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The Wealth Tax' Impact on Stock Exchange Listings

A comparative case study of wealth tax abolition's effect on stock exchange listings through the synthetic control method

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Abstract

The valuation basis for the wealth tax generally differs between listed and non-listed companies, where listed companies are valued at market value and non-listed companies are valued at book value. We analyze the 2007 wealth tax abolishment in Sweden. We find that the wealth tax abolishment in Sweden led to a persistent increase in the number of listed companies. Through the synthetic control method, we estimate a final increase in 2012 of 62% more listed companies compared to a scenario where Sweden kept its wealth tax. This increase corresponds to 13 more listed companies per million capita. Furthermore, through a fixed effects regression we also find the relationship between the wealth tax abolishment and the number listed companies in Sweden significant at the 1% level. Our findings from analyzing Sweden suggest that a wealth tax can discourage companies from going public. Nevertheless, the generalizability of our result is uncertain.

Contents

1 Introduction

The wealth tax is currently a trending topic, on which politicians, academics, and investors have widely varying opinions. In particular, there is disagreement about whether the effect of the wealth tax is negative. A common view among individuals that have a negative opinion on the wealth taxation systems is that these systems do not stimulate new establishment and the growth of existing small and medium-sized businesses. They argue that owners must withdraw funds from their companies to pay the tax, which prevents companies from developing further and/or expanding their operations. With this in mind, we want to further explore the attributes of the wealth tax by assessing whether it may suppress the listing of companies through its current format. We find this interesting because the tax base for non-listed companies is based on book value and market value for listed companies. Generally, the market value of a company exceeds its book value (Sandvik, 2015). For example, many technology companies base much of their revenues on assets that do not appear on their balance sheets (e.g., embedded software). With Norway‘s valuation rules, this can create an incentive for these companies to stay non-listed, since the market value of technology companies will appear much higher than the book value (Govindarajan, Rajgopal, & Srivastava, 2018). On the other hand, a listing may lead to easier access to capital, better visibility and credibility, increased liquidity for shareholders, and increased company transparency (Metropolitan Stock Exchange, 2021). Furthermore, companies listed in a well-developed stock market are better at utilizing opportunities for growth (Mortal & Reisel, 2013). Thus, the listing of a company can benefit its owners, investors, and society in general. Based on this, we aim to answer the following research question:

Does a wealth tax discourage companies from going public?

To investigate how the wealth tax affects stock exchange listings, we use the abolition of the wealth tax in Sweden as a natural experiment. We find a positive effect of the abolition of 62%, where the number of listed companies in Sweden with and without a wealth tax is about 22 and 35 per million capita, respectively. We find this effect by using the synthetic control method (SCM). In essence, we use the method to create *synthetic Sweden* composed of several other countries, which replicates Sweden's number of listed companies in the period prior to the abolishment. We further compare the number of listed companies after abolishment for synthetic and real Sweden. Ultimately, this results in a visual comparison of two graphs which makes it possible to detect the effect of the abolishment compared to a scenario of no abolition. We then put the result through a placebo test to assess the significance. Furthermore, we conduct an in-time placebo and a leave-one-out test to verify the robustness of the result.

From our analysis, we conclude that the positive effect of removing the wealth tax is credible. We base this on the outputs from our placebo, in-time placebo, and leave-one-out tests. In addition, we assess our result by conducting a fixed-effects regression. Through this, we find the positive effect to be significant. To evaluate the generalizability of our results, we apply the SCM to Finland, which abolished its wealth tax in 2006, and find that the effect is absent. However, Finland's weak in-time placebo and leave-one-out tests reduce the result's credibility. With this in mind, we still find it plausible that other countries that share characteristics with Sweden can experience a positive effect of abolishing their wealth tax. We emphasize, however, that this is uncertain.

2 Institutional Background

The wealth tax in Sweden was introduced in 1910 and abolished in 2007. Wealth taxation was only applied on the individual level and did not apply to companies. The purpose of the tax was to add a progressive dimension to the taxation of capital (Silfverberg, 2009). In 1991, through an extensive tax reform, the Swedish government replaced the old wealth tax system with a simpler design. The new two-bracket design had a 0% marginal tax rate on net wealth below a certain threshold and a 1.5% marginal tax rate on net wealth above the threshold. These margin tax rates remained constant until the abolishment in 2007, but the threshold changed several times (Seim, 2017). Table 1 illustrates the tax revenue from wealth taxation in percentage of total tax income, the percentage of taxpayers paying a wealth tax and the change in thresholds. We see that, after 2000, couples filing their taxes jointly and singles had different thresholds.

Year	Tax revenue in percent of total tax income	Tax payers in percent of total tax payers	Threshold, singles (SEK)	Threshold, couples (SEK)
2000	1.0	7.7	900 000	900 000
2001	0.8	5.3	1 000 000	1 500 000
2002	0.5	2.3	1 500 000	2 000 000
2003	0.7	3.5	1 500 000	2 000 000
2004	0.7	3.6	1 500 000	2 000 000
2005	0.6	2.5	1 500 000	3 000 000
2006	0.7	3.0	1 500 000	3 000 000

Table 1 - Wealth tax revenues and thresholds in Sweden (Seim, 2017)

Taxable liabilities were subtracted from taxable assets when calculating individuals' net wealth. The Swedish authorities assessed taxable liabilities by market value. Taxable liabilities could only decrease net wealth if they financed the taxable asset (e.g., mortgages). Like liabilities, the Swedish authorities also assessed taxable assets by market value. The difference was that special valuation rules applied for certain types of assets, for example, for non-listed shares. The rationale behind this was to incentivize investment in small- and medium-sized businesses (Silfverberg, 2009). Because of this, non-listed shares were assessed at 30% of their book value. After 1991, holdings of non-listed shares were fully exempt from net wealth calculations. Furthermore, companies listed on the stock exchange were measured with a 20% reduction of their market value in calculations of net wealth. An exception to this was if a person directly or indirectly owned at least 25% of a company's outstanding shares, in which case the holding of listed shares was exempt from the net wealth calculations (Silfverberg, 2009).

In the Swedish debate regarding the taxation of net wealth, the valuation assessment governing investments in the stock market was sharply criticized. The reason for this was the unequal tax treatment of taxpayers who had the same net wealth but had invested their wealth differently. Investors saw this tax treatment as unfair, and it was one of the reasons for the abolishment of the wealth tax in 2007.

3 Literature Review

Over the last two decades, income and wealth inequality has increased in most OECD countries, especially after the financial crisis in 2008 (Piketty, Saez, & Zucman, 2017). This development triggered new academic and political interest in wealth taxation. Previous publications focus broadly on how wealth tax affects entrepreneurship, business growth, and behavioral responses. However, they do not focus on how wealth tax affects business decisions like whether a company goes public. We contribute to this by focusing on the effects the wealth tax abolition in Sweden has on the number of listed companies. This chapter gives a brief overview of some of the publications and earlier findings on the economic effects of the wealth tax.

A master's thesis published by the Norwegian School of Economics in 2015 looks at the effect of wealth taxation on non-listed companies (Gobel & Hestdal, 2015). With data from the over-the-counter (OTC) list, Gobel and Hestdal (2015) examines how the Norwegian wealth tax valuation rules differentiate the valuation discount of listed and non-listed companies. The main finding from the study is that the average discount of holding a non-listed company compared to a listed is 68%. They also perform a regression on a dataset of 22 OTC companies that went public in the sample period, and finds that the size of the valuation discount did not affect whether a company went public. However, the research only considers a small number of companies that went public in the sample period. The fact that they only consider companies from the OTC list, which contains data on the most liquid non-listed companies, can be a source of selection bias. We contribute to this by using the development in listed companies to capture all companies that went public during our sample period. Furthermore, our approach focuses more on a possible effect on the number of listed companies after wealth tax abolition. In contrast, Gobel and Hestdal (2015) concentrates on the valuation discount between being listed and not.

Johnsen and Lensberg (2014) conclude that the wealth tax increases the required return on equity (ROE) for investors that hold non-listed shares. The wealth tax valuates non-listed companies by book value, which results in a low effective tax rate in good times and high in recession periods. This tax treatment increases the owner's systematic risk. Sandvik (2015) challenges Johnsen and Lensberg (2014), arguing that the taxation on actual wealth should be neutral in regard to investments in assets. Since market value often exceeds book value, wealth taxation favors non-listed companies over listed companies. Sandvik (2015) finds that the profitability of an investment in non-listed companies typically increases with wealth taxation because wealth taxation reduces the alternative return more than the actual return for non-listed companies. According to Sandvik (2015), an abolishment of wealth taxation should reduce the incentive to remain non-listed. Combined with the advantages of easier access to funding and exit opportunities in the stock market, we should see a positive effect on listed companies after the abolishment of wealth taxation. Since we use data from before and after the wealth tax abolishment in Sweden, our research can verify whether the arguments and findings of Sandvik (2015) apply to Sweden.

David Seim (2017) use Swedish administrative data to conduct an empirical assessment of the annual wealth tax. Several changes in the threshold allows Seim (2017) to apply a difference-in-difference (DiD) research design to estimate the wealth tax‘s potential effects on reported taxable wealth in Sweden. He finds that tax cutoffs in wealth tax have no significant effect on financial savings, the realization of capital gains/losses, taxable income, or rebalancing portfolios to avoid the tax (Seim, 2017). The findings also reveals that the positive net-of-tax-rate elasticities he observes appears because of reporting responses, rather than real responses like adjusting savings or rebalancing portfolios. Seim's (2017) conclusion supports earlier research by Slemrod (1995). Our research focuses exclusively on one effect: changes in listed companies. In accordance with Seim (2017) and Slemrod (1995), we should not be able to see any effect of the wealth tax abolition in Sweden.

Motivated by the practical solution for wealth taxation of hard-to-value assets, Schindler (2018) analyzes how these assets can be taxed effectively and efficiently. Realistically, tax on hard-to-value assets like non-listed companies often relies on their historical book values. The publication proposes a sector that consists of fully diversified investors and a corresponding sector of non-listed companies with fully undiversified investors. He applies a model analysis, which demonstrates that optimal wealth taxation includes a strictly positive tax rate, set with an imputed interest rate on book value larger than the risk-free market rate of return. Realistic wealth tax systems like that of Norway do not apply imputed inflation of book values. Schindler (2018) states that this grants an implicit subsidy for non-listed companies and distorts investments. This suggests that the wealth tax system in Norway incentivizes investment in non-listed companies compared to listed companies. Schindler (2018) do not consider that wealth taxation worsens financial constraints, especially for small- and medium-sized businesses with limited liquidity, which weakens his conclusion. Berzins, Bøhren and Stacescu (2019) finds a correlation between shocks to household liquidity and company liquidity. As a result of a negative shock to company owners' personal liquidity from wealth taxation, they identify a reduction in cash holdings in the company since the company raise shareholders' dividends and salaries. This negative shock results in reduced growth and profitability of the company. Based on the findings of Berzins et al. (2019), the inclusion of the changes in investors' financial constraints would strengthen Schindler's analysis and conclusions.

On the background of discussions in the popular press about wealth taxation's advantages and harmful effects, Hansson 2006) uses data from 20 OECD countries to estimate the relationship between the wealth tax and economic growth. Her findings suggest that the wealth tax dampens economic growth. However, Hansson's (2006) research is one of the first attempts to estimate the relationship between wealth tax and economic development. Later research demonstrates that empirical work on the effect of wealth tax on economic growth has not reached a consensus.

Other notable empirical contributions examine the impact of wealth tax on entrepreneurial activity. For example, Bjørneby, Markussen and Røed (2020) studies the relationship between changes in the wealth taxation of small- and medium-sized business owners and the companies' investment and employment decisions. The main results indicate a positive causal relationship between the level of a household's wealth taxation and the subsequent employment growth in companies under household control. They explain that households reduce taxation by reinvesting their wealth in the privately-owned company and that increased taxation levels reinforce this incentive. Guvenen, Kambourov, Kuruscu, Ocampo and Chen (2019) argue that wealth taxation makes entrepreneurs who have similar wealth levels pay the same amount in wealth taxes, regardless of the company's productivity. This tax treatment expands the tax base and shifts the tax burden toward unproductive entrepreneurs. As a result, wealth taxation can simultaneously increase socio-economic efficiency, facilitate higher economic growth, and reduce wealth inequality.

We emphasize that while our thesis does not study the effect wealth tax has on entrepreneurial activity, investor risk, and economic growth, these factors potentially influence whether a company goes public. Furthermore, we are not aware of any previous research estimating the effect on listed companies because of a wealth tax abolishment. Researchers like Seim (2017), Bjørneby et al. (2020), and Hansson (2006) use the DiD method. We build on this with a relatively new method called the SCM. Therefore, our thesis contributes to the presented literature and gives deeper insight into the economic implications of wealth taxation.

4 Methodology

4.1 Comparative Case Study

The main objective of our study is to estimate the effect on listed companies following the abolishment of the wealth tax in Sweden. To assess this, we compare the development in listed companies in Sweden to a country that has not abolished its wealth tax through a comparative case study.

Notably, there are some issues regarding traditional comparative case studies (Abadie, Diamond, & Hainmueller, 2010). For example, one of our main challenges is to identify control group countries directly comparable to Sweden. The problem with this is that countries have widely varying characteristics, which makes it difficult to identify a control group of countries fulfilling the parallel trend assumption, that is, directly comparable to Sweden. If we do not use a proper control group, the estimated effect we observe can either be a product of wealth taxation abolishment or the difference in characteristics between Sweden and the control group countries. We could solve this problem by choosing control group countries based on subjective judgment. However, subjective judgment can result in some degree of ambiguity (Abadie et al., 2010). By basing our study on these prerequisites, we could have problems interpreting our results and distinguishing whether the effects originate from treatment or the subjective selection of control group countries.

Based on the limitations of conducting traditional comparative case studies, we use a more sophisticated technique introduced by Abadie and Gardeazabal (2003) called the synthetic control method (SCM).

4.2 Synthetic Control Method

With the SCM, we use an optimization algorithm to select a weighted combination of other countries that replicates Sweden's characteristics as close as possible. The weighted combination is composed to mimic Sweden's characteristics in terms of listed companies in the period before the wealth tax abolishment in 2007. The SCM includes both the observed and unobserved characteristics of Sweden (Abadie et al., 2010). Thus, we avoid the aforementioned pitfalls of both searching for countries with similar characteristics to Sweden and using our subjective judgment to choose them. By using this method, we can compare listed companies in Sweden to a scenario in which Sweden keeps its wealth tax and look for a visible difference. We refer to this weighted combination of countries as *synthetic Sweden.*

To create synthetic Sweden, we first define a *donor pool* of other countries. The donor pool includes country characteristics that influence the number of listed companies, predictors, and the number of listed companies itself. Our donor pool must be in line with three assumptions: i) only Sweden has an effect of the wealth tax abolishment, ii) Sweden does not experience any effect before the actual abolishment, and iii) Sweden can be replicated by a fixed combination of the countries in our donor pool (Gault & McClelland, 2017). In addition to these assumptions, the donor pool must contain data for at least one year before and one year after the abolishment in 2007. The donor pool must hold this requirement to define a pre- and post-treatment period.

With a donor pool that holds these assumptions, we can apply the optimization algorithm to assign weights to the countries in our donor pool and create synthetic Sweden. The goal of the algorithm is to minimize the mean squared prediction error (MSPE) in the period before the wealth tax abolishment (Cunningham, 2021). The MSPE is the mean of the squared difference between listed companies per million capita in synthetic and real Sweden (Abadie et al., 2010). Thus, the MSPE essentially indicates how closely synthetic Sweden replicates Sweden in terms of listed companies. The algorithm assigns the country weights by jointly optimizing the predictor and outcome variable weights (Diamond & Hainmueller, 2015). Both the country and the predictor weights must separately meet two requirements: i) the weights must be between 0 and 1, and ii) the total sum of weights must be approximately 1 (Abadie et al., 2010).

To compare synthetic and real Sweden, we plot graphs for listed companies for the pre- and post-treatment period. We observe an effect if the graphs are similar prior to 2007 and then split after the abolishment of the wealth tax. If the graphs are divergent prior to 2007, we have a model with a poor fit, indicating that synthetic Sweden does not match real Sweden in the listed companies per million capita. In this case, we would have an invalid implementation of the SCM, and we could not argue that a potential effect after 2007 comes from the wealth tax abolishment (Gault & McClelland, 2017).

To measure the fit and effect of the model, we apply two different methods: eyeballing and post/pre MSPE ratios. By eyeballing, we use our own judgment to consider the fit of the two graphs prior to the abolishment in 2007 and look for a difference in the years after. With post/pre MSPE ratios, we measure the MSPE pre and prior to 2007. The MSPE of the period before the abolishment of the wealth tax reveals how good the fit of the model is. We want a low MSPE, where the size of the MSPE must be considered in relation to our outcome variable (Abadie et al., 2010). Furthermore, the MSPE after the abolishment of the wealth tax is a measure of the effect. Thus, we want to see a large post-treatment MSPE. A low pre-treatment MSPE and a large post-treatment MSPE would yield a large post/pre MSPE ratio. This would imply that we have a large effect in our model, and vice versa.

