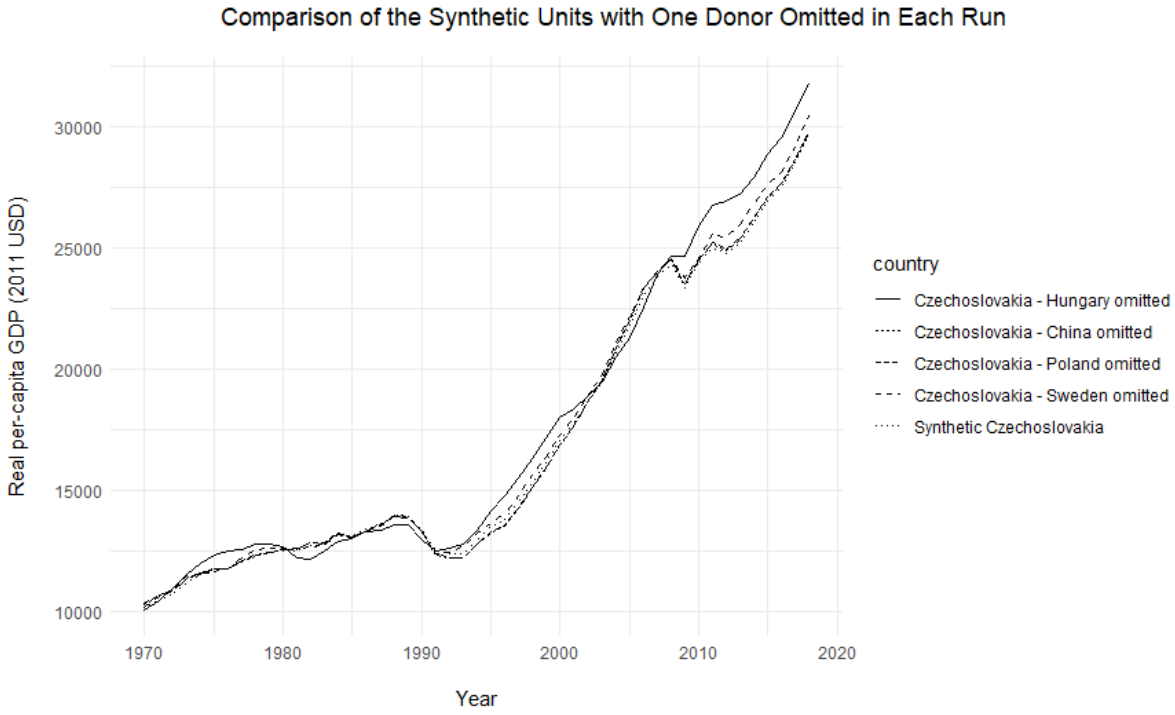

Figure 7: Comparison of the synthetic units, each one having omitted a different donor country from the donor pool, optimisation period set to 1970-1992.

4.3.3 In-space placebo

The aim of this test is to showcase whether the effect of a treatment can be observed only in the treated unit. The validity of this test is however limited in cases of macro-economic applications, as global shocks may affect these units differently. Policymaking is also specific for each country, making it more difficult to correctly model the synthetic unit compared to for example studies conducted on regional levels.

In our case, we observe that compared to Czechoslovakia, we struggle to obtain accurate predictions of more developed countries. This might be caused by the choice of predictors – in order to fit the post-communist countries, we chose more of the industry-focused predictors, which might yield a better fit compared to the service-focused economics of developed countries. However, if we assign the treatment to the economies closest to Czechoslovakia – Poland and Hungary – we are able to obtain pretty accurate predictions up until year 2009, which is associated with significant economic shock.

In case of Hungary, the main donor coming out of the analysis is Bulgaria. The result suggests that the synthetic Hungary would have a much smaller GDP per capita that its actual counterpart (via Appendix B). However, the shock-treatment privatisation that was employed in Bulgaria caused the country almost economically collapsing in 1997 (Dobrinsky, 2000). Moreover, it is constantly one of the lowest performing countries of the EU (Petkov, 2023), none of which could be accounted for in the pre-treatment period, causing a downward bias in the synthetic output. If we omit this country, we obtain a result assigning the most weight to Poland, which results in a narrower gap between the placebo and the actual unit.

We however would also like to highlight that compared to Czech Republic, Slovakia and Hungary, Poland recovered relatively quickly after the crisis of 2009 and did not experience a halt of growth in the 2013 crisis. Therefore, the results which include Poland as the main donor include a divergence in the era post 2009.

