ABSTRACT

Romneycare: A Boon to Employment

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Using Massachusetts Healthcare Reform passed in 2006 we explore the casual effect that universal insurance has on labor market outcomes in the healthcare care industry. Using aggregated data, we find an increase in employment in the healthcare industry and no effect on the average wage of healthcare workers. The majority of the increase in employment we see, 80,000 jobs, occurs post 2012 when an amendment to the bill is accepted placing price controls on the medical industry.

Romneycare: A Boon to Employment

by

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A Thesis

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ACKNOWLEDGMENTS

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DEDICATION

To my first teacher, thank you for never quitting Mom.
To my first friend, thank you for the happiest times in my life Grant.
To my constant source of joy, I miss you Annabelle.

CHAPTER ONE

Introduction

History of Massachusetts Health Care Reform

This paper will be written in four parts, the first describing the lead-up to reform and the viable facts supporting its passage. The second will contain a literature review covering job mobility research and research done on the reform. The third will cover methodologies used in the paper with justification for their use. The fourth will analyze the results found, ending with a conclusion.

History of Massachusetts Health Care Reform

In 2005, a Medicaid waiver extended by the federal government to Massachusetts was set to expire. Waiver 1115 allowed Massachusetts to expand eligibility to those who would not typically qualify for Medicaid. The public of Massachusetts was highly concerned that those who were covered under the waiver would soon be uninsured, and this concern eventually led to the formation of several coalitions to lobby the legislators. Affordable Care Today (ACT), a health care reform coalition, gathered over seventy-five thousand signatures to enlarge MassHealth (Medicaid and SCHIP) if reform was not passed. Politicians took notice, promising at first to find a way to cover half of the uninsured and eventually promising to cover all of the uninsured.

Massachusetts' health insurance market was uniquely situated at the beginning of the twenty-first century. In 2000, one hundred thousand of its citizens had privately bought health insurance. By 2005, that number had dropped to fifty thousand and the

"free care pool" budget was annually underfunded (Mass.gov), only being used to cover the cost of emergency room visits for the uninsured. The price of health care was rising rather dramatically during this time period as well, with the small group market price increasing much quicker than the large group.

Using the renewal of Waiver 1115 in 2006, which gave Massachusetts matching funds for the health care cost of the uninsured, Massachusetts' Congress was able to pass Chapter 58 of the Acts of 2006, or as it's colloquially known: "Romneycare." On April 12, 2006, Mitt Romney, the then-governor of Massachusetts vetoed eight sections of the bill. These vetoes primarily concerned dental insurance and extending coverage to disabled or elderly legal immigrants. By June of 2006, the Massachusetts Congress had overturned the vetoes and the bill was passed to its full effect.

The bill went on to be reformed several times in the coming years, with changes being made in 2008, 2010, and 2012. Changes in 2008 and 2010 primarily dealt with moving the bill closer to the Affordable Care Act. One of the most important changes, ended the open enrollment period, which was often gamed by market participants to avoid co-pays and deductibles. Research corresponding with this fraud, investigated by the state, shows a possible one to two percent increase in premium costs. The 2012 reform had very little to do with health insurance and instead focused on placing price controls on hospital practices. The price control introduced a luxury tax on hospitals that charged for procedures that cost over twenty percent of the median value. It also established a governing body, The Division of Health Care Cost and Quality, which would oversee the hospitals new regulations.

Relevant Literature

The Massachusetts Health Care Reform was an effort by Massachusetts to begin to implement universal coverage. They did this by implementing "incremental universalism." Instead of trying to completely tear down the health insurance market, they instead tried to "fill in the gaps" in coverage (Gruber 2008). Gruber describes this approach as three-pronged: affecting insurance market reform, mandates, and health insurance subsidies (Gruber 2010).