4.2.1 Inference and robustness

To assess the significance of our result, we apply a test called the "in-space placebo" test, which was introduced by Abadie, Diamond and Hainmueller (2015). This test allows us to consider whether a result comes from the abolishment of wealth taxation or from a different factor. We conduct this straightforward test by running the SCM on all the countries in our donor pool. Since our donor pool holds the aforementioned assumptions, none of the countries should experience any effect in the model. We consider the results by eyeballing and by looking at the post/pre MSPE ratios. If any of the countries in our donor pool show an effect, we cannot conclude that the result we see in Sweden was caused by the abolition of the wealth tax. The in-space placebo test also provides us a P-value. This P-value is the fraction of donor pool countries that have a post/pre MSPE ratio at least as large as Sweden. For example, if Sweden have the largest ratio, the P-value will be one divided by the number of donor pool countries.

Abadie et al. (2015) also introduce two robustness tests, the "in-time placebo" and the "leave-one-out" test. To apply the in-time placebo test, we use our pre-treatment period as a sample and then set a year during this period as the treatment year. The rationale behind this is to determine whether there is a treatment effect in Sweden by examining a period in which the wealth tax was still in place. Ideally, our new in-time placebo path should follow a similar path to the real pre-treatment path. If this is not the case and the paths diverge significantly, we must question our model‘s predictive power.

In the leave-one-out test, we exclude one of the countries in synthetic Sweden from the test and rerun the SCM to create a new synthetic Sweden. We repeat this for all the countries in synthetic Sweden. Through this test, we aim to identify whether any of the countries drives our result. If this appears to be the case, we must verify the credibility of the outcome path of this country—that is, that no other factors drive the number of listed companies in this country. We can also use the test to look for spillover effects, but we find this unlikely to be a potential pitfall in our model.

4.2.2 Advantages and limitations

The SCM has several advantages, a significant one being Jens Hainmuller's "Synth" package for Stata, MATLAB, and R (Hainmueller). This package makes it easy for us to understand and to implement the model step-by-step. The output we derive from the package is also easy to assess, which makes the model transparent. Furthermore, compared to a different comparative case method, the DiD approach, we can use the SCM with fewer assumptions. The DiD approach assumes unobservable effects to be fixed over time, while the SCM lets them vary over time (Abadie et al., 2010). A third advantage is the aforementioned point that the SCM removes subjective researcher bias, since an algorithm chooses the countries in synthetic Sweden. The weight restriction that they must be between 0 and 1 also prevents extrapolation issues. In addition, since the SCM minimizes MSPE in the pre-treatment period, the model is robust against cherry picking for a desirable result (Ye, 2019).

The SCM also presents some limitations. Sweden cannot have an extreme value in the outcome variable, listed companies, compared to the donor pool, as this would lead to a poor fit for synthetic Sweden (Gault & McClelland, 2017). In addition, we must exclude all countries with extreme values in listed companies from the donor pool to reduce interpolation bias (Abadie et al., 2015). We must also ensure that we have outcome and predictor values for Sweden as close to the donor pool median as possible to achieve a good fit for our model (Gault & McClelland, 2017). As an extension to this, the donor pool must include countries that exhibit similar trends in the aforementioned values for synthetic Sweden to adequately replicate actual Sweden (Gault & McClelland, 2017). This limits what countries we can include in our donor pool. In addition to the donor pool limitations, we consider the way we judge our results in the SCM to be a limitation. We determine our results through subjective judgment of graphs and MSPE values instead of coefficient and significance values, which can lead to erroneous interpretations of the results. Ferman and Pinto (2016) also argue that the placebo test has a drawback for hypothesis testing, since we use the SCM when the pre-treatment fit for the treated country is good but do not always apply the same requirement for the donor pool units. They argue that a comparison between the treated country and countries with a poor pre-treatment fit is invalid (Ferman & Pinto, 2016).

5 Data

In creating our SCM model, we use annual country-specific data on several economic indicators, which serve as predictors. We use data on European countries to be able to find countries that share institutional characteristics with Sweden. First, we choose predictors we believe influence whether a company goes public. This results in the following predictors: GDP per capita, inflation, unemployment rate, the cost of starting a business, stock market return, stock price volatility, listed companies per million capita, market turnover ratio, and a financial freedom indicator. We refer to Tables A.1 and A.2 in the appendix for a detailed description and summary statistics of each predictor in the dataset. Our dataset consists of data from 1996 to 2012, which allows us to use a pre-treatment period of sufficient length, thus facilitating a good model fit (Gault & McClelland, 2017). We obtain the data from the Global Economy database, which consists of data from the World Bank and the World Economic Forum (WEF), among others (The Global Economy, 2021). We supplement this data with data of listed companies per million capita and turnover rates from the Federal Reserve Economic Data (FRED) (Federal Reserve Bank of St.Louis, 2021).

5.1 The Donor Pool

We further prepare the data to create a donor pool for our model. We start by excluding countries that experienced treatment similar to that of Sweden during the sample period. Because of this, we exclude countries like Denmark, Poland, the Netherlands, and Finland from the dataset on the basis that they abolished their wealth tax between 1996 and 2012 (Drometer, et al., 2018). Next, we remove countries with missing data on one or more of the predictor variables. This cleaning ensures a dataset with complete and comparable values in the predictor variables and provides a good foundation to create a synthetic control group.

Once we have a complete and clean dataset, we investigate it to identify countries that have extreme values in one or more of the predictors. We do this to establish a donor pool with comparable characteristics to avoid interpolation bias and potential overfitting (Abadie et al., 2015). With an emphasis on this, we construct a donor pool of countries with predictor values that do not deviate too far from Sweden's. We also ensure that Sweden's predictor values are not the highest or lowest in the donor pool. Because of this, we omit countries like Italy, Turkey, and Portugal, which reduces the number of countries in the donor pool but improves the accuracy of the weight choice for each country (Hahn & Shi, 2017). Table A.3 in the appendix presents the average values from 1996 to 2006 for each country in the original dataset and identifies whether they are included in the donor pool, while Table A.4 in the appendix displays the summary statistics for our donor pool.

5.2 Limitations

When gathering data for our dataset, we experience difficulties collecting data on all predictors for each country. As a result, some of the countries in the donor pool have predictor values that deviate more from the Swedish data than is ideal to conduct a "perfect" experiment. To illustrate, only four countries in our dataset have a number of listed companies per million capita in the +/- 50% range of Sweden’s. Because of this, we must make compromises to create a solid donor pool and avoid excluding too many countries. Furthermore, the evaluation of which countries to include in our donor pool is a subjective evaluation based on our data; therefore, we may include some countries that should arguably be excluded, and vice versa.

6 Analysis

Through our literature review, we identify how the field has already been studied from different angles. We want to add to this by looking at the effect wealth tax has on companies' stock exchange listings. Therefore, in this chapter, we investigate the research question presented in the introduction: *Does a wealth tax discourage companies from going public?*

By applying the SCM to examine the effect that abolition of the wealth tax had on Sweden, we find a positive effect on the number of listed companies. We also find this result significant at the 1% level through a fixed-effects regression. We additionally apply the SCM to data on Finland to look for similar results. In the Finland case, the effect is absent. A weak robustness test on the model for Finland limits the credibility, but we still consider the results to reduce the generalizability of our results from Sweden.

Figure 1 illustrates the average listed companies per million capita for the donor pool compared to Sweden between 1996 and 2012. The dotted line marks the abolishment of the wealth tax in 2007. We observe that the two graphs correlate for most of the period except between 2005 and 2008, where Sweden makes some leaps. In particular, we see an increase after the abolishment in 2007. In the following section, we analyze the actual effect using the SCM.

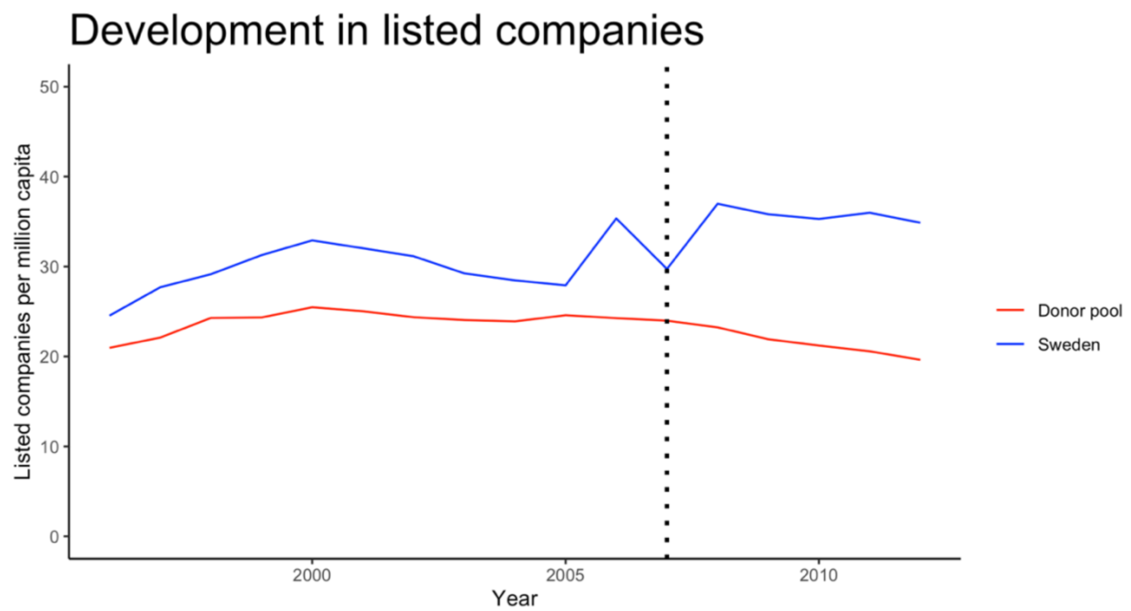

Figure 1 - Listed companies per million capita for the donor pool (average) and Sweden

6.1 Evaluation of the Synthetic Control Group

To create our model, we minimize the pre-treatment MSPE with a Broyden-Fletcher-Goldfarb-Shanni algorithm (BFGS) through the Synth package. The BFGS algorithm solves nonlinear and unconstrained optimization problems (Brownlee, 2021). The model‘s output is synthetic Sweden, which consists of three out of seven countries in the donor pool: the United Kingdom (UK), France, and Norway. The UK, France, and Norway yield weights of 0.515, 0.403, and 0.082, respectively. We provide an overview of the weights in Table B.1 in the appendix.

Looking further into the synthetic control group, we seek to find similarities in the predictors of Sweden and the countries with the largest weights. We look for similarities in trends, not numerical values, and emphasize the predictors with the largest magnitude. In our model, the predictor for listed companies per million capita accounts for 0.466 of the weight. The weight proves that the predictor is crucial in creating our synthetic control group. In addition, the cost of starting a business and financial freedom indicator predictors count for 0.270 and 0.154, respectively, meaning that only three out of nine predictors account for 89% of the total predictor weights. The predictors for unemployment and stock price volatility have respective weights of 0.060 and 0.030. The rest of the predictors have small or zero weights. Table B.2 in the appendix displays all the predictor weights.

The predictor with the largest weight is also the dependent variable in our model. We find this logical since the algorithm minimizes the MSPE between Sweden and synthetic Sweden in this predictor. Figure B.3.1 in the appendix presents listed companies per million capita for each of the countries in synthetic Sweden. We see that all countries move fairly similarly to Sweden until 2007, although some deviations exist. Focusing on France and the UK, which comprise 92% of the weights in the synthetic control group, we see that the graphs for the UK and Sweden correlate to a large extent. The graphs for France and Sweden exhibit reasonably similar slopes for a large part of the pre-treatment period, with deviations around the years 2000 and 2005. Overall, the correlation substantiates that the synthetic control group fits Sweden in terms of the listed companies' predictor.

The second-largest predictor is the cost of starting a business. We believe the cost of starting a business is a useful proxy for measuring to what extent people in a particular country choose to start a company—in other words, the lower the cost, the lower the startup barriers. In turn, more companies founded enlarge the pool of potential listed companies, which leads to more listed companies. Therefore, we are not surprised that the predictor has a relatively large magnitude in our model. Figure B.3.2 in the appendix displays the cost of starting a business. We see similar trends in the graphs for Sweden, France, and the UK, while Norway exhibits a negative trend through the whole period. Since Norway has a relatively smaller weight in synthetic Sweden than France and the UK, we consider synthetic Sweden to be a good match for real Sweden in terms of the cost of starting a business predictor.

Figure B.3.3 in the appendix presents the predictor with the third-largest magnitude, the financial freedom index. As with the direct cost of starting a business, we believe this predictor serves as a good proxy for how high the barriers to starting a company are. We also believe it is a good measure of how advantageous it may be to have a listed company, since the index includes how developed capital and financial markets are. Therefore, it appears natural that the predictor has a large weight in our model. Figure B.3.3 illustrates that all the countries in the synthetic control group follow the same path as Sweden in the initial years. Sweden then leaps upward in 2002 and continues on the same path as the rest for the following years before returning to its initial level in 2005. We also see that the index for France moves upward in 2006, when Sweden’s graph is flat. Since France has the second-largest weight in synthetic Sweden, this may influence our model’s fit compared to real Sweden. On the other hand, most countries move in parallel with Sweden for much of the period. Overall, we conclude that the synthetic model can be a good fit for Sweden in terms of the financial freedom index.

Figures B.3.4 and B.3.5 in the appendix present the graphs for the two smaller but considerable predictors, unemployment (0.060) and stock price volatility (0.030). We see that the unemployment graphs for France and Sweden correlate for most of the pre-treatment period. The graphs for Norway and the UK are relatively flat, but the UK moves together with Sweden for a couple of years around 2000, while Norway and Sweden move together from 2005 and throughout the pre-treatment period. For stock price volatility, the countries in synthetic Sweden and Sweden have similar graphs for the whole pre-treatment period, with the exception of a couple of years around 2001. From 2001 to 2003, Norway and Sweden have relatively flat graphs, while the other two rise. In sum, we find the overall movement in the two predictors adequately similar between the countries of the synthetic control group and Sweden.

As well as looking at the main predictor's trend over time, the "Synth" package provides an overview of mean predictor values. The overview compares the mean values for the predictors of Sweden, synthetic Sweden, and our donor pool. Table B.4 in the appendix presents an overview of the mean values.

Looking at listed companies, we see that Sweden and synthetic Sweden are very similar, with mean values of 29.955 and 39.929, respectively. In comparison, the donor pool has a mean of 23.653. This observation is in line with our analysis of the graph in appendix Figure B.3.1. The cost of starting a business deviates more, with mean values of 0.680 and 1.126 for Sweden and synthetic Sweden, respectively. Values for the financial freedom index also deviate, with values of 75.000, 70.948, and 67.619 for Sweden, synthetic Sweden, and the donor pool. Even though we observe some differences in the values for two of the main predictors, we still consider them to be reasonably similar.

For the two minor predictors, unemployment and stock price volatility, we see that real and synthetic Sweden have nearly equal values for unemployment, with respective means of 7.050 and 7.191. We also see some difference in stock price volatility, where Sweden has a mean of 24.694 and synthetic Sweden 18.869. We also find the values for the predictors with very small or zero weights to be fairly similar, except for the turnover predictor. Since this predictor has a weight of 0.001, we consider the effect of this to be small.

When analyzing the mean values for the pre-treatment period, we preferably want to observe similar values for Sweden and synthetic Sweden. While four of the five predictors with notable weights fulfill this, the predictor for stock price volatility may deviate slightly more than desired. On the other hand, the predictor's small weight limits this effect. Moreover, since the values are mean values, the deviation may be limited to certain parts of the pre-treatment period. Based on this, we consider the model to have the properties to make a synthetic replication of Sweden sufficient to investigate our research question.

6.2 Comparing Synthetic and Real Sweden

Figure 2 compares listed companies per million capita between Sweden and synthetic Sweden before and after Sweden's abolishment of wealth taxation in 2007. Judging the fit of synthetic Sweden by eyeballing, we find the fit to be reasonably good throughout the pre-treatment period. However, we notice some minor deviations, including a relatively large one between 2005 and 2007, where Sweden's graph spikes in 2006. We expect some deviation since the mean values for some of the synthetic predictors diverge from actual Sweden's, as mentioned earlier in the analysis. The cause of this spike may be mergers and acquisitions activity in Sweden and is difficult to replicate with our synthetic control group while minimizing the MSPE. Furthermore, we consider the MSPE of the model to be relatively low at 2.56. For comparison, the number of listed companies per million capita in Sweden ranges between 24.55 and 36.99.