And as the aim of this model is to predict Czechoslovakia the best, we can conclude that we do not observe any consistent bias of trajectories associated with the synthetic placebo countries and we can therefore conclude that the model does neither systematically underestimate nor overestimate the development of a country. Moreover, we do not observe

any significant effect of the split on the treated country.

However, this in-space placebo test showcases that the model fails to sufficiently fit plenty countries which appear in the donor pool. We show that this does not necessarily have to mean poor quality of the model, as we are able to correctly fit certain amount of countries, but rather that the method does not encompass the country-specific shocks which came after the treatment.

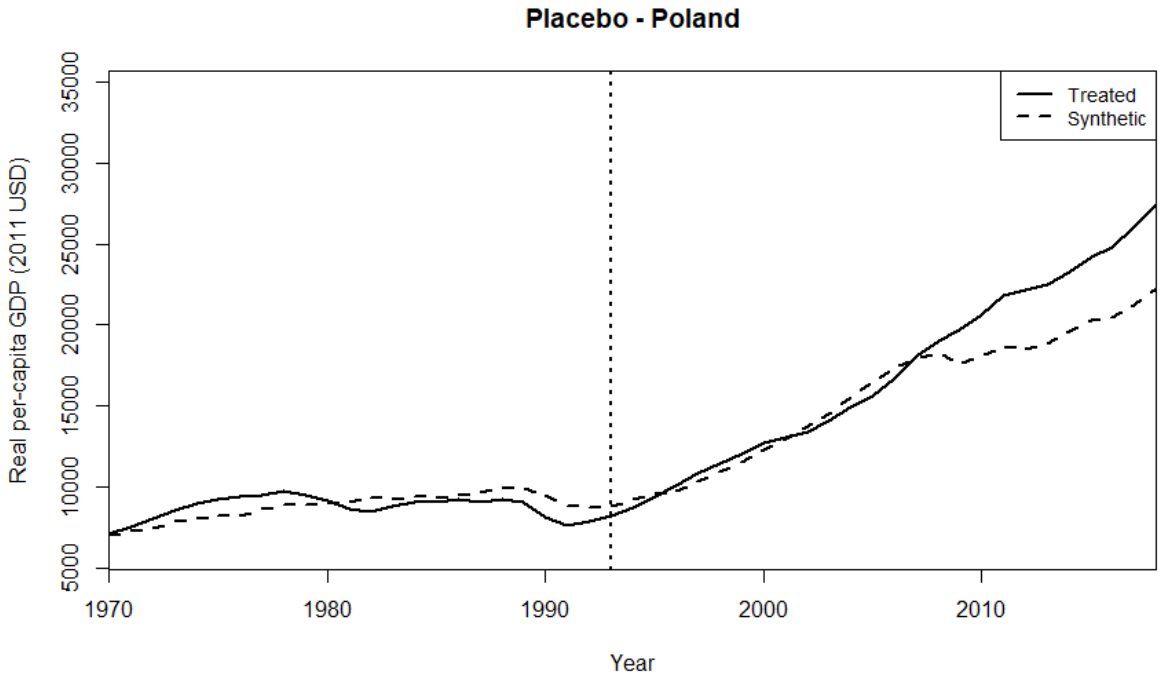

Figure 8: Synthetic placebo Poland, optimisation period being set to 1970-1992, Czechoslovakia omitted from the donor pool.