Market reform focused on allowing those without access to group markets the opportunity to access the Commonwealth Health Insurance Connector Authority, an insurance exchange designed for those without access to private-market or employer-provided insurance (Courtemanche and Zapata 2014). Insurers in the exchange are not allowed to drop or decline coverage based on preexisting conditions or vary premiums based on health status. The reform also made it a mandate for adults to carry coverage and for employers of more than ten people to make "fair and reasonable" contribution to an employer-provided health insurance program. For the individual who did not carry adequate coverage, they had to pay a penalty equal to half the cost of the premium of their appropriate Health Connector plan. For employers, the fine for not "fairly" contributing to a health care plan was $295 per employee annually.

The final prong of the reform, subsidies, was to help the lower and middle classes afford the insurance mandate. With subsidies, insurance was free for those 150 percent below the Federal Poverty Line, and premiums were subsidized on a sliding scale of 150 to 300 percent FPL with no deductibles. The reform also expanded Medicaid to children 300 percent below the FPL.

Romneycare led to a significant decline in the uninsured rate, with Long finding a 5.6 percent decrease (Long et al. 2009). Long also found a 2.9 percent increase in the number of employer-provided health insurance. Another study found a 9 percent drop in the insurance rate, and the uninsured rate among the self-employed dropped from 20 percent down to 10 percent (Becker and Tuzemen 2014). Despite the decreases in the uninsured rate overall in Massachusetts, groups exist where there are consistent lapses in coverage. Long's study found that minorities, those 138 percent below the FPL, and those lacking a high school diploma still have gaps in coverage (Long et al. 2016).

Post-reform Massachusetts also saw an increase in the use of preventive medicine (Miller 2012). Easier access to care created a reduction in out-of-pocket health care spending and medical debt (Long 2008). Researchers have also found improvement in the general health of the population and self-reported health metrics (Courtemanche and Zapata 2014; Long 2008). Sommers and Powell found decreases in the mortality rate after the reform (Sommers et al. 2014; Powell 2017).

As well as showing the uninsured rates decline, many authors have found a general increase in self-employment (Heim and Laurie 2014; Niu 2012; Becker and Tuzemen 2014). Since the US has experienced declining rates of self-employment since the 1990s, it stands to reason that universal health care removed a barrier of entry into this market (Ivanchev 2015). The intuition of this is clouded, as the penalties to not have insurance may deter some from entering self-employment. Despite this, it appears the offsetting effect of subsidized health care outweighs this deterrence.

With Romneycare, the demand for preventive care, and the decrease in the uninsured rate, Steinger found that the medical sector added eighteen thousand more jobs between 2006 and 2010 (Steinger 2011). Much of this growth happened in 2006 or 2007

as Romneycare was phased in. Using employment data, Steinger found that much of this increase took place in administrative roles, with Massachusetts experiencing per capita growth at a 10 percent higher rate in health care administration. This paper uses a traditional difference-in-difference model, thus, its standard errors are estimated to be low. Steinger does not find significance in any other subset of the health care industry.

This paper must closely resemble the work done by Steinger (Steinger 2011). Both papers examine the effect that Romneycare has on the health care labor market. The primary differences are in the methodology; this paper uses Fischer permutations and synthetic control to find the causal effect of the bill, while Steinger used a traditional difference-in-difference model (Fischer 1935; Steinger 2011). Fischer permutations are a much more strenuous test of significance than a traditional difference-in-difference. Synthetic control will then be used as a robustness test.

Data

The data used was collected from the Bureau of Economic Analysis (BEA), the Bureau of Labor and Statistics (BLS), and the Current Population Survey (CPS). The primary dataset is comprised of five smaller datasets, with three coming from the BEA. The BEA datasets have details referring to population, employment by sector, income by sector, and Gross State Product. Historical unemployment rates by state were pulled from the BLS, while level of high school education was taken from the CPS. Unemployment was left as non-seasonally adjusted.

Data from the BEA differentiates various industries and subindustries using Standard Industry Classification and North American Industry Classification System codes. SIC and NAICS codes are designated by the US federal government to document

businesses' primary field, allowing easier analysis of the macro economy (SicCode.com). SIC, the older of the two systems, was in effect from the 1930s to the 1990s. Set by the Office of Management and Budget, the validity of SIC codes were called into question in the early '90s, resulting in a call for a more specialized coding for primary business functions. The SIC codes were revised for the last time in 1997 and officially phased out in 2001. The changes in SIC and NAICS codes result in a jump in health employment, shown in the graphs for synthetic control.