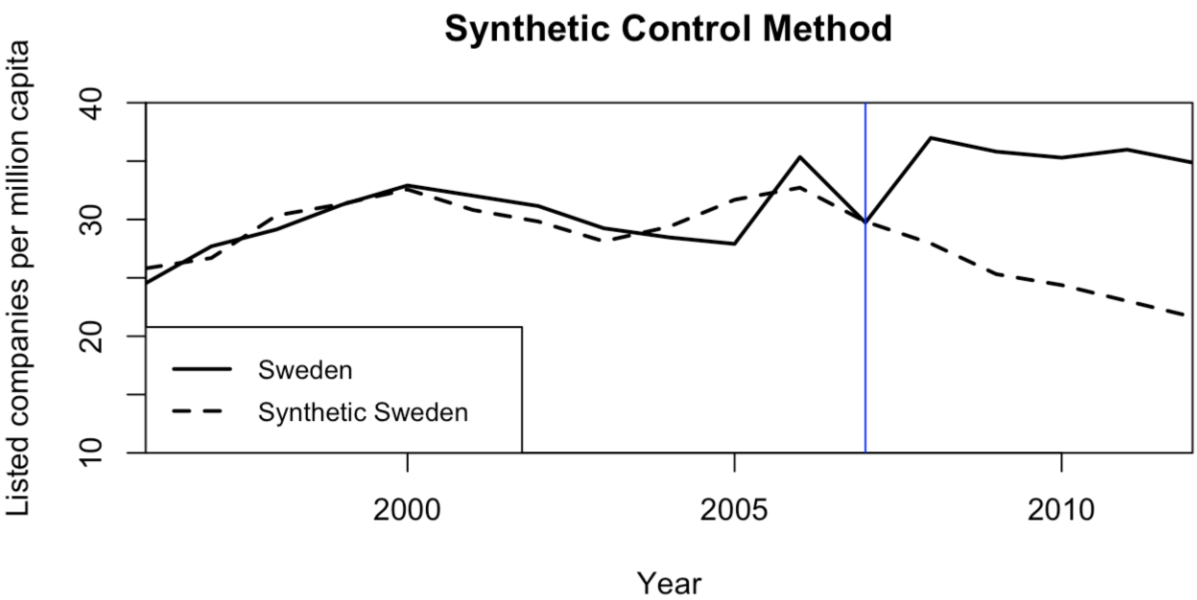

Figure 2 - Listed companies per million capita for synthetic and real Sweden

When we evaluate the effect of the treatment, we ideally want to see the two graphs deviate in the post-treatment period. In Figure 2, we observe a clear split between the graphs after 2007. Since the graph for actual Sweden leaps up from synthetic Sweden, the figure indicates that Sweden yields fewer listed companies when wealth tax is in place. The effect is clearer in Figure 3, which provides a different projection of the results in Figure 2 with synthetic

Sweden as a benchmark. We see that the graph for Sweden rises steeply in the years after the abolishment, with an increase of 62%, leaving a gap of 13.22 listed companies per million capita in 2012. According to our model, this implies that about 13 more companies are listed per million capita in Sweden compared to a scenario with no abolishment of the wealth tax.

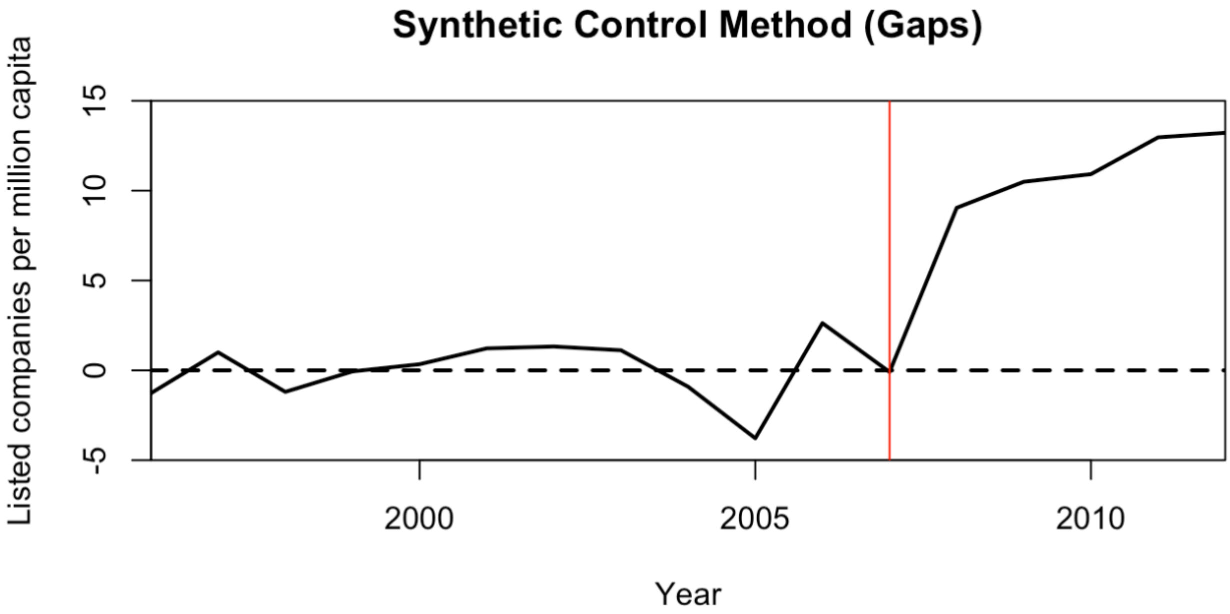

Figure 3 - Listed companies per million capita for real Sweden with synthetic Sweden as a benchmark

6.3 Placebo Test

To evaluate the effect in Figures 2 and 3, we perform a placebo test. Figure 4 illustrates the outcome of this placebo test, with the paths for the countries in the donor pool shown in grey. We have set the pre-treatment MSPE limit to 10 times that of synthetic Sweden to avoid including synthetic countries with extreme pre-treatment MSPE values.

We only observe an increase in listed companies after the treatment for two countries: Norway and Switzerland. Norway has a poor and volatile pre-treatment fit, which may be explained by the high number of listed companies per million capita throughout the pre-treatment period. Norway also has the highest number of listed companies for about half of the observed period, which makes it impossible to use weighted values from the donor pool to match Norway for these years. These values make it challenging to create a synthetic version of Norway with a good pre-treatment fit. Considering synthetic Switzerland's graph in the pre-treatment period, we note that it has a poor fit and moves far from the benchmark; in other words, it has a high pre-treatment MSPE. Therefore, the increase in listed companies could be due to various factors. Thus, the increase does not show that the country experiences a treatment effect in the test despite not being treated.

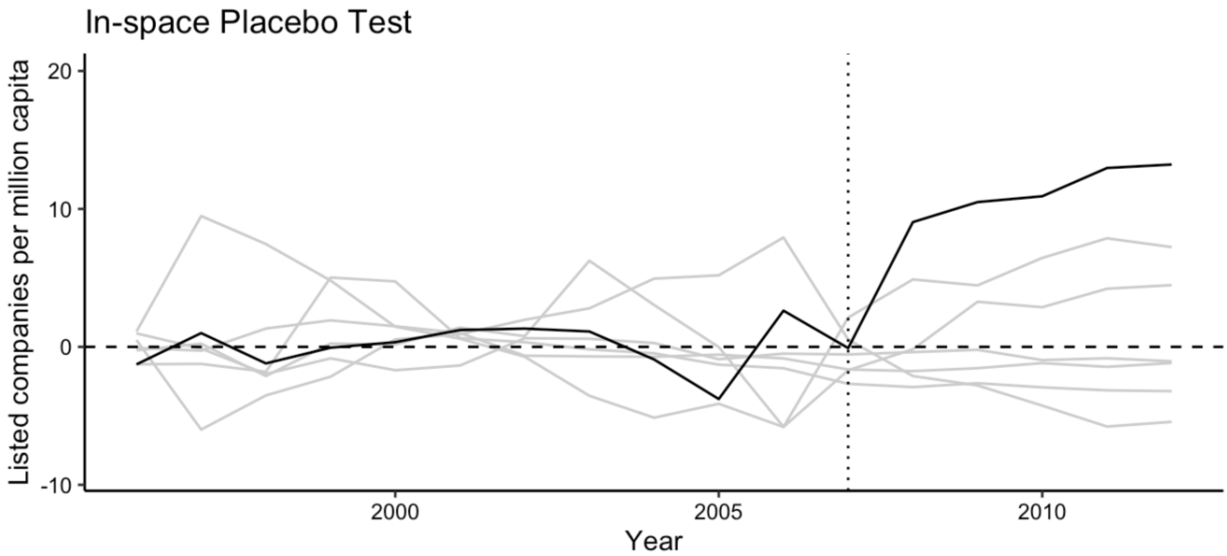

Figure 4 - In-space placebo test with MSPE limit of 10

To further investigate the outcome of the abolishment, we compare the post/pre MSPE ratios for Sweden and the countries in the donor pool to identify the relative effect between the pre- and post-treatment periods. Figure 5 displays the ratios for all the countries. The figure demonstrates that Sweden exhibits the largest change from the pre-treatment to the post-treatment period, with a ratio of about 51. In contrast, Switzerland and Norway have ratios of around 1.5. The low ratios for Switzerland and Norway indicate that the difference before and after the treatment is small, in line with the poor pre-treatment fit exhibited in the placebo graphs. The rest of the countries that experienced a negative effect after the treatment also show post/pre MSPE ratios around 1. The P-value of the placebo test is 0.143, which we must interpret in relation to the MSPE ratio limit we set at 10. If we set no limit and include all donor pool countries in the placebo test, the P-value is 0.125. Overall, our findings support that the removal of the wealth tax led to an increase in listed companies in Sweden.

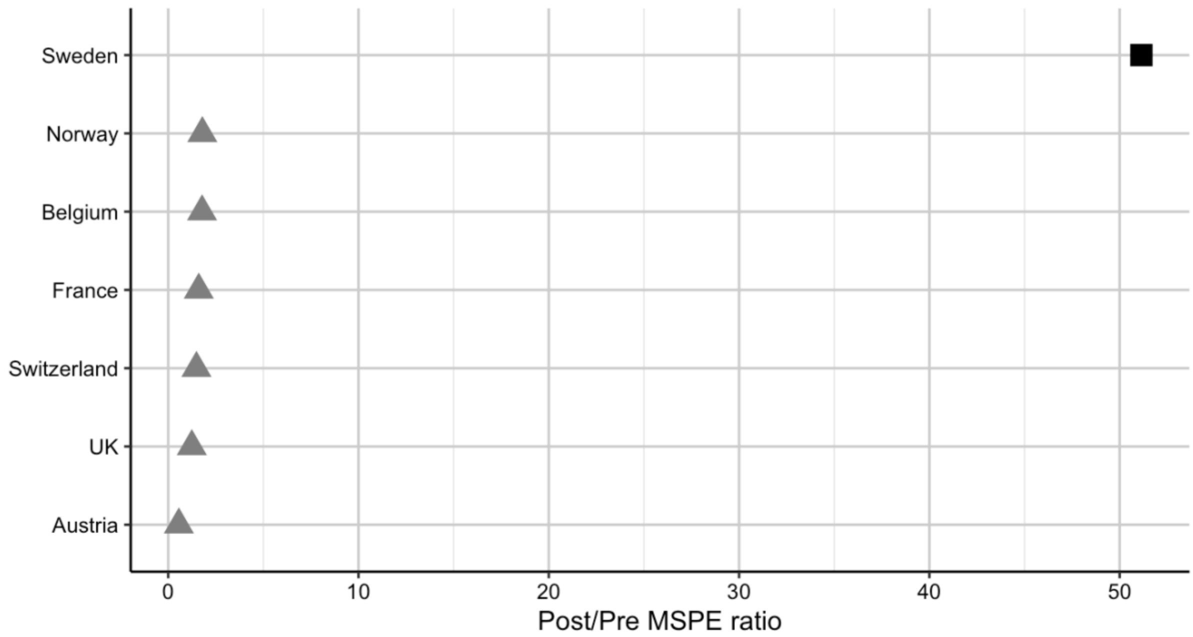

Figure 5 - Post/pre MSPE ratios for Sweden compared to the donor pool countries

6.4 Sensitivity and Robustness

To test the sensitivity and robustness of the findings from the synthetic control model, we conduct two different tests: "in-time placebo" and "leave-one-out." Moreover, we expand our robustness test with a fixed-effects regression.

6.4.1 In-time placebo test

To test the robustness of our results, we conduct an in-time placebo test for the period from 1996 to 2006. We choose 2004 as the treatment year to include all the same predictors as in the real model. Figures B.5.1 and B.5.2 in the appendix display the slopes of the real pre-treatment period and the in-time placebo test. By eyeballing, we see that the slopes exhibit similarities, with some minor differences in the pre-treatment period where the in-time placebo model has a better fit. We find this reasonable since the pre-treatment period of the in-time placebo model ends before Sweden's spike in listed companies in 2005.

In addition, we conduct a second in-time placebo test with 2002 as the treatment year. Since the predictor for the cost of starting a business only contains data from 2003, we exclude it from the test. Figure B.5.3 in the appendix presents the output of the test. We observe a better fit for the 2002 in-time placebo than both the 2004 in-time placebo and the real model in the pre-treatment period. Besides the better fit, we consider the two in-time placebo models to be nearly identical.

We expect some divergence in the in-time placebo tests because the weights change with a shorter pre-treatment period. Overall, we consider the graphs for the in-time placebo tests to be reasonably similar to the pre-treatment period of the real model. We do not observe signs of a positive effect in any of the models when we set the treatment year to a year prior to the wealth tax abolishment in Sweden. We conclude that it does not challenge the predictive powers of our model.

6.4.2 Leave-one-out test

To further test the robustness of our model, we conduct a leave-one-out test. In this case, we are particularly interested in the effect of removing the UK and France from the donor pool due to their large weights in the original version of synthetic Sweden (0.515 and 0.403). Figure B.5.5 in the appendix displays the outcomes for the three different models, including the original model with the complete donor pool. We see two notable changes. The outcome changes slightly when we leave the UK out, where there is a small reduction in the positive effect in the post-treatment period. However, we consider this reduction too small to suggest that the UK drives the results of our model. Our model also has a reduced fit when we exclude France, but we still judge the synthetic graph to have a sufficient fit compared to Sweden. Thus, the leave-one-out test supports the robustness of our results.

6.4.3 Fixed-effects regression

To further assess the results using the SCM, we run a two-way fixed effects regression as a multiple regression with a dummy variable. A multiple regression is a regression where we try to explain the number of listed companies per million capita by using our predictor variables. Thus, listed companies per million capita is our *dependent variable,* and our predictors are our *independent variables* (Yuferova, Multiple Regression, 2021). Wealth tax abolishment serves as our dummy variable, which is an independent variable with the value 1 in the years after the wealth tax was abolished, and 0 otherwise. This allows us to investigate what effect wealth tax abolishment have on listed companies per million capita. We evaluate the effect of each independent variable by considering how significant it is. A low significance level means that the independent variable is important to explain the number of listed companies per million capita in a country. Since we have data on different countries over several years, we can conduct our multiple regression as a *two-way fixed effects* regression. A two-way fixed effects regression lets us control for unobserved characteristics that vary over time but not between countries, and unobserved characteristics that vary between countries but not over time (Yuferova, 2021) Our regression has clustered standard errors, which allows for autocorrelation within countries and is robust against heteroskedasticity. Heteroskedasticity means that the variance in listed companies per million capita is inconsistent for different values of our independent variables (Rohrer, 2021).

We can use R-squared and adjusted R-squared to consider how good the fit of our two-way fixed effects regression is. R-squared and adjusted R-squared measure the variation in listed companies per million capita that can be explained by our independent variables. While R-squared considers all independent variables in the regression, adjusted R-squared considers only the significant independent variables. R-squared will increase when we add independent variables to the regression. In contrast, adjusted R-squared only increase when the new independent variables are significant (Yuferova, 2021).

We use the data from our donor pool and add wealth tax abolishment as a dummy variable to conduct our regression. To maintain a balanced dataset and reduce potential bias, we exclude the predictor for the cost of starting a business, because we only have values from 2003 for this predictor. We also have six NAs in our dataset, which are in the stock price volatility and stock return predictors. We run our regression with the NAs instead of removing years, countries, or the two predictors from our dataset. Table 2 presents the output of our regression.