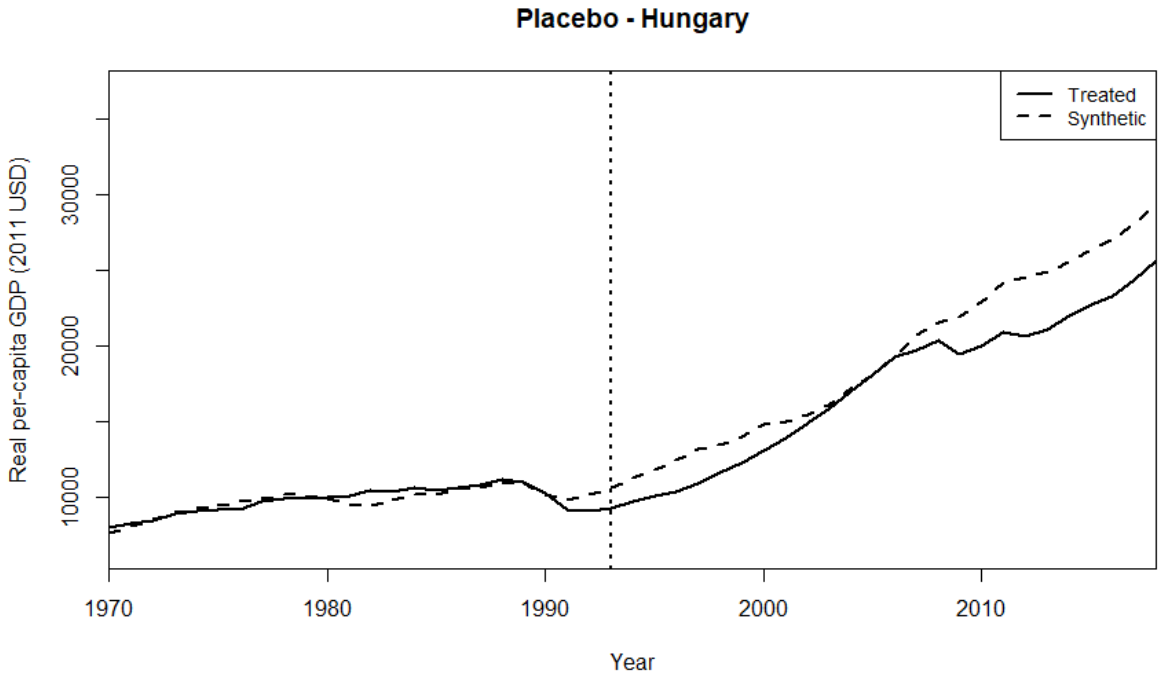

Figure 9: Synthetic placebo Hungary, optimisation period set to 1970-1992, Bulgaria and Czechoslovakia are omitted from the donor pool

4.3.4 Significance of the result

In this part of the analysis, we faced difficulties with the technical apparatus used. Despite the Synth package being the best at creating the most fitting synthetic unit, its lack of optimisation causes the minimisation procedure to take up to one minute to compute. If we wanted to perform this analysis using this specific package, we concluded that it would take up to 2 hours to compute placebo units for all countries in the donor pool. With a donor pool of our size, we had to resort to using different package. Tidysynth package, which we ended up using, incorporates a tool optimised to create a placebo unit for all units in the donor pool. Its disadvantage however is that it provides a worse fitting synthetic unit in our case.

After creating the placebo units for all units of the donor pool, comparing their pre and post-split MSPE and ordering them, we conclude that the rank of Czechoslovakia is 75, yielding a p-value of 0,712. This allows us to confidently reject the null hypothesis, which is that the treatment had any significant effect.

The results of this analysis strongly support what we were insinuating – that is that

using the predictors we used, in the time period we used them and on the chosen donor pool, we are able to reject the null hypothesis that the split of Czechoslovakia had no significant effect on the trajectory of development on both countries.