Employment and wage data is consistent in its SIC and NAICS coding throughout the data set, allowing us find the industry average wage. Due to SIC and NAICS not differentiating between subsectors in industry, all empirical work will be presented as the aggregate or average.

Methodologies

The passage of a universal health care bill obviously will affect the labor market, and as previous research has shown, it increases a propensity to earn some income from self-employment (Laurie et al 2011). It stands to reason that the increase in insured individuals and higher demand for preventive care would cause an ambiguous increase on the health sector labor market. To examine this, we used permutation testing and synthetic control as a robustness check.

We will examine the health industry labor market in two ways: the aggregate number of jobs in the industry and average wages across the industry. We will build on the analysis done by Steinger in 2011by using Fischer permutation tests to better estimate the causal effect of Romneycare on these outcomes. Since treatment is only applied to one state, the asymptotic assumption associated with difference-in-difference clustering

does not apply in this setting. Prior to Buchmueller, DiNardo, and Valletta in 2011, statistical inference in a setting where only a single unit is treated was deemed dubious. Donald and Lang found that comparisons between single states collapsed the degree of freedoms in the model, causing larger sampling variance than the more conventional asymptotic framework (Donald and Lang 2007).

Buchmueller, DiNardo, and Valletta's work, however, highlights a framework that allows researchers the opportunity to approximate the causal effect of the model by implementing variations of Fischer's permutation test. In the framework of this paper, we will estimate equation (1) on all members of the donor pool, made up of the fifty states and the District of Columbia. Comparing Massachusetts to its placebos using a two-tailed p-test shows how statistically demanding the framework is. Massachusetts would have to rank in the top or bottom two states to achieve 10 percent significance and be the top or bottom state to achieve less than 5 percent significance.

$$Y_{it} = \alpha_s + \Upsilon_t + \beta * \mathrm{I}(s = 22) * \mathrm{I}(t = 2007) + \lambda_{st} + \epsilon_{st} \quad (1)$$

The variable Y_{it} is the outcome variable for state *s* and *t,* with the outcome variable being either aggregate employment or average wage. The model includes state fixed effects (α), year fixed effects (ϒ), state linear trends (λ), and the residual (ϵ). The coefficient of interest is β, which is the difference-in-difference estimate of the effect of the health care reform on the outcome variables. Results from this equation will be placed in Figure 1 (a histogram) from the placebo-based investigation. Vertical dashed bars represent the fifth and ninety-fifth percent confidence interval, excluding the treated unit. The vertical solid bar represents the difference-in-difference estimate for Massachusetts.

As stated above, this particular research question does not allow for the traditional "clustering" framework. Instead, using the permutation framework discussed above, we have to check the assumption that other states are not affected by the reform. We do this by estimating equation (2).

$$Y_{it} = \alpha_s + \Upsilon_t + \beta * \mathrm{I}(s = 22) * \mathrm{I}(t = 2000, 2001 \ldots 2015) + \epsilon_{st}$$

(2)

All variables stay as defined in equation (1) however the years defined change. In equation (1) we examine all the available years in the dataset. Equation (2) only examines 2000 through 2015 to balance the pre- and posttreatment dates. Figure 2 plots the coefficients of the outcome variables (employment and average wage) taken from equation (2). The vertical bar represents the ninety-fifth percent confidence interval for the placebo estimates.

A new comparative study methodology, synthetic control, allows for states to be picked from the donor pool that most closely match the pre-treatment dynamics of Massachusetts (Abadie et al. 2010). Allowing the caveat that the donor pool will select the "correct" control group for the outcome variable, the control group will be weighted to minimize the root mean squared predication error (RMSPE) in the pretreatment period. The inferential technique is based on applying pretreatment weights, then applying those weights to posttreatment outcomes. If the treatment is significant, the posttreatment fit or RMSPE will increase. Statistically, we test this by generating pre- and posttreatment RMSPE ratios for each state. The ratio should be high for Massachusetts and remain small for the majority of the states. The p-value of the technique is found by ranking the ratio from lowest to highest, with the rank order of Massachusetts being divided by the

number of units in the donor pool. This technique allows us to investigate whether the effect is random or attributable to the treatment.