	Dependent variable:
	listedpercap
abolished	7.722***
	t = 12.038
gdpcap	0.00002
	t = 0.549
inflation	-0.271
	t = -1.151
unemploy	-0.099
	t = -0.463
stockreturn	-0.021
	t = -1.316
pricevola	0.024
	t = 0.494
turnover	-0.021**
	t = -2.161
finfreedom	0.067**
	t = 2.023
Observations	150
R^2	0.304
Adjusted R^2	0.114
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 2 - Two-way linear fixed-effects regression with wealth tax abolishment as dummy variable

From the output, we see that the dummy for the wealth tax abolishment*, abolished,* has a coefficient of 7.722 at a 1% significance level. Interpreting the dummy, this implies that the abolishment increases the number of listed companies by 7.722 per million capita. The low significance level supports the positive effect we find using the SCM and suggests a positive effect of the abolishment. We also see that the stock market turnover rate, *turnover,* and the financial freedom index, *finfreedom,* have 5% significance levels. In comparison, the financial freedom index and turnover have predictor weights of 0.154 and 0.001 in our SCM model. This implies that the SCM places almost no emphasis on turnover rate, a predictor that the regression finds significant. Further, the regression finds all the other predictors we use in our SCM model insignificant. Because most of the predictors we use as independent variables are insignificant, this leads to the difference of approximately 20% between R-squared and adjusted R-squared. An adjusted R-squared of 11% in this context means that the *abolished,* *turnover* and *finfreedom* variables explains 11% of the variation of listed companies in Sweden in our data sample. Since listed companies, the cost of starting a business, and the financial freedom index account for 89% of the predictor weights in synthetic Sweden, the insignificant predictors receive little attention in the SCM as well.

In our regression, *turnover* and *finfreedom* have coefficients of -0.021 and 0.067. Thus, the lower the turnover and higher the financial freedom, the more listed companies a country has. We consider the negative coefficient of turnover to be counter-intuitive since it suggests that fewer companies are listed if the market is more liquid. Basic economic theory assumes that stockholders demand a premium to invest in a stock with low liquidity (Corporate Finance Institute, 2021). Therefore, we assume that it is less advantageous to be listed in a market with low liquidity, since the price of capital is higher. An explanation for why this assumption does not hold in our model may be that our donor pool only contains countries with sufficient liquidity. Our donor pool has a mean turnover ratio of 75, with 98% of the ratios above 21. Thus, the liquidity risk premium may be small, and, therefore, a relatively high turnover does not encourage more companies to become listed.

6.5 Synthetic Control Method on Finland

To test the generalizability of our results, we apply the SCM to Finland to see if we find a similar effect. Finland abolished its wealth tax in 2006 (Drometer, et al., 2018). The wealth tax rate in Finland was 0.8% on excess wealth over €250,000, and Finland valued listed companies at 70% of market value and non-listed companies based on net assets (Colliander, 2005).

We use the same donor pool as for the analysis on Sweden but with the inclusion of Greece. We add Greece to the donor pool because Greece has more mean predictor values similar to Finland than to Sweden. Table A.3 in the appendix displays the mean predictor values for the countries in the donor pool. Table A.5 in the appendix presents summary statistics for the donor pool we use to apply the SCM to Finland.

In Figure C.1 in the appendix, we compare Finland's listed companies to the donor pool's mean. Aside from some deviations in the pre-treatment period, the graphs correlate to a large extent, and we do not see a change in Finland's number of listed companies after 2006.

6.5.1 Evaluation of the synthetic control group

When we apply the SCM on Finland, we end up with a synthetic Finland that consists of three countries from the donor pool: Greece (0.461), France (0.283), and Norway (0.256). Table C.2 in the appendix displays the weights.

Furthermore, stock return (0.263), listed companies (0.244), and GDP (0.144) have the three largest predictor weights. Stock price volatility, unemployment, and the cost of starting a business account for about 10% each, while the rest of the predictors have minor weights. Table C.3 in the appendix lists all the predictor weights.

Figures C.4.1, C.4.2, and C.4.3 in the appendix display the graphs for the three main predictors. We find it reasonable that stock returns have one of the largest weights in synthetic Finland, since a high stock return may make capital easier accessible in the market. Easily accessible capital in the market makes it more advantageous for companies to be listed, thus stock returns are an important predictor for the number of companies listed in a country.

When comparing stock returns for the countries in synthetic Finland to real Finland, we find that they are similar in general, but we also see some notable differences. Finland has the highest value until 2001, which means that synthetic Finland is unable to replicate real Finland in these years. Furthermore, Greece's graph is flat throughout the period, while the other countries' stock returns move together with Finland's. Since Greece is the country with the largest weight, this worsens the model's fit. Nevertheless, Norway's and France's trends being similar to Finland improves the fit.

Furthermore, Norway deviates from Finland in the whole period regarding listed companies, while France and Greece have graphs very similar to Finland's. Since Norway has the smallest weight, we believe the other two countries can compensate for much of this deviation. The third largest weight is GDP, which is an important indicator of economic growth. We believe that GDP is a relevant predictor for the number of listed companies in a country, since a high GDP level means that the activity and production in the economy is high, and vice versa. Thus, the GDP level can be an important factor in how many companies that gets established and listed in an economy. The graphs for GDP reveal that Norway have a steeper graph for the final years of the pre-treatment period. Moreover, all the graphs have a similar trend. In conclusion, we observe some deviations in the predictors for Greece and Norway. However, we consider the overall trends to be similar and capable of compensating for some of each other's defects.

Figures C.4.4, C.4.5, and C.4.6 in the appendix project the three smaller predictors. For stock price volatility, we see that the graphs are similar in the first year but that Finland has the highest value through the rest of the pre-treatment period. Since Finland has the highest value, synthetic Finland cannot replicate real Finland. This negatively affects synthetic Finland's fit. We also see that the values are close and move similarly from 2003, which offsets some of the aforementioned deviation. Looking at the graphs for unemployment reveals some deviations between them in the initial years. Furthermore, they all correlate to a large extent from 1999 to 2006. The graphs for the cost of starting a business also correlate for most of the pre-treatment period. The only exception is Greece, which declines between 2003 and 2004, while the rest is flat. Our overall impression of the trends in the six largest predictors, which account for 95% of the total weight, is that they are sufficient to create a good fit for synthetic Finland.

When looking at the mean values in Table C.5 in the appendix, we find close to identical values for listed companies for synthetic and real Finland, with values of 26.509 and 26.424, respectively. The mean values for GDP, stock return, and unemployment deviate some, but we still find them to be relatively similar. We also see some differences in the values for the financial freedom index and price volatility, but we consider them to be sufficiently close. Furthermore, we observe a substantial difference in the predictor cost of starting a business, where Finland and synthetic Finland have values of 1.150 and 13.624. This large deviation negatively influences the credibility of the outcome path for synthetic Finland, but because of the predictor's weight of 0.083, we consider the effect to be limited. In sum, we consider the mean values to be in line with our prior impression that the donor pool is sufficient to comprise a good synthetic replication of Finland.

6.5.2 Comparing synthetic and real Finland

Based on our conclusion that the model should provide a good replication of Finland, we compare listed companies per million capita for synthetic and real Finland in Figure 6. The model has a good fit in the period prior to the wealth tax abolition in 2006, with only minor deviations. The pre-treatment MSPE of synthetic Finland is 0.741, which we consider low since Finland's number of listed companies ranges between 21.98 and 30.50 in the period of our model. We do not observe any positive effect after 2006; the only visible effect is a slightly negative one. The gap in 2012 is -0.75, which means that about one less company is listed per million capita in Finland compared to synthetic Finland. The gap is almost equal to the pre-treatment MSPE. Therefore, we consider this gap too small to be an evident effect and conclude that we do not see any effect in Finland. The absence of an effect can also be seen in the gaps plot in Figure C.6 in the appendix.

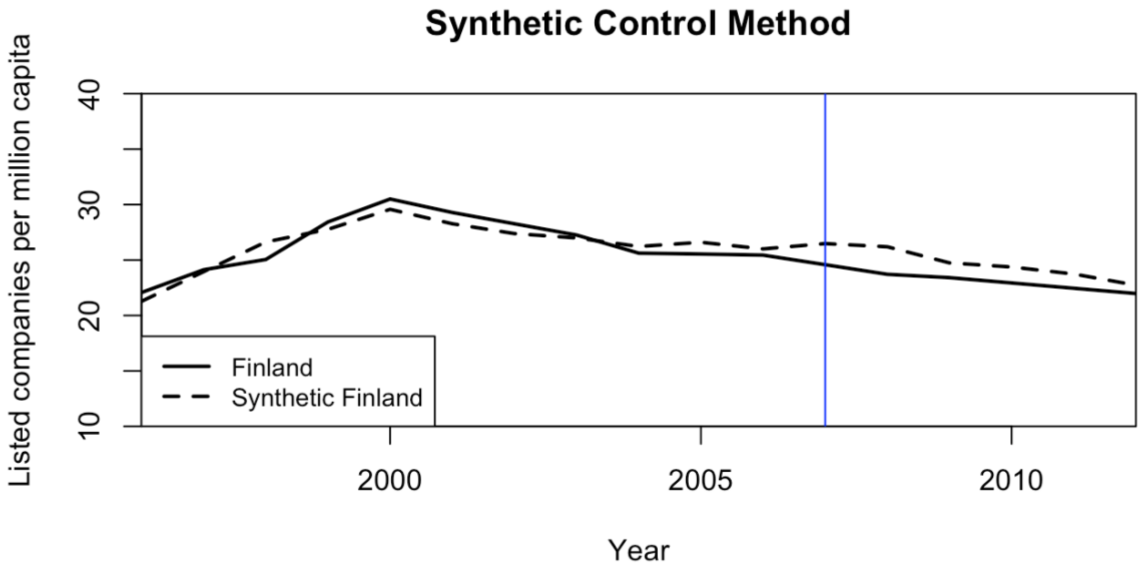

Figure 6 - Listed companies per million capita for synthetic and real Finland

6.5.3 Placebo test

We additionally conduct a placebo test to evaluate the results of our model. Figure 7 illustrates the results of the test. The MSPE limit is set to 20 times that of Finland because of Finland's low pre-treatment MSPE value. From the figure, we see that only Switzerland increases after 2006. Since Switzerland has a volatile graph with a poor fit in the years prior to 2006, other factors could cause this increase. Thus, it does not prove that Switzerland experienced a positive effect after the wealth tax abolishment in Finland. Furthermore, we see that the rest of the countries have graphs similar to Finland's, which means that none of the donor pool countries experienced any effect in our model.

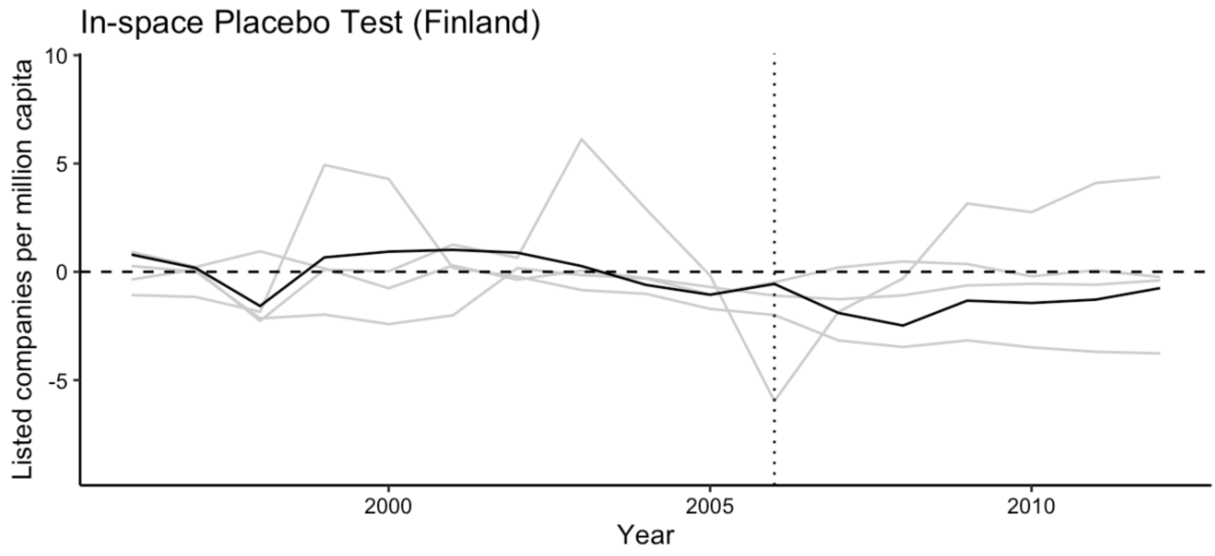

Figure 7 - In-space placebo test with MSPE limit of 20

From the post/pre MSPE ratios in Table C.7 in the appendix, we see that Finland has the largest difference in the post compared to the pre-treatment period. Since we consider the effect to be absent, our key takeaway from the ratios is that no other country experienced a considerable treatment effect despite not getting treatment. Overall, the placebo test supports the results of the SCM.

6.5.4 Sensitivity and robustness

As with synthetic Sweden, we conduct an in-time placebo and a leave-one-out test on synthetic Finland to further assess our findings' robustness.

We conduct two in-time placebo tests: one with 2001 and one with 2003 as the treatment year. Figures C.8.1, C.8.2, and C.8.3 in the appendix present the graph for the real pre-treatment period and the graphs for the in-time placebo tests. When we consider the 2001 placebo model, where the cost of starting a business is excluded, we find that the fit in the pre-treatment period is close to the real model. However, the placebo model reveals a negative effect around the year 2002. Since the 2001 placebo model has a good fit in the pre-treatment period, we question the model's predictive power. We see a similar decline in the 2003 model from the year 2002, but the model has a poor fit. This poor fit prevents interpretation.

Figure C.8.4 in the appendix presents the results from the leave-one-out test. We see that the model loses its fit when we exclude Greece, which implies that Greece drives the model's outcome. This loss of fit does not mean that our model is poor but that we must judge the credibility of Greece's outcome path. In doing so, we especially consider the large impact the 2008 financial crisis had on Greece's economy. The economic crisis led to a negative nominal GDP after 2007 and reduced trust in the Greece financial markets (Ozturk & Sozdemir, 2015). Furthermore, prior to the financial crisis, Greece wasted money through actions like bribery and corruption, which led to a rise in public debt and budget deficits (Williams, 2010). We believe these factors could have affected the number of listed companies in Greece, which weakens the credibility of the outcome path of our model.

Both the in-time placebo test and the leave-one-out test reveal weaknesses in the results of our model. Thus, we must interpret the effect the abolishment of the wealth tax had on Finland with caution. We believe that the absence of an effect our model shows is plausible. However, the drawbacks in the robustness tests prevent us from drawing a conclusion on the actual effect. Therefore, the test neither strengthens nor weakens the results we observe in our analysis of Sweden. However, it does make us consider the possibility that the effect can be absent or negative in Finland, despite Finland having somewhat similar institutional values to Sweden.

6.6 Criticism of the Model

Some weaknesses exist in the models presented in our analysis. First, the sample of countries in the analysis was relatively small. Even though it is sufficient to investigate our research question, a larger sample with more countries with attributes comparable to Sweden and especially Finland can strengthen the analysis. The placebo test will also be more comprehensive and possibly include more countries after setting the MSPE limit. More countries in the donor pool can lower the P-value, which is far above a 5% significance threshold in our analysis. Furthermore, the placebo test in the SCM cannot include the country with the fewest listed companies per million capita—in this case, Germany—which limits the placebo test to some extent. Ferman and Pinto (2016) argue that we have an invalid comparison if we compare the treated country to countries with a poor pre-treatment fit. We partly deal with this in the analysis by setting an MSPE limit of 10 for Sweden, and 20 for Finland. Our analysis of the results from the SCM also heavily relies on eyeballing, which makes the SCM more suitable to show that an assumed effect occurs rather than evaluating a null hypothesis. We perform a fixed-effects regression on the effect in Sweden to expand our analysis and reduce this drawback.

Furthermore, the treated country cannot be an outlier in any of the predictors we include in the SCM. Using such predictors causes a problem when the model assigns weights to match predictor values for the synthetic country to the real country. This restriction limits the potential countries we can include in our donor pool. It also makes what countries we include in the model sensitive to what predictors we chose. This requirement can make us leave out countries or predictors that we want to include. Taking the criticism into account, we believe that we sufficiently deal with these factors.

6.7 Generalization of Findings

To investigate the generalization of the results we find when analyzing Sweden, we conduct a similar analysis on Finland. Table A.3 in the appendix shows that Finland and Sweden have similar mean values in many of our predictors. Moreover, as mentioned in the analysis, their wealth taxation builds on some similar principles. Despite this, we do not find similar results from our analysis of the wealth tax abolition in Finland. Moreover, our robustness tests on the SCM for Finland reveal some weaknesses. Thus, we interpret Finland's result with caution but believe it decreases the generalizability of our results from the analysis of the effect in Sweden.