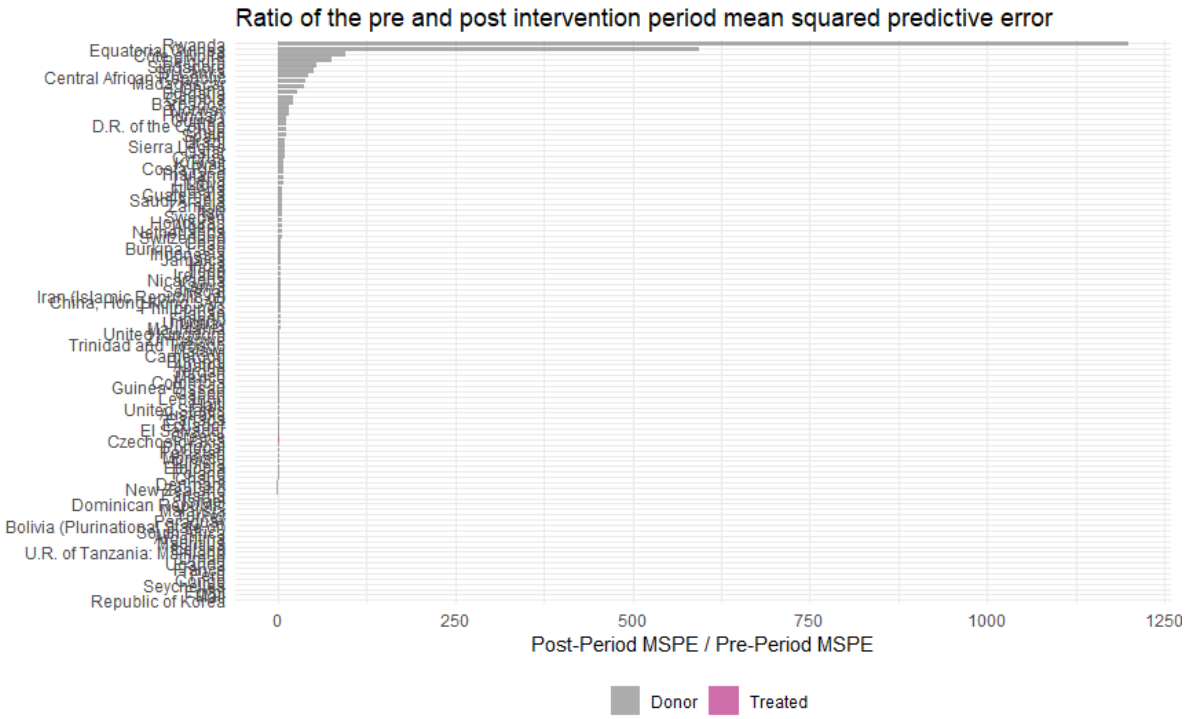

Figure 10: Ratio of the pre and post intervention period MSPE in descending order of all countries present in the donor pool plus Czechoslovakia, the treated unit. Optimisation period is set to 1970-1992. The ratio of Czechoslovakia is the 75th largest.

5 Discussion

We presented the estimated effect of the split, which does not appear statistically significant, and the results of which are in line with the existing literature. We would however like to acknowledge that the analysis has some limitations. Firstly, we would like to highlight and what has been mentioned prior, which are the limitations macroeconomic application of the synthetic control method, which is that units on levels of countries often react differently to economic shock and that the shocks may have asymmetric effect. This does not necessarily mean that the method is wrong, rather that it uses the "ceteris paribus" assumption on the trends which the units follow and does not account for smaller scale shocks appearing after the treatment.

Secondly, we admit that the choice of predictors may appear unusual. However, we strongly believe that these predictors sufficiently describe the economic development of Czechoslovakia as well as help to choose the correct donor units. We would also like to highlight the difficulty of obtaining trustworthy and comparable data for post-communist countries, especially Czechoslovakia (as the country no longer exists, some sources do not include it in their time series, despite the fact that the records do cover the period of its existence).

We also need to admit that this method does not control for the idiosyncratic shock, which was economic transformation, leading us to resort to more qualitative approach when evaluating the results.

Regarding the possible improvements, we are aware of the following enhancement: if the full set of separate data on the Czech Republic and Slovakia was available, it would be interesting to test the effect on each of the country – either by SCM, or by another approach (Ritter Gutierrez (2022) uses difference-in-differences, Reynaerts and Vanschoonbeek (2022) use fixed effect with the dummy variable representing independence included).

Lastly, we would like to discuss possible reasons why the split may not have had any significant effect on the trajectories of both countries. Firstly, the split was peaceful. Literature suggests that for example in the case of former Yugoslavia, it was not the split

itself that caused economic recession, but rather the war in the area.

Secondly, as Fidrmuc, Horvath and Fidrmuc (1999) claim, Czechia and Slovakia were prone to asymmetric shocks in the period of the split. For example, the military industry was predominantly located in Slovakia. As the demand for weapons receded after the fall of the Iron Curtain, Slovakia faced unemployment exceeding 11 per cent which was not the case of Czechia (Blazek, 1995). Splitting the country might have allowed the countries to choose their own ways.

Coinciding with the previous mentioned is the fact that Slovakia experienced an increase of nationalist tendencies in the period pre-split (Rychlík, 2018). Had the countries not been split, the situation might have escalated resulting in not-so peaceful split, which might have in turn worsened the economic performance of the countries for years to come.

Lastly and perhaps most importantly, both Czech Republic and Slovakia actively tried to prevent the split from having any effect, as the countries formed a customs union. This not only meant the continuation of zero tariffs on mutual trade, but also led to the same external tariffs for the whole period of 1993-2004 (Dangerfield, 2001). Both countries eventually joined the European Union in 2004. This could have also helped to erase the effect of the split. This might be even observed in the SCM output, after 2004, the trajectories start to converge, until they eventually meet.

Conclusion

The split of Czechoslovakia was a defining moment for the successor countries of Czech Republic and Slovakia, regarding the political evolution and the national identity. The economic impact of this event however difficult to quantify.