CHAPTER TWO

Empirical Results and Conclusion

Permutation Results

Estimating equation (1) on health employment, we arrive at the results presented in Table 2 and Figure 1. The results lack significance when taking into account state fixed effects, time variant controls, and state linear effects. While it is concerning that the results lack significance, Figure 1 and synthetic control results tell a different story. Figure 2 results are found from estimating equation (2) on the years 2000 through 2015. The solid line represents the 95 percent confidence interval, and the dot represents the health employment coefficient of Massachusetts.

As evident in Figure 1, parallel trends do hold in the pretreatment, but we see an odd effect in the posttreatment. The first four years of posttreatment results shows that Massachusetts employment does increase into roughly the top quartile of the results, then in 2012 through 2015 moves into the 10 percent significance range. While a somewhat unique result, the actions of the economy at that time may have had a confounding result. With the Great Recession beginning at approximately the same time as the passage of Romneycare, the contraction in the economy may have prevented many hospitals from hiring at the level needed. It is interesting to note that in 2012, the first year Massachusetts shows significance in Figure 2, the US Supreme Court upheld the legality of the Affordable Care Act individual mandate.

Estimating equation (1) and (2) on average wage data leads to an interesting result. Parallel trends for average wages do not hold. As clearly shown in Figure 3,

Massachusetts shows significance in the negative level leading up to 2006, when a market correction occurs and average wages are then significant at the positive level. In 2012, Massachusetts' average medical wage corrects itself to reflect national averages. Results from the permutation testing are reported in Table 3 and the histogram is shown in Figure 4, as parallel trends do not hold, these results are considered invalid.

Synthetic Control

As the donor pool might not accurately reflect the treatment group, we use synthetic control as a robustness check. Using selected covariates, synthetic control matches untreated units that approximate the treated covariates. From there, it weights those states to create an approximation of the state's pretreatment trends that matches Massachusetts. Figure 5 shows the synthetic controls findings. The solid line represents Massachusetts' outcome and the dashed line is the constructed synthetic group. Treatment is imposed in 2007, the first year Romneycare is in full effect. In the pretreatment phase, the only significant deviation in the synthetic from the actual occurs in years the SIC or NAICS coding changed.

As discussed above, using inferential techniques based on Abadie et al, we placed the ratio of post-RMSPE to pre-RMSPE and ranked the states in this manner (Abadie et al 2010). In order for 10 percent significance to be achieved, the treated Massachusetts would have to rank in the top or bottom two states. Using this form of inference, the results show significance. Over the span of 2007 through 2015, eighty thousand jobs were created in the medical industry in Massachusetts. Roughly half of those jobs are created after 2012.

Figure 6 shows the gap between the actual and synthetic Massachusetts. As shown, the pretreatment trends fit well outside of the changes in SIC or NAICS coding, which affects the years 1997 through 2001. In post-treatment we do see the divergence between the synthetic grouping and the actual outcome. As the synthetic control follows pretreatment trends of Massachusetts, this divergence signifies a change in the outcome variable. Shown differently Figure 7 shows maps all of the placebo gaps, showing that it fits the model well in pretreatment. Removing placebos whose pretreatment mean squared prediction error (MSPE), or the error between the synthetic and actual, greater than five times allows us to more clearly see the what happened in Massachusetts. We remove these placebos as the model does not correctly fit them, meaning their interpretation is meaningless. Figure 8 includes only placebos who correctly fit the model, removing: California, Florida, New York, North Carolina, and Texas. After removing units who clearly do not fit the model, one can see quite clearly that the model fits Massachusetts well in pretreatment and it is trend changes significantly in post treatment.