To consider the model's ability to be generalized further, we assess how it can be generalized to the countries that still exercise a wealth tax in Europe. This is only the case for three countries: Norway, Switzerland, and Spain (Drometer, et al., 2018). Based on an examination of our data on Norway and Switzerland, they share many of the same attributes as Sweden for the different predictors. This is particularly true for Norway, since Norway is a part of synthetic Sweden. Norway and Switzerland also have wealth tax rates somewhat similar to what Sweden had prior to 2007 (Drometer, et al., 2018). However, Sweden's model for assessing the wealth tax basis was rather unique, where non-listed companies and companies with major owners with stakes above 25% were not subject to wealth tax. This uniqueness can, to some extent, lead to differing results of abolishment in Sweden compared to Norway and Switzerland. Based on the mean predictor values and wealth tax rates, we find it possible that the positive effect of the model can be generalized for both countries. Our analysis of the effect in Finland makes this assumption uncertain, despite the limited credibility of the analysis.

In Spain, the wealth tax system is more complex. For example, Madrid does not levy a wealth tax, which makes it possible to avoid the wealth tax in parts of the country (Ramallo, 2020). Since residents in Madrid avoids wealth taxation, we find it likely that the effect of wealth tax abolition in terms of the number of listed companies is absent. Therefore, we do not expect our results from Sweden to be generalizable for Spain.

6.8 Implications of Findings

Through our implementation of the SCM and a fixed-effects regression, we find results indicating that the abolition of the wealth tax in Sweden lead to an increase in listed companies. We further expand our analysis to see if the same results holds for Finland, where the results suggest that the effect of the wealth tax abolition is absent in terms of listed companies. This absence limits the generalizability of our results from the analysis of Sweden. It is important to note that our analysis of Finland has limited credibility.

Our results on Sweden add a new point of view to the current literature on the wealth tax topic, as well as to the ongoing discussions about whether the wealth tax is a negative tax feature. The results particularly contribute to Gobel and Hestdal (2015) which suggest that the wealth tax valuation discount of remaining non-listed does not influence a company's decision of whether to go public. Our analysis on Sweden find opposite results, while our analysis on Finland is in line with their findings. Our results from Sweden indicate that the valuation discount of not being listed may actually be a factor in a company's decision of whether to go public. The results we find in our analysis of Sweden is also in line with the findings of Sandvik (2015), which suggest that a wealth tax abolishment should reduce the incentive for companies to be non-listed.

Furthermore, our results shed light on a potential skewness in the valuation principles of the current wealth tax system. They imply that the wealth tax may not be neutral in terms of business decisions like whether a company should go public. This skewness can enrich political discussions of the wealth tax and how it should be implemented to yield the desired effect.

We emphasize that the generalizability of our results is uncertain, both due to the absence of an effect in Finland and because we only studies two cases of wealth tax abolishment, which both happened about 15 years ago. Moreover, the limited credibility of our results for Finland suggests that the analysis of Finland can be expanded to obtain a more credible outcome. Thus, further research should focus on expanding the analysis on Finland by, for example, composing a better donor pool or analyzing the effect with a different method. Further research should also look at the effect in other countries to examine the generalizability of the effect of wealth tax abolition, with particular focus on how it is generalizable for the countries that still levy a wealth tax.

7 Conclusion

The main objective of our thesis is to answer the research question: *Does a wealth tax discourage companies from going public?* Through an analysis of the abolishment of wealth tax in Sweden in 2007, we find evidence that the abolishment positively impacted the number of companies listed. Thus, this positive effect implies that a wealth tax did discourage companies from going public in Sweden. We examine this through the SCM, using placebo, in-time placebo, and leave-one-out tests to verify the sensitivity and robustness of our results. We also expand our robustness analysis beyond the SCM and run a fixed-effects regression, which supports our findings.

We assess the generalizability of the results with particular emphasis on European countries that still levy a wealth tax. To do this, we use the SCM on Finland, which abolished its wealth tax in 2006, to look for effects similar to Sweden's. We find no effect in the model for Finland, but the model has reduced credibility according to weak robustness tests. Therefore, under uncertainty, we find it possible that countries with predictor values and wealth tax systems similar to Sweden's can benefit from abolishing their wealth tax in terms of number of listed companies.

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9 Appendix 1: Data

9.1 Table A.1: Explanation of Predictors

Name	Indicator	Description	Range
gdpcap	Gross domestic product per capita	GDP divided by midyear population. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars (The Global Economy, 2021).	1996-2012
inflation	Inflation	Inflation as measured by the consumer price index. The Laspeyres formula is generally used.	1996-2012
unemploy	Unemployment rate	Unemployment refers to the share of the labor force that is without work but available for and seeking employment (The Global Economy, 2021).	1996-2012
buscostpercap	Cost of starting a business, % of income per capita	The indicator includes all official fees and fees for legal or professional services if such services are required by law. The company law, the commercial code, and specific regulations and fee schedules are used as sources for calculating costs. The indicator excludes bribes (The Global Economy, 2021).	2003-2006
stockreturn	Stock market return, %	Stock market return is the growth rate of annual average stock market index. Annual average stock market index is constructed by taking the average of the daily stock market indexes available at Bloomberg (The Global Economy, 2021).	1998-2006
pricevola	Stock price volatility, %	The 360-day standard deviation of the return on the national stock market index (The Global Economy, 2021).	1998-2006
listedpercap	Number of companies listed on the stock exchange	Listed domestic companies, including foreign companies which are exclusively listed, are those which have shares listed on an exchange at the end of the year. Investment funds, unit trusts, and companies whose only business goal is to hold shares of other listed companies, such as holding companies and investment companies, regardless of their legal status, are excluded. A company with several classes of shares is counted once. Only companies admitted to listing on the exchange are included (The Global Economy, 2021).	1996-2012
turnover	Stock turnover ratio	Total value of shares traded during the period divided by the average market capitalization for the period (Federal Reserve Bank of St.Louis, 2021).	1996-2012
finfreedom	Financial freedom index, 0-100	The extent of government regulation of financial services, the degree of state intervention in banks and other financial firms through direct and indirect ownership, the extent of financial and capital market development, government influence on the allocation of credit and openness to foreign competition. Higher index values denote banking efficiency and independence from government control and interference in the financial sector (The Global Economy, 2021).	1996-2012

9.2 Table A.2: Summary Statistics

```
     year       listedpercap        gdpcap         inflation         unemploy
 Min.   :1996   Min.   : 7.515   Min.   : 12043   Min.   :-0.700   Min.   : 2.490
 1st Qu.:2000   1st Qu.:12.295   1st Qu.: 26870   1st Qu.: 1.100   1st Qu.: 4.803
 Median :2004   Median :25.247   Median : 37322   Median : 1.750   Median : 7.510
 Mean   :2004   Mean   :24.237   Mean   : 39391   Mean   : 1.858   Mean   : 7.303
 3rd Qu.:2008   3rd Qu.:34.713   3rd Qu.: 46632   3rd Qu.: 2.500   3rd Qu.: 8.900
 Max.   :2012   Max.   :48.307   Max.   :101524   Max.   : 8.200   Max.   :24.440

 buscostpercap     stockreturn        pricevola        turnover         finfreedom
 Min.   : 0.600   Min.   :-42.590   Min.   : 8.33   Min.   :  5.429   Min.   :30.00
 1st Qu.: 0.975   1st Qu.:-13.760   1st Qu.:16.11   1st Qu.: 50.262   1st Qu.:50.00
 Median : 2.400   Median :  8.070   Median :21.32   Median : 74.677   Median :70.00
 Mean   : 5.144   Mean   :  7.696   Mean   :22.80   Mean   : 76.618   Mean   :66.82
 3rd Qu.: 5.600   3rd Qu.: 24.550   3rd Qu.:26.84   3rd Qu.: 99.406   3rd Qu.:80.00
 Max.   :32.700   Max.   :101.580   Max.   :54.65   Max.   :247.783   Max.   :90.00
 NA's   :70       NA's   :3         NA's   :3
```

9.3 Table A.3: Average Predictor Values by Country (1996 to 2006)

Country	gdpcap	inflation	unemploy	buscostpercap	stockreturn	pricevola	listedpercap	turnover	finfreedom	*Donor pool (SWE):*	*Donor pool (FIN):*
Austria	30421,57	1,70	5,06	5,85	15,06	16,18	12,36	42,17	73,64	*Yes*	*Yes*
Belgium	28658,02	1,87	7,98	9,83	9,02	16,70	14,33	27,55	70,00	*Yes*	*Yes*
Czechia	8762,03	4,35	7,01	9,80	14,10	19,06	5,27	61,28	90,00	*No*	*No*
*Finland**	*28836,15*	*1,33*	*11,65*	*1,17*	*21,35*	*32,36*	*26,62*	*68,30*	*58,00*	-	-
France	27657,88	1,56	10,06	1,20	11,84	21,48	14,00	76,60	50,00	*Yes*	*Yes*
Germany	28991,35	1,40	9,40	5,40	12,07	22,01	8,39	111,88	53,64	*Yes*	*Yes*
Greece	16397,39	4,04	10,21	27,23	20,38	24,64	25,97	67,60	40,91	*No*	*Yes*
Hungary	6963,44	9,92	7,18	26,65	34,68	27,08	4,92	72,46	70,00	*No*	*No*
Italy	25121,63	2,41	9,87	21,05	6,80	21,29	4,73	104,20	66,36	*No*	*No*
Norway	46687,87	2,07	4,02	2,90	16,54	20,36	40,99	79,71	50,00	*Yes*	*Yes*
Portugal	14265,32	2,93	5,72	11,70	14,90	14,19	7,09	61,83	50,00	*No*	*No*
Slovakia	7583,62	6,81	15,81	6,23	13,27	21,97	4,74	103,58	64,55	*No*	*No*
Sweden	*34708,65*	*1,01*	*7,13*	*0,70*	*14,58*	*23,58*	*29,64*	*94,14*	*75,45*	-	-
Switzerland	46887,03	0,82	3,60	7,33	11,78	18,60	34,87	67,82	86,36	*Yes*	*Yes*
Turkey	4763,86	47,08	8,55	29,80	62,34	46,47	4,20	161,95	57,27	*No*	*No*
United Kingdom	32255,66	1,85	5,66	0,83	6,49	15,00	40,63	58,31	90,00	*Yes*	*Yes*

* *Finland is quoted from 1996 to 2005.*

9.4 Table A.4: Summary Statistics for Donor Pool for Sweden

```
      year       listedpercap        gdpcap         inflation         unemploy
 Min.   :1996   Min.   : 7.515   Min.   : 22364   Min.   :-0.700   Min.   : 2.490
 1st Qu.:2000   1st Qu.:11.851   1st Qu.: 29611   1st Qu.: 0.900   1st Qu.: 4.582
 Median :2004   Median :22.000   Median : 39632   Median : 1.650   Median : 6.170
 Mean   :2004   Mean   :23.921   Mean   : 42113   Mean   : 1.652   Mean   : 6.462
 3rd Qu.:2008   3rd Qu.:35.533   3rd Qu.: 47027   3rd Qu.: 2.300   3rd Qu.: 8.320
 Max.   :2012   Max.   :48.307   Max.   :101524   Max.   : 4.500   Max.   :12.570

 buscostpercap     stockreturn        pricevola        turnover         finfreedom
 Min.   : 0.600   Min.   :-36.770   Min.   : 8.33   Min.   :  5.429   Min.   :50.00
 1st Qu.: 0.900   1st Qu.:-10.860   1st Qu.:15.08   1st Qu.: 51.271   1st Qu.:50.00
 Median : 2.400   Median :  8.950   Median :20.87   Median : 75.012   Median :70.00
 Mean   : 3.375   Mean   :  7.448   Mean   :21.45   Mean   : 76.978   Mean   :69.56
 3rd Qu.: 5.425   3rd Qu.: 22.000   3rd Qu.:25.68   3rd Qu.: 99.684   3rd Qu.:80.00
 Max.   :11.300   Max.   : 54.880   Max.   :51.08   Max.   :247.783   Max.   :90.00
 NA's   :56       NA's   :3         NA's   :3
```

9.5 Table A.5: Summary Statistics for Donor Pool for Finland

year	listedpercap	gdpcap	inflation	unemploy
Min. :1996	Min. : 7.515	Min. : 12043	Min. :-0.700	Min. : 2.490
1st Qu.:2000	1st Qu.:12.139	1st Qu.: 26691	1st Qu.: 1.200	1st Qu.: 4.700
Median :2004	Median :23.710	Median : 36822	Median : 1.800	Median : 7.530
Mean :2004	Mean :23.411	Mean : 39125	Mean : 1.925	Mean : 7.306
3rd Qu.:2008	3rd Qu.:34.040	3rd Qu.: 45427	3rd Qu.: 2.500	3rd Qu.: 8.960
Max. :2012	Max. :48.307	Max. :101524	Max. : 8.200	Max. :24.440

buscostpercap	stockreturn	pricevola	turnover	finfreedom
Min. : 0.700	Min. :-42.590	Min. : 8.33	Min. : 5.429	Min. :30.00
1st Qu.: 1.100	1st Qu.:-14.215	1st Qu.:16.02	1st Qu.: 43.751	1st Qu.:50.00
Median : 2.800	Median : 7.365	Median :21.11	Median : 70.421	Median :70.00
Mean : 5.644	Mean : 7.404	Mean :22.60	Mean : 73.973	Mean :65.75
3rd Qu.: 5.700	3rd Qu.: 24.580	3rd Qu.:26.73	3rd Qu.: 96.606	3rd Qu.:80.00
Max. :32.700	Max. :101.580	Max. :54.65	Max. :247.783	Max. :90.00
NA's :63	NA's :3	NA's :3		

10 Appendix 2: The Synthetic Control Method

10.1 Table B.1: Donor Pool Weights for Synthetic Sweden

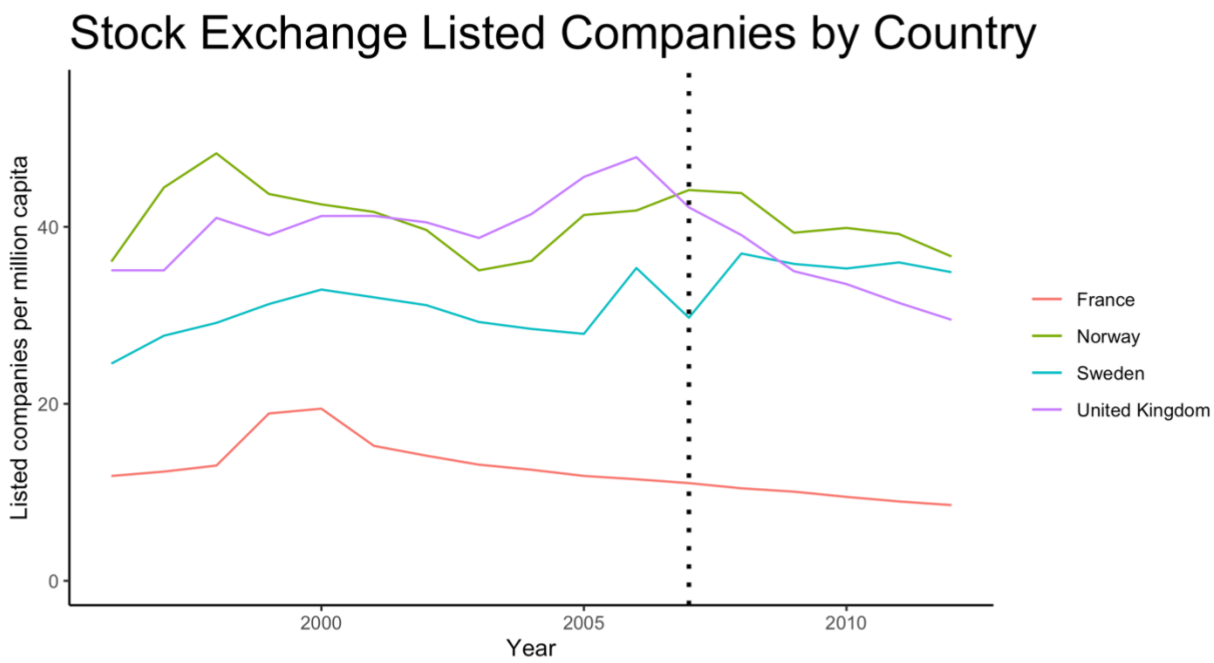
	w.weights	unit.names
1	0.000	Austria
2	0.000	Belgium
3	0.403	France
4	0.000	Germany
5	0.082	Norway
7	0.000	Switzerland
8	0.515	UK