The literature describing this event specifically and from economic point of view is sparse. Hence why we summarised this topic from multiple points of view, including general knowledge about the country secessions. The literature does not provide a consensus on this topic, rather it is focused on specific cases, as each country split happened in different institutional settings and under different circumstances. There however appears to be a line of thought which emphasizes that the way in which the split happened – whether it was peaceful or with a conflict – matters, as well as the post-split relationship between the two countries.

When trying to discover whether the split of Czechoslovakia had any significant effect on the two successor countries, we faced a major obstacle when trying to obtain the data available for the analysis. Due to the nature of the political system, the comparability of majority of the data reported by the country itself is questionable. We therefore had to choose predictors carefully and with the limited data we obtained. We would also like to stress that with the method we used, we could not control for the effect the economic transformation of the countries had.

To answer the main question of this thesis, we opted for using the synthetic control method, which has been used in similar studies, as we demonstrated in the literature review. To further test the results, we performed several robustness and sensitivity tests: the in-space and in-time placebo, along with the testing of the analysis of the sensitivity of the result to the composition of the donor pool.

We were able to determine that according to the analysis, the event had no significant impact on the economic performance of the area – we observed marginally higher GDP per capita between years 1998 and 2008, but the statistical analysis yielded a p-value equal to 0.712, which is not sufficient evidence to reject the null hypothesis that the treatment had zero effect.

The sensitivity analysis also suggested that the result is sensitive to the composition of the donor pool. The trajectory of the development changed slightly depending on whether the main donor was Poland or Hungary. However, we highlight that the split happened in the period of economic transition towards market capitalism system and each post-communist country implemented different means of privatisation and macroeconomic reforms. Therefore, the results always reflect the situation of the main donor.

We therefore conclude that using the methods we used on the data which we used, the result suggest that the split had no significant effect on the sum of both countries, which is in line with what the literature currently presents.

We however believe that we demonstrated the limitations this method has on the cases of comparative economics. This method does not account for the shock the treated unit undergoes unless the donor countries undergo the same shocks and have the same reaction to it. The results therefore may be biased and this method does not provide any other way how to filter them out, except for manually curating the donor pool. This however creates a space for personal bias or simply a wrong choice of donor units based on incomplete information.

Therefore, we believe that when performing the SCM analysis, the results should not only be interpreted strictly by mechanically reproducing the results of the testing, but also by implementing fragments of qualitative analysis as well. We also suggest that this might be the main contribution of this hypothesis. We do not directly critique the method itself, but rather we point out the limitations we demonstrated.

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List of Appendices

Appendix A: Results of the primary SCM analysis of the split of Czechoslovakia

Appendix 1: Comparison of the output of the SCM analysis in comparison with the reported values of the countries stepping into the analysis. Values report the real GDP per-capita (2011 USD).

Year	Synthetic CSK	Treated CSK	CZE	SVK
1993	12420.4506	11879.8085	12974.1973	10481.1153
1994	12988.7498	12358.111	13517.5819	11063.9487
1995	13517.1049	13181.2916	14550.1046	11874.398
1996	13849.7730	13981.7828	15386.3207	12622.9096
1997	14504.5823	14199.4082	15494.3169	13335.459
1998	15323.0728	14485.9278	15657.4256	13822.1874
1999	16138.6437	14769.3998	16102.5076	13750.3331
2000	17061.8163	15378.2064	17056.1595	13904.9854
2001	17732.3944	15999.6404	17868.5676	14361.9012
2002	18610.2941	16595.3988	18431.0272	14984.7311
2003	19486.8912	17407.0739	19344.0902	15773.0948
2004	20693.3277	18389.2277	20555.0356	16570.8619
2005	21791.6936	19774.0612	22128.5801	17649.5204
2006	23023.1628	21409.4276	23888.164	19099.4277
2007	23815.2319	23146.2075	25382.8075	21109.9388
2008	24318.3393	24256.8832	26186.0454	22231.9882
2009	23397.0721	23659.4751	25093.8629	20953.0367
2010	24381.4547	24573.3095	25922.3941	21941.2122
2011	25015.2418	25289	26725	22483
2012	24808.6853	25279	26474	22816
2013	25217.8701	25329	26338	23132
2014	26063.5324	25976	27024	23703
2015	26931.1212	27041	28194	24588
2016	27524.0570	27738	28823	25364
2017	28512.5173	28773.3313	29997.7582	26096.1478
2018	29625.7937	29600.5982	30748.5084	27075.5344

Appendix B: Results of the SCM analysis of placebo Hungary with Bulgaria included in the donor pool

Appendix 2: Output of the SCM analysis performed for Hungary when Bulgaria is included in the donor pool. The optimisation period is set to 1970-1992.