Applying synthetic control to the outcome variable average wage led to a similar outcome as the permutation results. Specification can be reached where pretreatment trends fit well but significance is not achieved. Due to the nature of the placebo-based inference, posttreatment trends have to differ significantly to achieve statistical significance. The shock to average wages does not seem to differ in Massachusetts when compared to the donor pool. Due to the issues in exploring the effect of Romneycare on average wages in the medical sector, we will move to only explore the health employment outcome.

Synthetic Control: Falsification

In order to check the validity of the synthetic control, we perform various forms of falsifications tests. The simplest of the falsifications, interchanging the outcome variable, allows us to see if the specification is correct and to see if the effect is specific to the outcome variable. Figure 9 shows that the covariates used for matching remain the same, and we change the outcome variable to show the effect of Romneycare on total employment. Looking at the trends in the posttreatment, we can conclude that Romneycare had little effect on the total number of people employed.

Using total employment as a falsification is beneficial because it allows us to explore whether the economy of Massachusetts added jobs or if job switching took place. As the total number of the employed does not seem to deviate from the synthetic group as shown in Figure 9, we can conclude that jobs are not being added to the total economy, but rather, people are engaging in job switching. To add credence to this theory, we perform synthetic analysis on the unemployment rate. Figure 10 explores the trends in unemployment, showing very little change in posttreatment trends between the synthetic and actual. With the supporting evidence that Romneycare had little to no effect on either total employment or the unemployment rate, we point to job switching as the most likely explanation of the increase in medical employment.

To ensure that the increase in medical employment is caused by Romneycare and not some unknown phenomena, we set the treatment year at a different point, in this case 1997, and set the treatment years to be equivalent with the original model, which in this case is eight years. The synthetic line of Figure 11 fits in the same manner as the original graph, Figure 5, which fails to falsify the original result. From these falsification tests, we

determine that the results procured by synthetic control using employment as an outcome are valid and significant.

Conclusion

With the passage of universal health care bills, we should consider a wider range of their impact on societal well-being. If health care bills are viewed only in the light of traditional metrics, such as the uninsured rate, premium costs, and hospital utilization, we miss out on the externalities not thought of when creating the bill. Large-scale government programs have ripple effects that reach far beyond the scope of the bill—ripples that affect the landscape of America. Despite the ambiguous nature of the results, significant results using synthetic control and almost significant results using Fischer permutation testing, we conclude that the employment market was affected by Romneycare. This effect added roughly eighty thousand jobs after the passage of the bill.

With many of the jobs being added to the market after 2012, it appears that the price controls implemented in the 2012 Massachusetts Healthcare Act Reform sparked a creation of jobs in the health care industry. While this paper was not able to explore in fullness where the job creation in the healthcare industry due to limitations in data it appears many citizens of Massachusetts engaged in job switching. The reasoning behind the job switching cannot be ascertained using current data, but generally accepted reasoning can be applied, people benefited in some form of compensation.

APPENDIX

APPENDIX

Tables and Figures

Table A.1. Summary Statistics

Variable	Mean	Std. Dev.	N
H.S. Education	0.494	0.158	1836
Health Employment	224614.379	266440.11	1836
Health Average Wage	30.445	10.43	1836
Population	5364569.564	5986432.169	1836
GSP Per Capita	33183.875	18899.614	1836
Unemployment Rate	6.084	2.103	1836

Table A.2. Difference-in-Difference and Permutation Inference on Health Employment

Dependent variable:	Health Employment		
Panel A: Clustered SE			
MASS post-2006	64482.135**	1.07e+05***	6408.340
	(23044.606)	(16228.022)	(4480.600)
Panel B: Placebo-based confidence intervals			
MASS post-2006	64482.137	107494.836	6408.340
5th percentile	-125794.500	-81956.891	-29436.434
95th percentile	411726.000	180570.438	28990.523
Two-tailed test p-value	0.35	0.24	0.39
N	1836	1836	1836
Mean of dependent variable	224614.38	224614.38	224614.38
State and year FE	Yes	Yes	Yes
Time variant controls	No	Yes	Yes
State linear trends	No	No	Yes