10.2 Table B.2: Predictor Weights for Synthetic Sweden

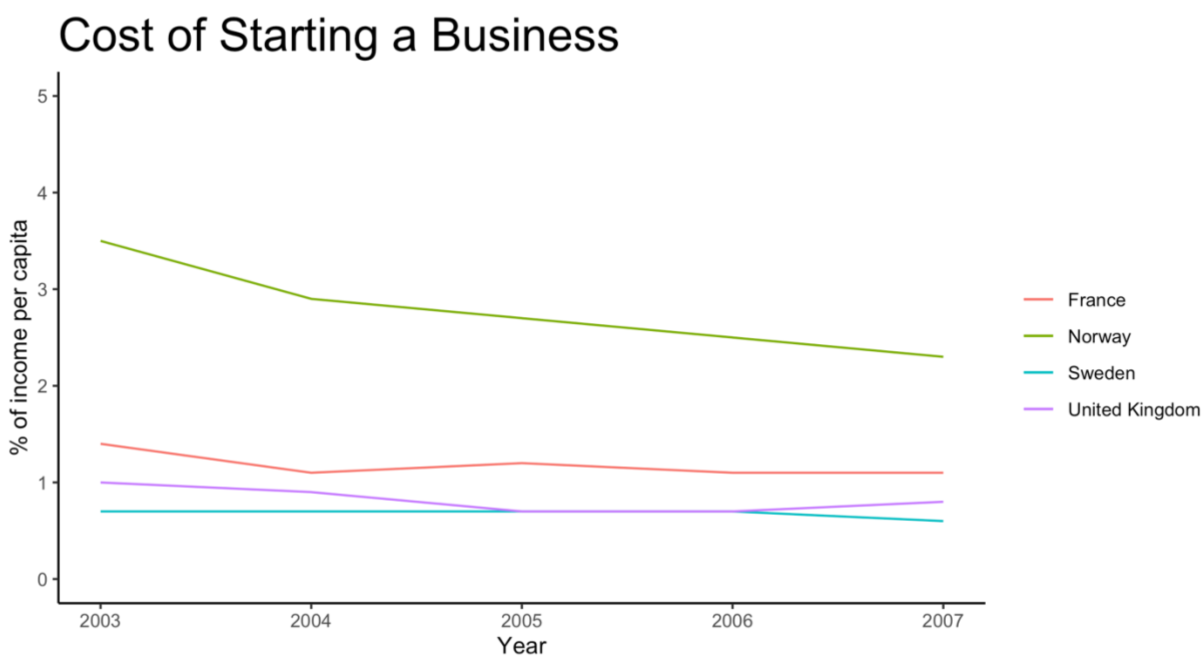
	BFGS
inflation	0.000
unemploy	0.060
gdpcap	0.004
listedpercap	0.466
turnover	0.001
finfreedom	0.154
special.buscostpercap.2003.2007	0.270
special.stockreturn.1998.2007	0.014
special.pricevola.1998.2007	0.030

10.3 B.3: Paths for Predictors for Synthetic Sweden

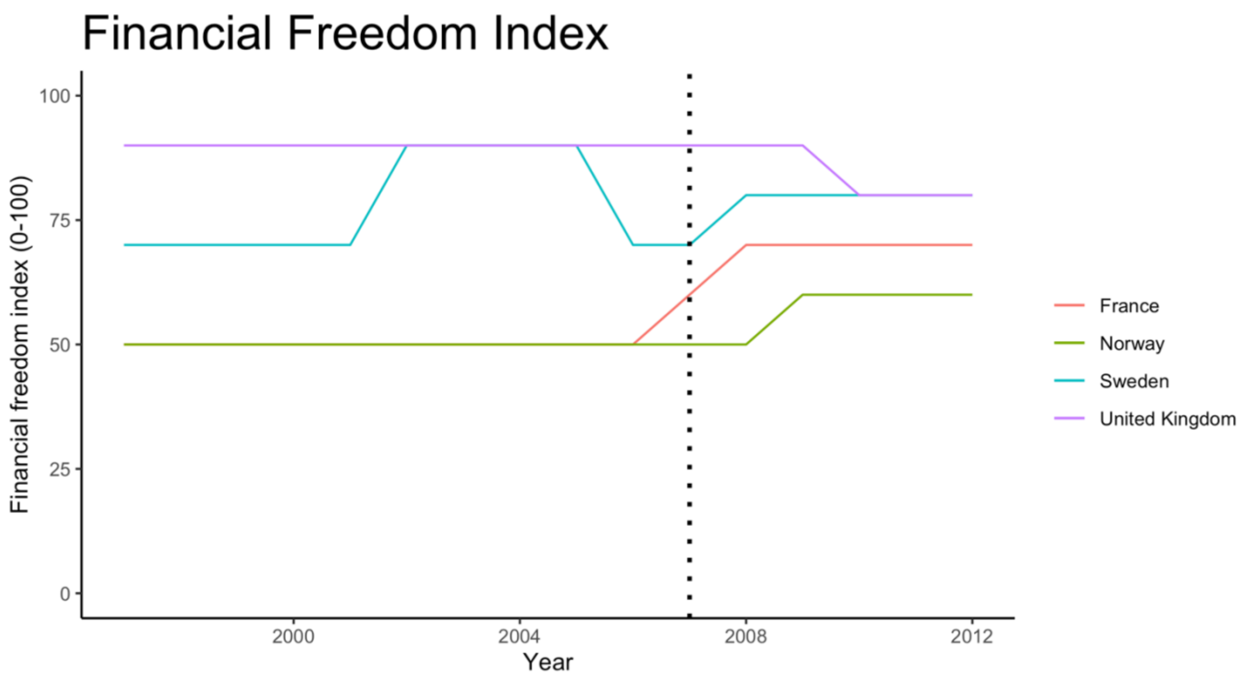
10.3.1 Figure B.3.1: Stock Exchange Listed Companies



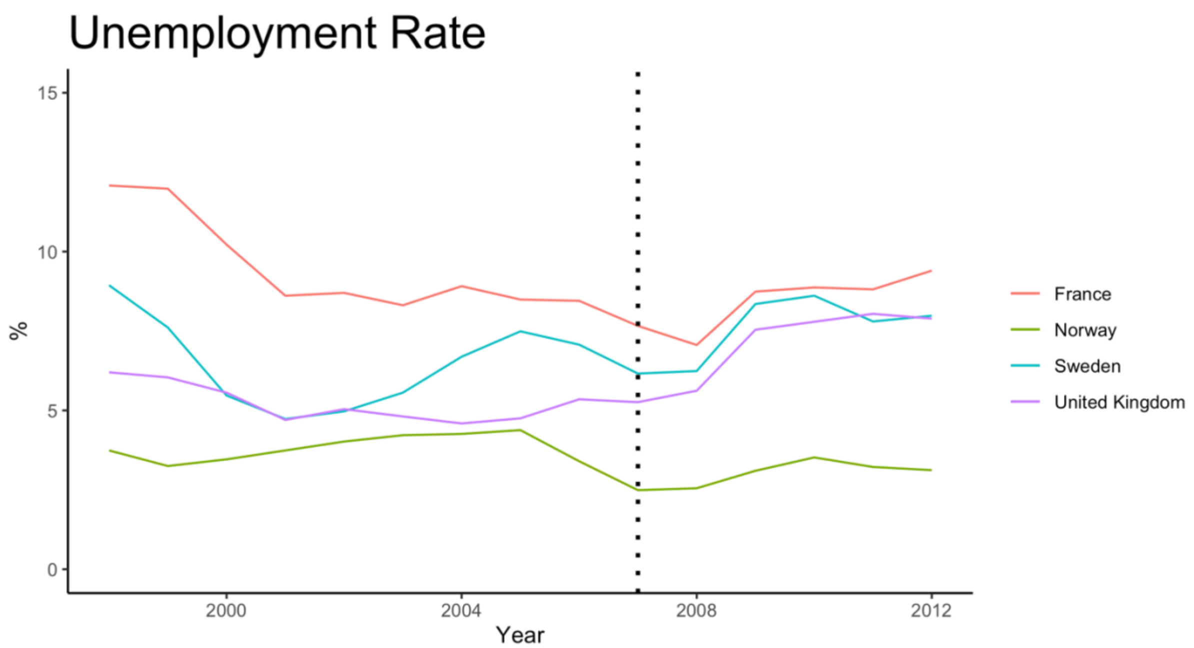
10.3.2 Figure B.3.2: The Cost of Starting a Business



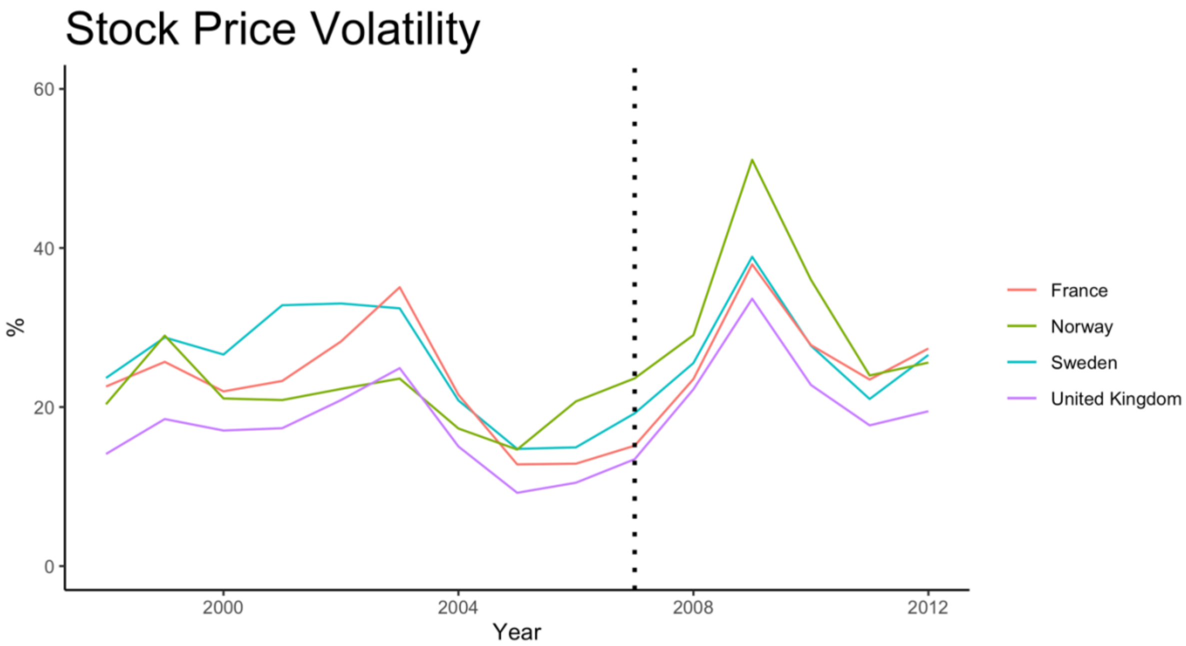
10.3.3 Figure B.3.3: Financial Freedom Index



10.3.4 Figure B.3.4: Unemployment Rate



10.3.5 Figure B.3.5: Stock Price Volatility

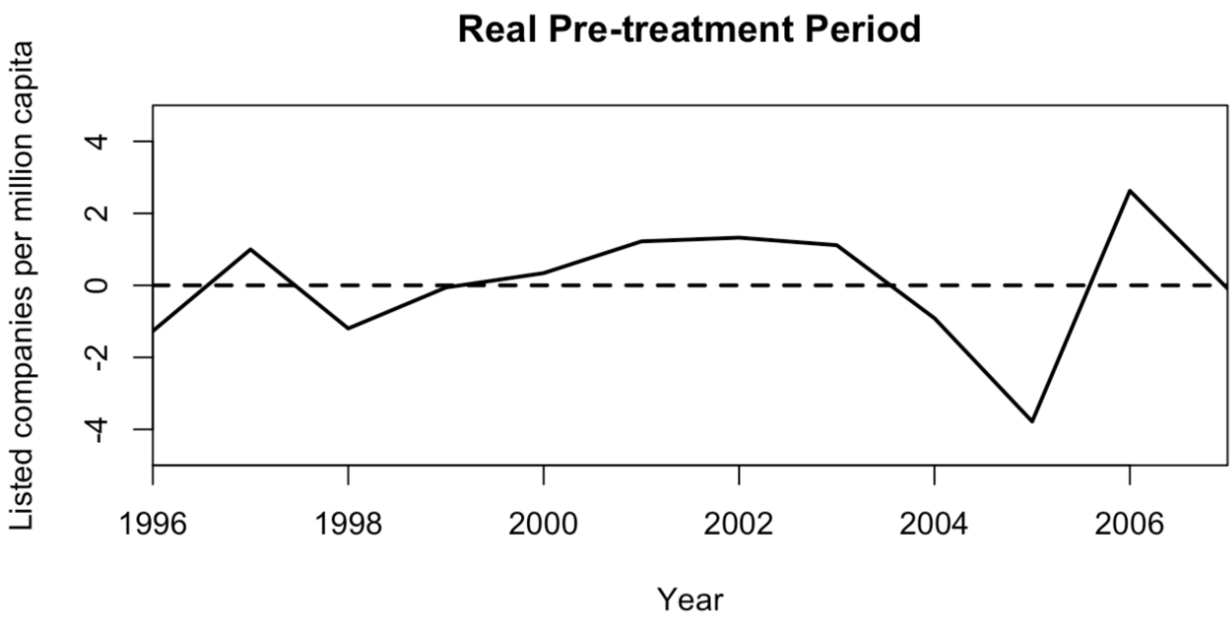


10.4 Figure B.4: Mean Values for Sweden, Synthetic Sweden, and the Donor Pool Countries

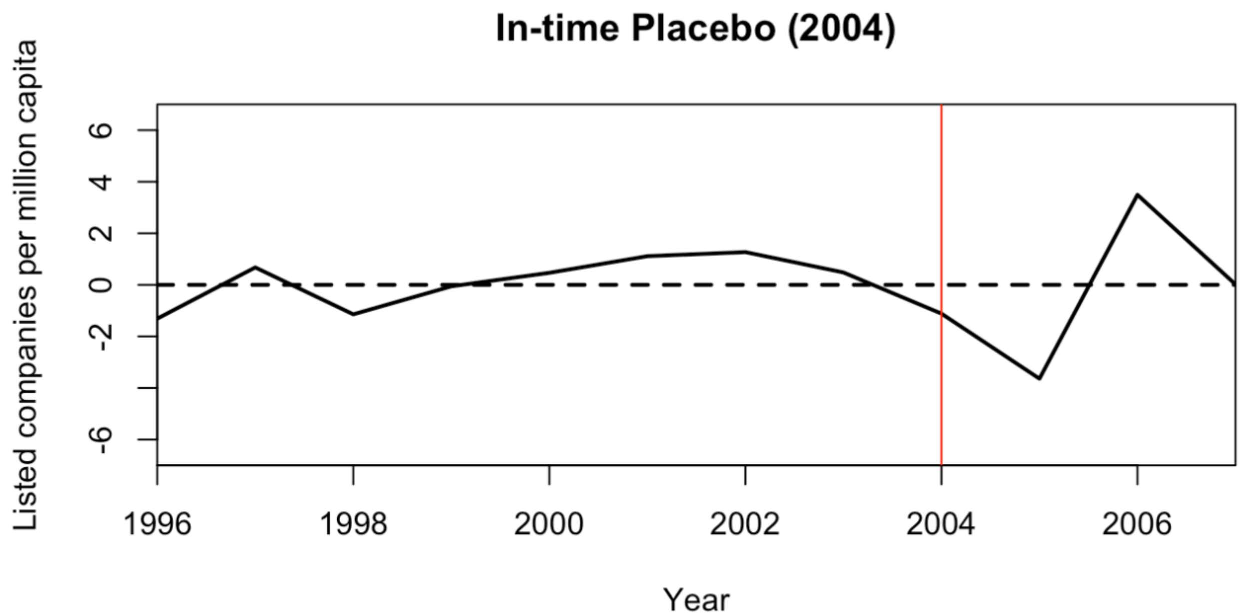
	Treated	Synthetic	Sample Mean
inflation	1.108	1.763	1.614
unemploy	7.050	7.191	6.474
gdpcap	36291.264	33100.021	36098.951
listedpercap	29.955	29.929	23.653
turnover	99.366	70.550	69.265
finfreedom	75.000	70.948	67.619
special.buscostpercap.2003.2007	0.680	1.126	4.474
special.stockreturn.1998.2007	10.901	7.617	10.110
special.pricevola.1998.2007	24.694	18.869	19.281

10.5 B.5: In-time Placebo and Leave-one-out Tests for Sweden

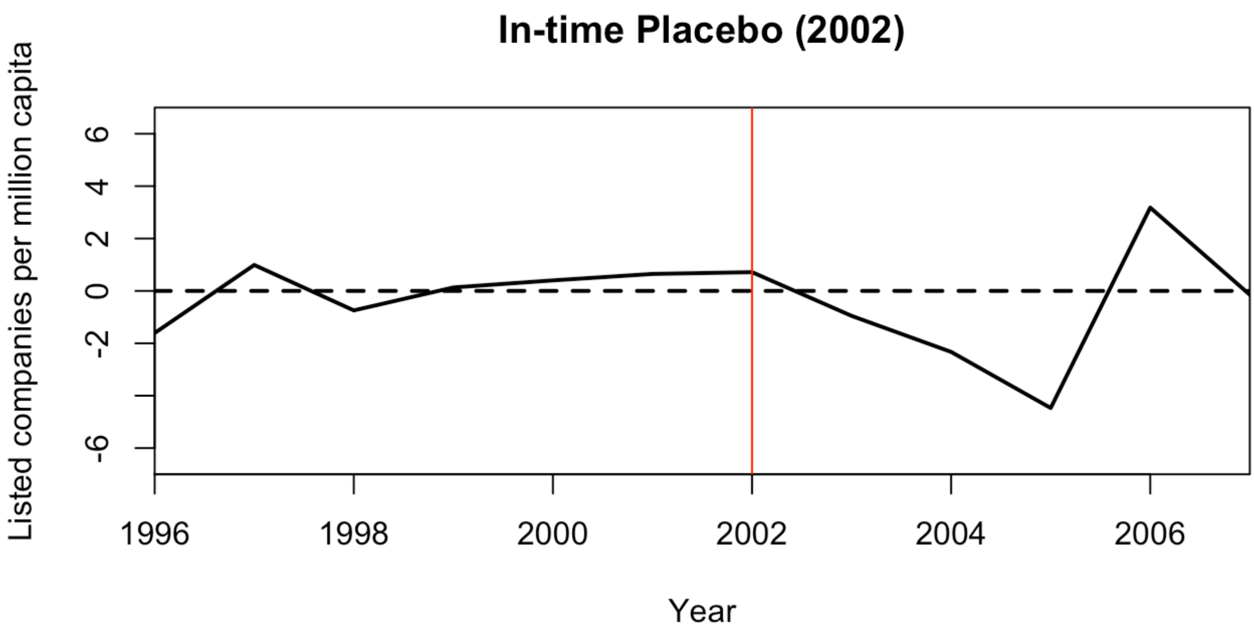
10.5.1 Figure B.5.1: Pre-treatment Period of the Real Model



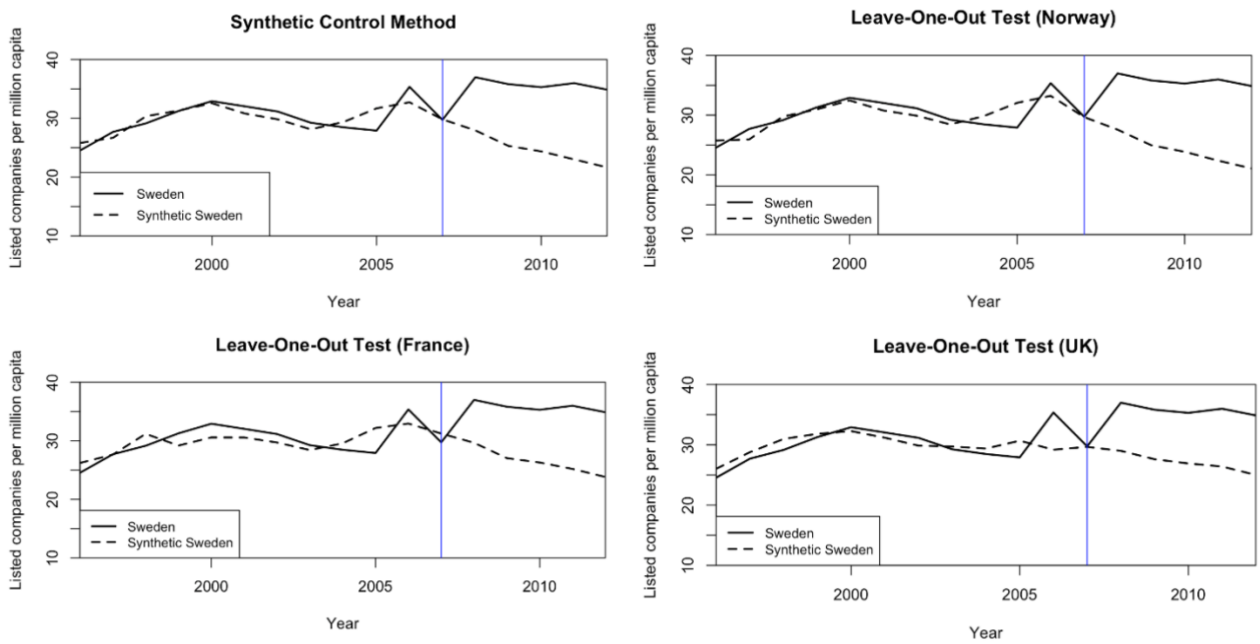
10.5.2 Figure B.5.2: In-time Placebo Test with Treatment in 2004



10.5.3 Figure B.5.4: In-time Placebo Test with Treatment in 2002

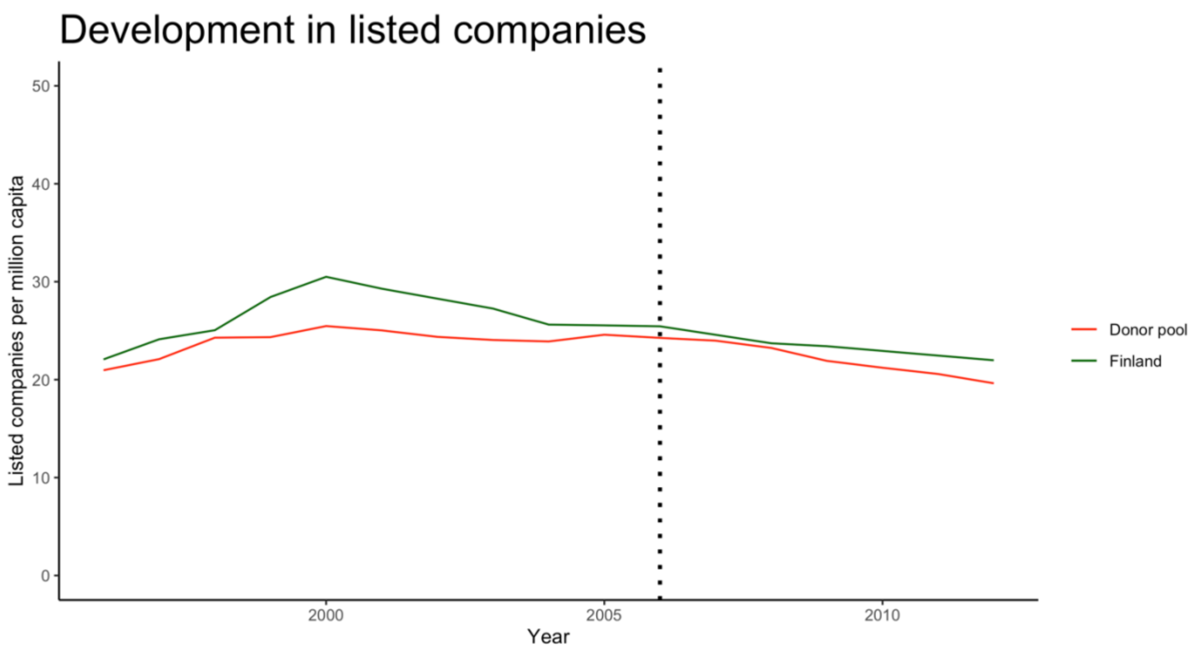


10.5.4 Figure B.5.5: Path Plots for the Leave-one-out Test



11 Appendix 3: The Synthetic Control Method on Finland

11.1 Figure C.1: Listed Companies per Million Capita for the Donor Pool and Finland



11.2 Table C.2: Donor Pool Weights for Synthetic Finland

	w.weights	unit.names
1	0.000	Austria
2	0.000	Belgium
3	0.283	France
4	0.000	Germany
5	0.256	Norway
7	0.000	Switzerland
8	0.000	UK
9	0.461	Greece

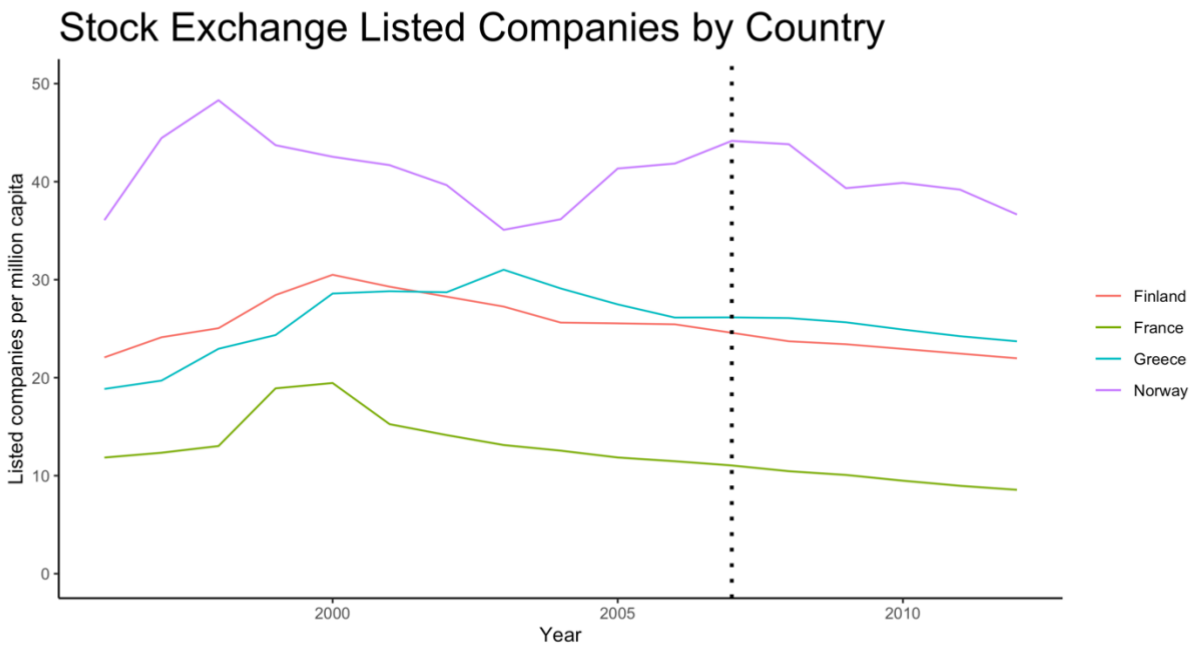
11.3 Table C.3: Predictor Weights for Synthetic Finland

	BFGS
inflation	0.009
unemploy	0.094
gdpcap	0.144
listedpercap	0.244
turnover	0.023
finfreedom	0.044
special.buscostpercap.2003.2006	0.083
special.stockreturn.1998.2006	0.263
special.pricevola.1998.2006	0.096

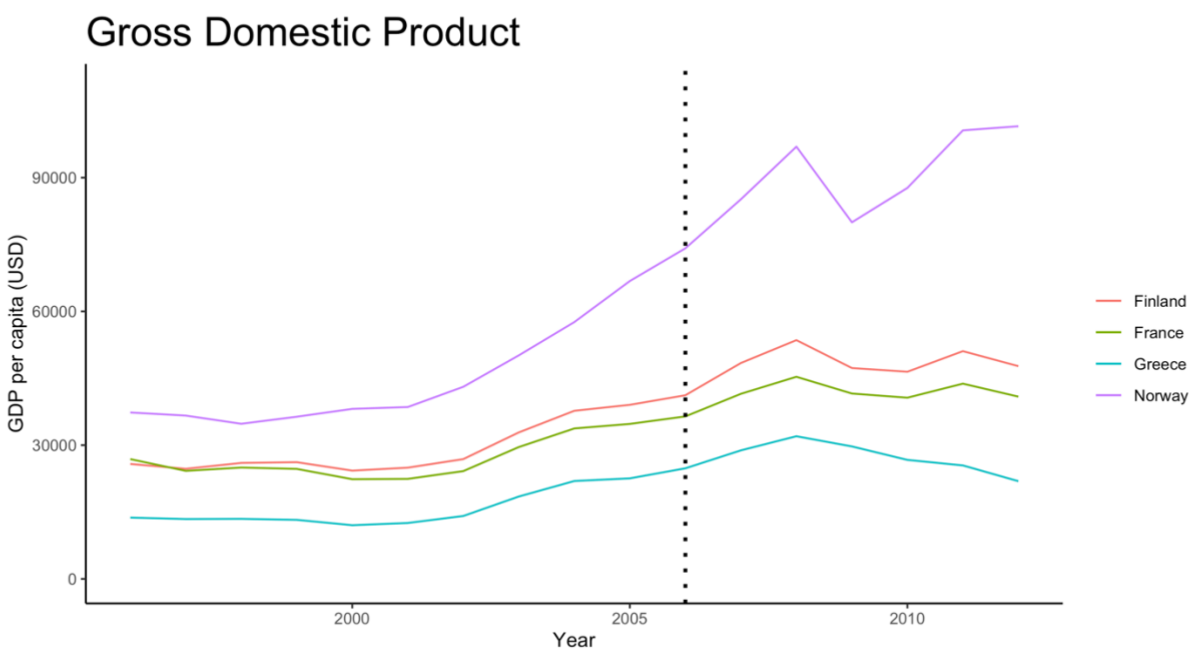
11.4 C.4: Paths for Predictors for Synthetic Finland

11.4.1 C.4.1: Average Stock Market Returns

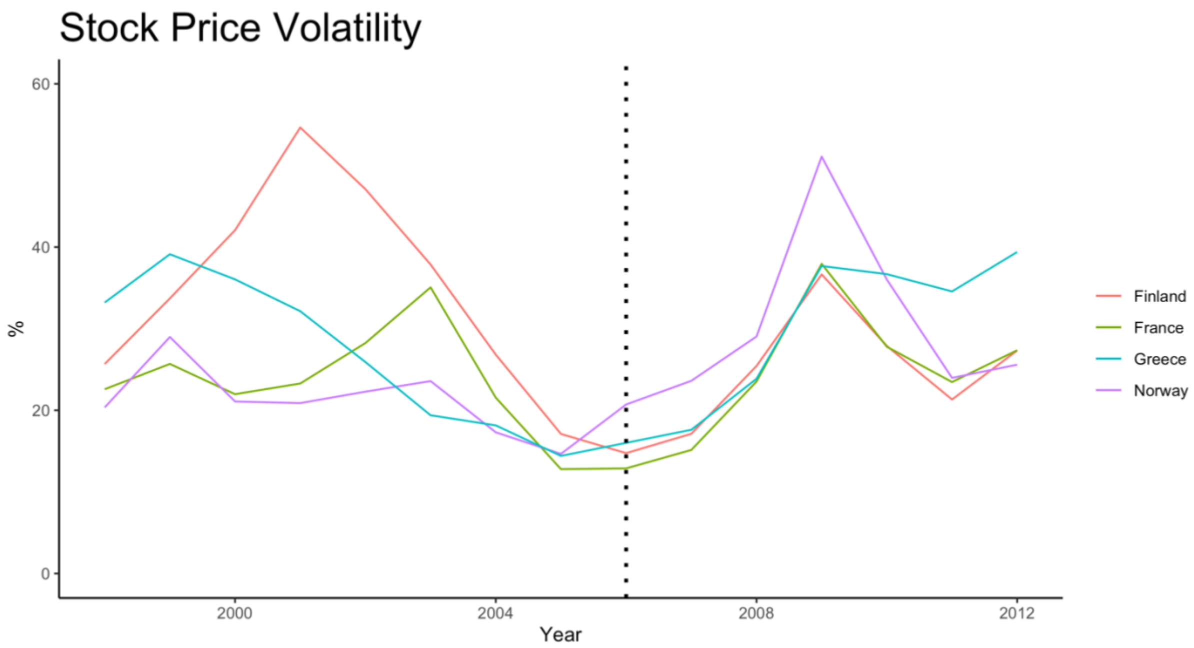
11.4.2 C.4.2: Stock Exchange Listed Companies