Panel A presents clustered standard errors and Panel B presents 5th and 95th percentile confidence intervals from placebo-based inferential calculations, and p-values from a two-tailed test based on the share of placebo effects with larger estimates in absolute value than Massachusetts. * p<0.10, ** p<0.05, *** p<0.01

Table A.3. Difference-in-Difference and Permutation Inference on Health Average Wage

Dependent variable:	Health Average Wage		
Panel A: Clustered SE			
MASS post-2006	5.356***	4.450***	1.563***
	(0.271)	(0.279)	(0.171)
Panel B: Placebo-based confidence intervals			
MASS post-2006	5.356	4.450	1.563
5th percentile	-3.120	-2.272	-1.950
95th percentile	3.008	2.586	1.955
Two-tailed test p-value	0.08	0.04	0.27
N	1836	1836	1836
Mean of dependent variable	30.44	30.44	30.44
State and year FE	Yes	Yes	Yes
Time variant controls	No	Yes	Yes
State linear trends	No	No	Yes

Panel A presents clustered standard errors and Panel B presents 5th and 95th percentile confidence intervals from placebo-based inferential calculations, and p-values from a two-tailed test based on the share of placebo effects with larger estimates in absolute value than Massachusetts. * p<0.10, ** p<0.05, *** p<0.01

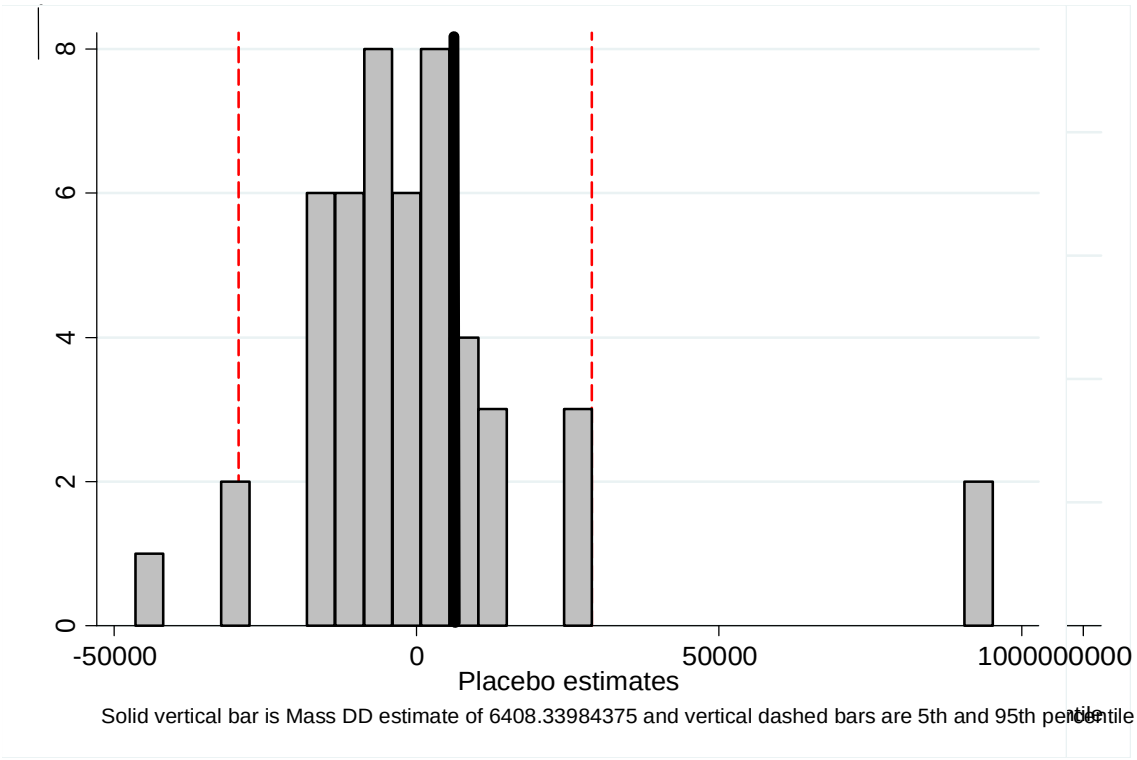


Figure A.1. Shows the effect estimates of the Fisher permutation tests- Employment