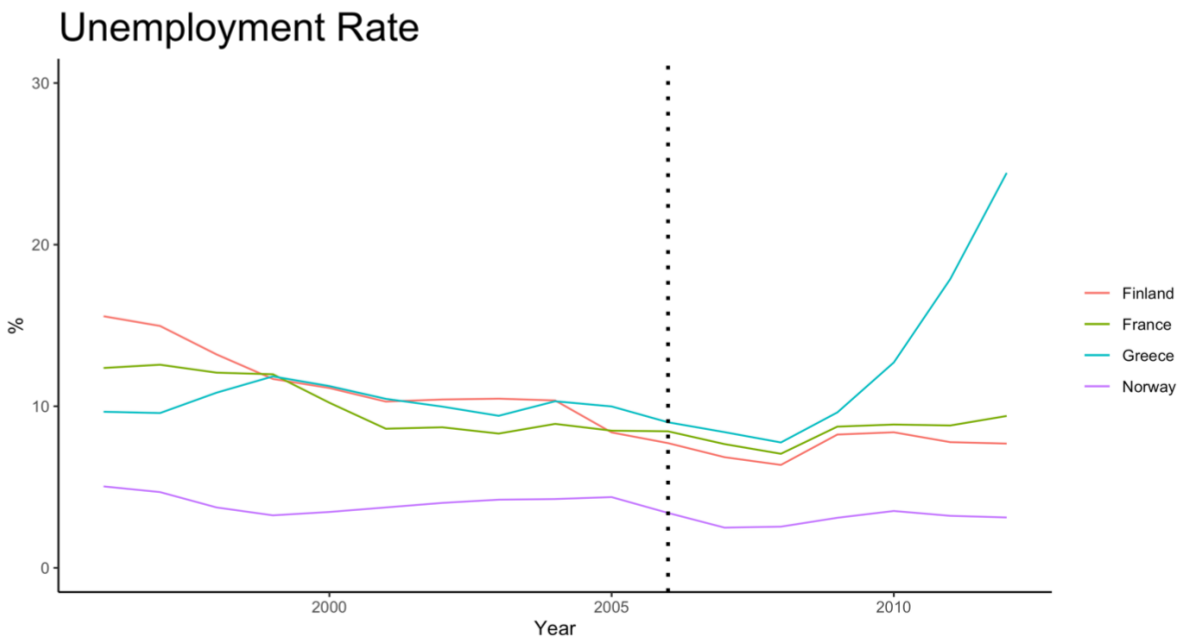
11.4.3 C.4.3: Gross Domestic Product



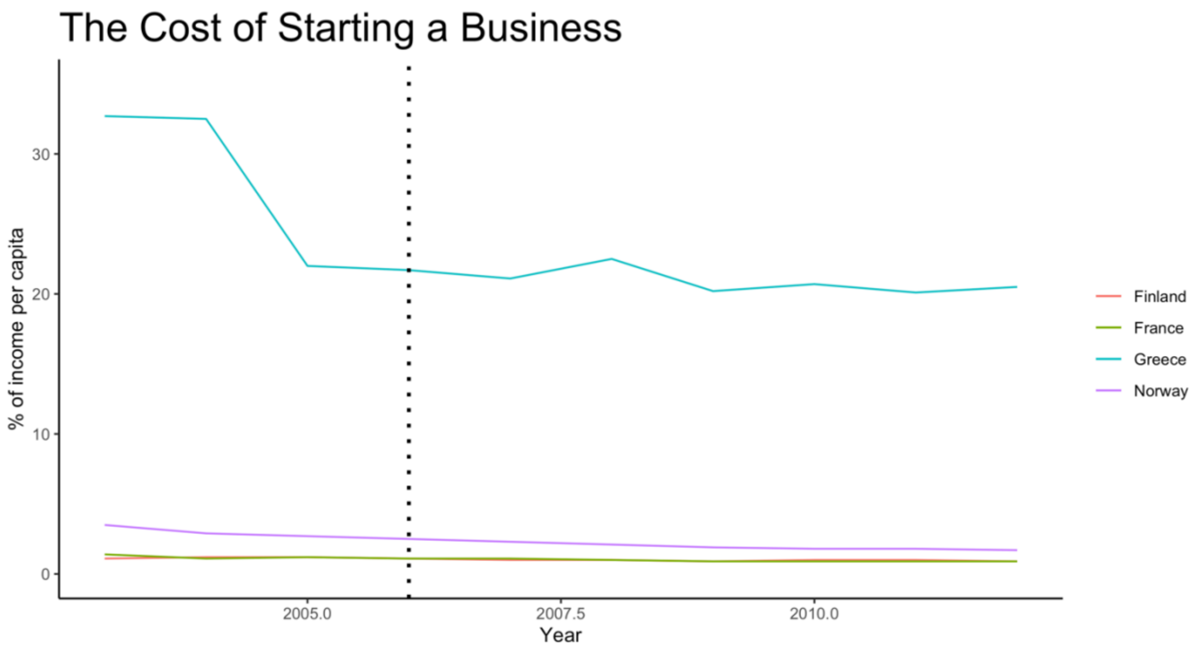
11.4.4 C.4.4: Stock Price Volatility



11.4.5 C.4.5: Unemployment Rate



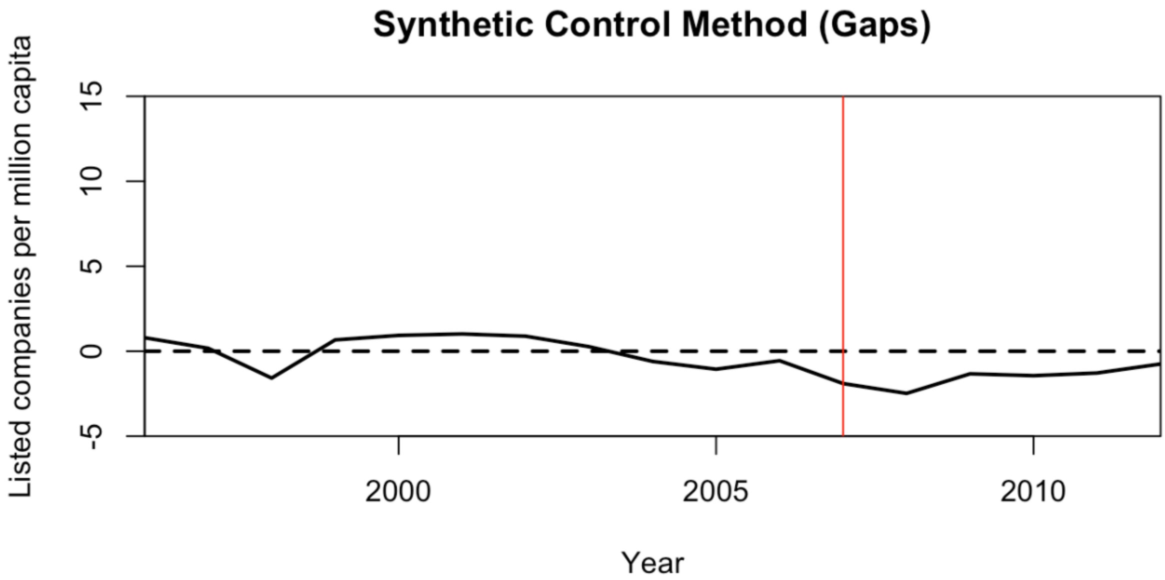
11.4.6 C.4.6: The Cost of Starting a Business



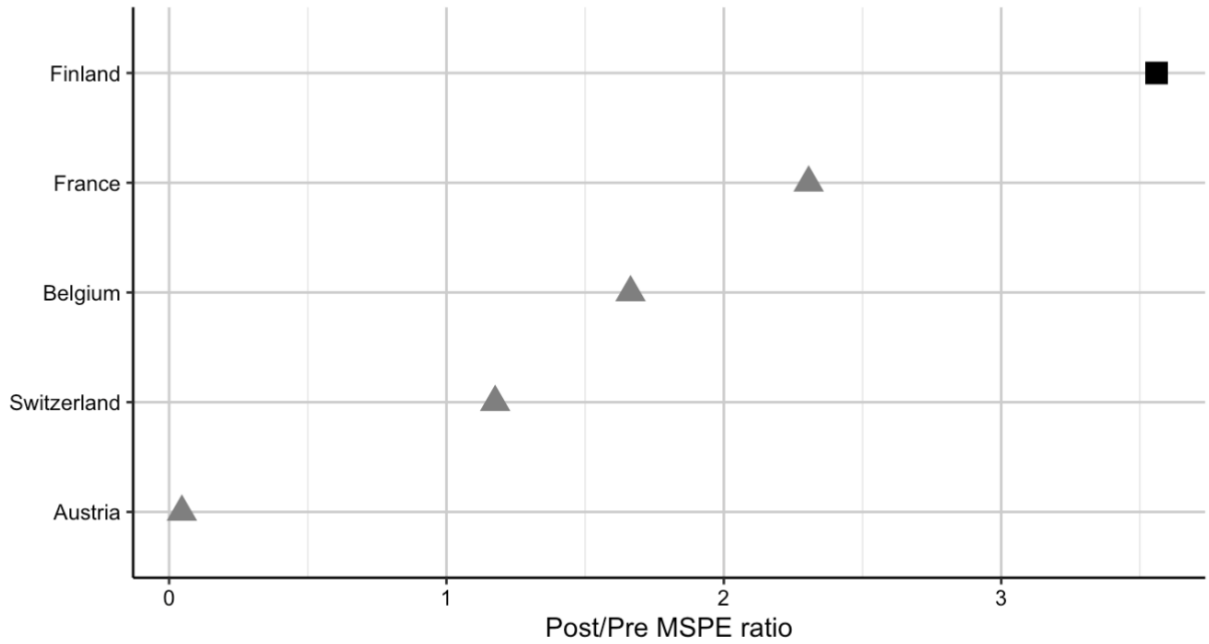
11.5 Table C.5: Mean Values for Finland, Synthetic Finland, and the Donor Pool Countries

	Treated	Synthetic	Sample Mean
inflation	1.355	2.833	1.914
unemploy	11.292	8.584	7.001
gdpcap	29959.057	27342.390	32244.596
listedpercap	26.509	26.424	23.941
turnover	75.677	73.251	66.455
finfreedom	59.091	45.812	64.318
special.buscostpercap.2003.2006	1.150	13.624	7.569
special.stockreturn.1998.2006	19.377	14.345	10.446
special.pricevola.1998.2006	33.302	23.819	20.414

11.6 Table C.6: Listed Companies per Million Capita for Real Finland with Synthetic Finland as a Benchmark

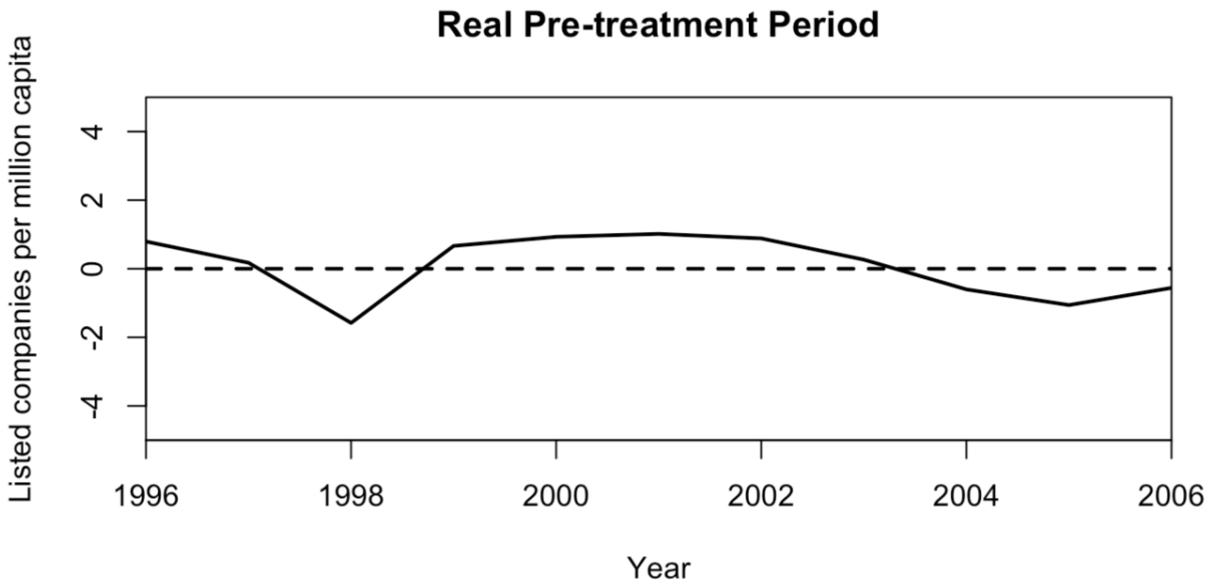


11.7 Table C.7: Post/Pre MSPE Ratios for Finland Compared to the Donor Pool Countries

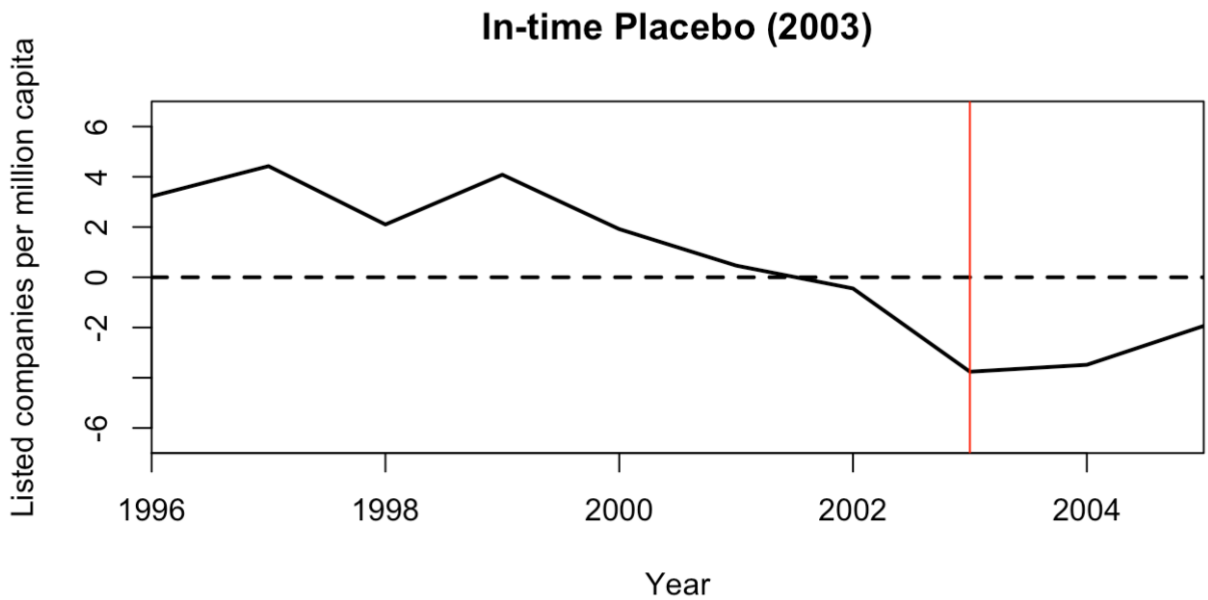


11.8 C.8: In-time Placebo and Leave-one-out Tests for Finland

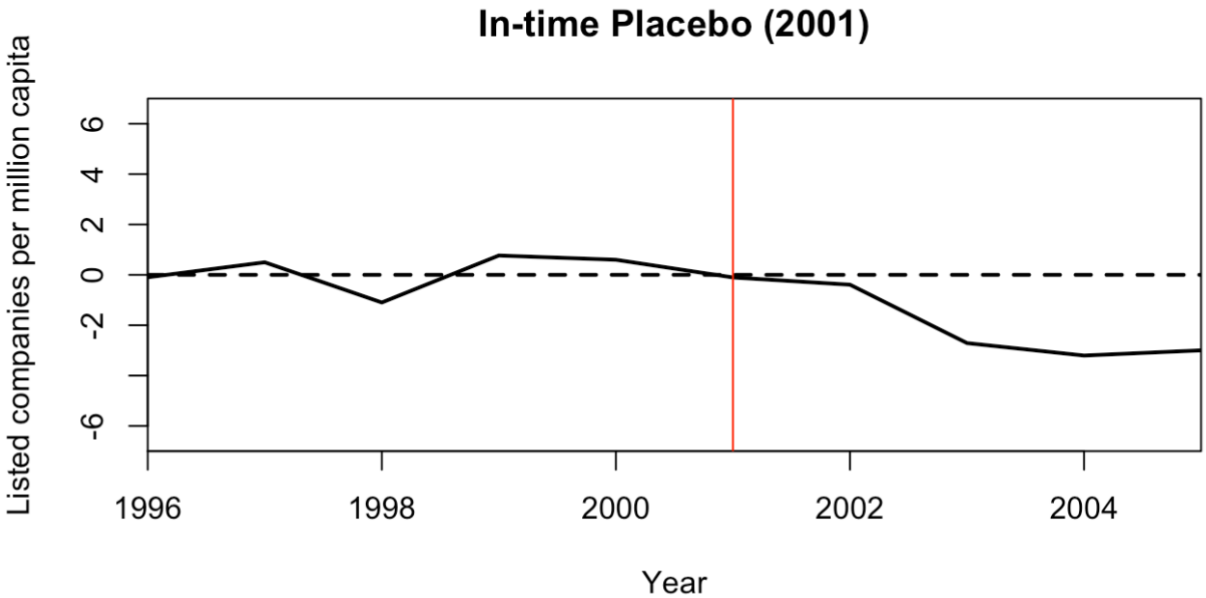
11.8.1 Figure C.8.1: Pre-treatment Period of the Real Model



11.8.2 Figure C.8.2: In-time Placebo Test with Treatment in 2003



11.8.3 Figure C.8.3: In-time Placebo Test with Treatment in 2001



11.8.4 Figure C.8.4: Path Plots for the Leave-one-out Test