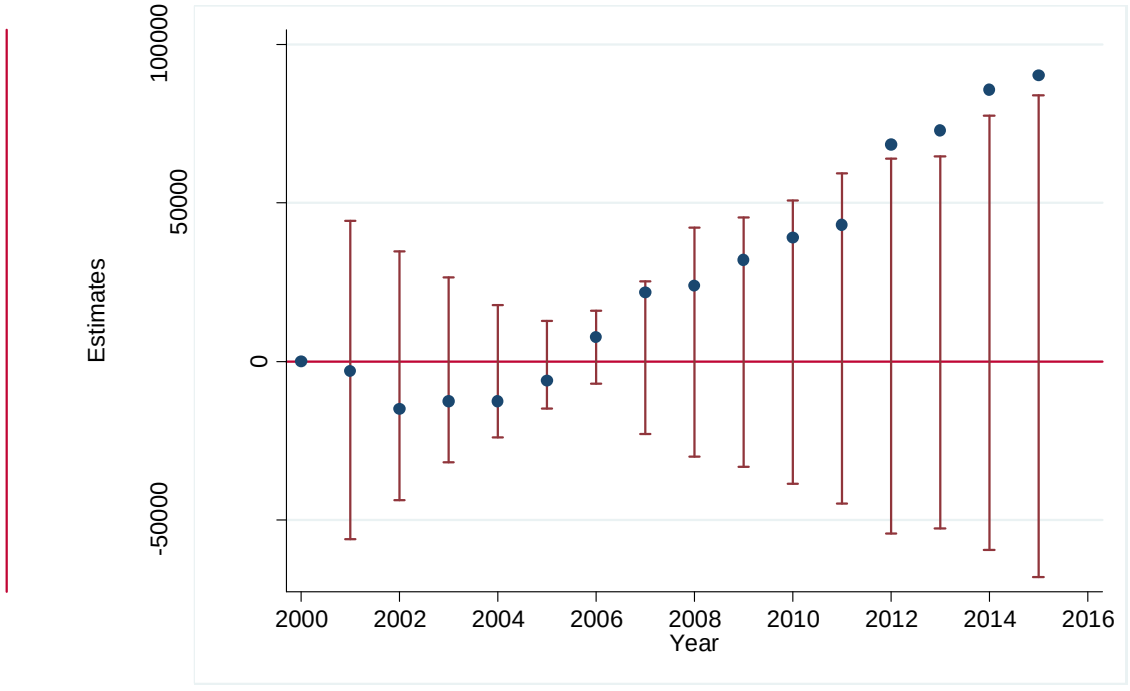


Figure A.2. Plots Distribution Marking 95% Confidence Intervals and Massachusetts Coefficient

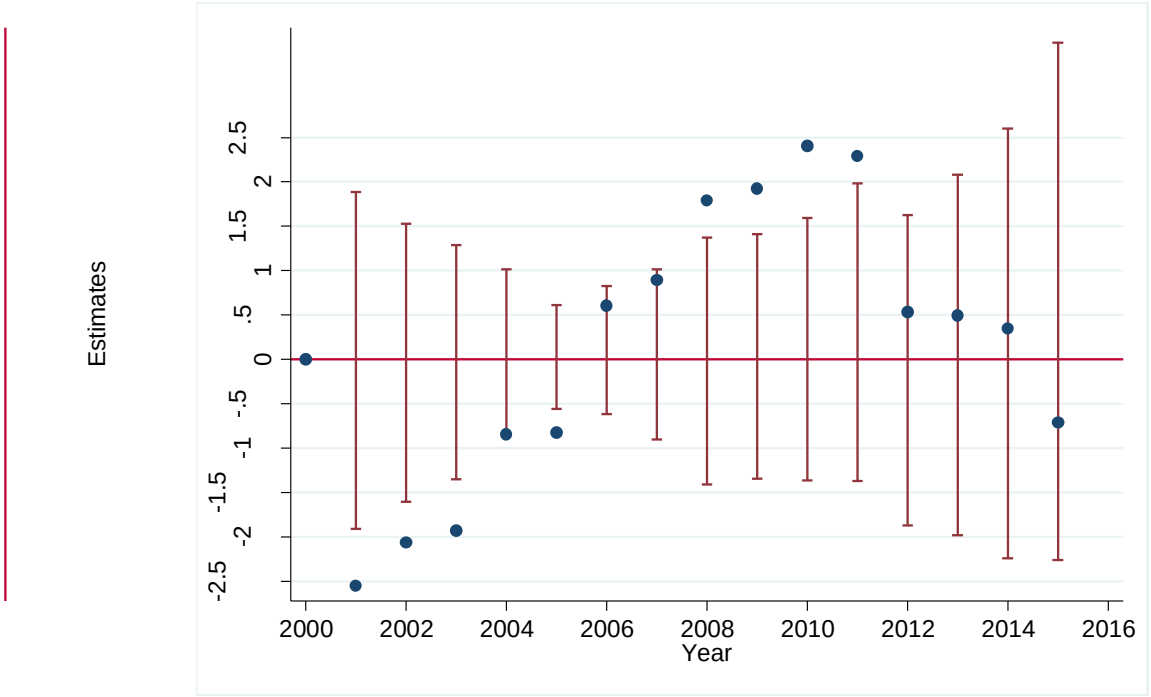


Figure A.3. Plots Distribution Marking 95% Confidence Intervals and Massachusetts Coefficient

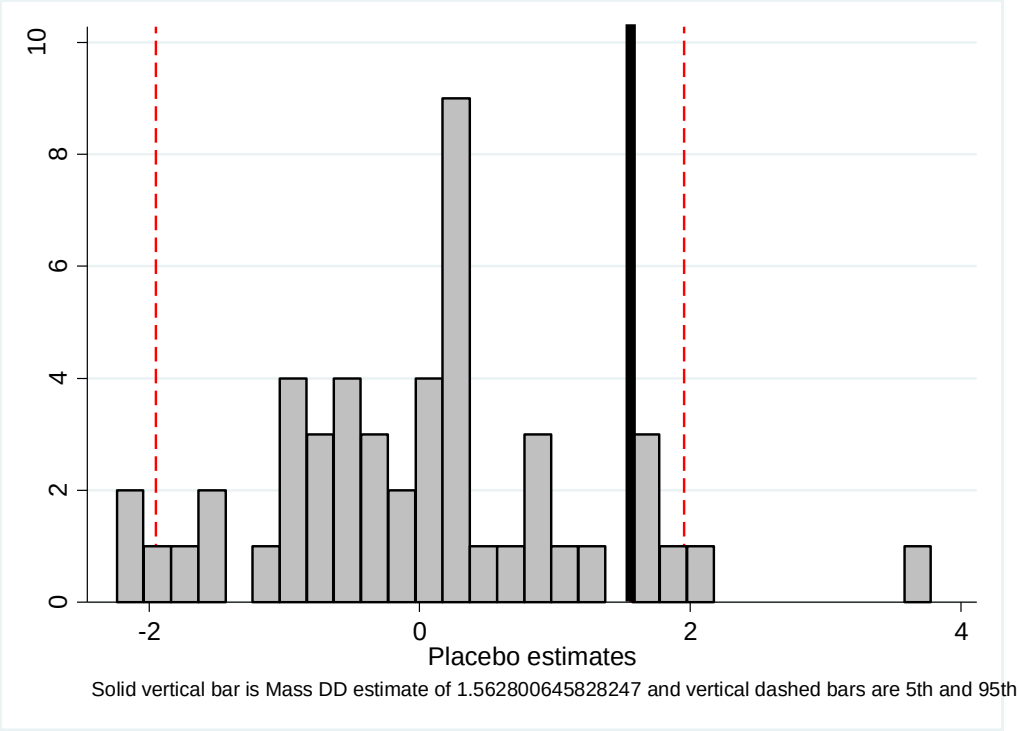


Figure A.4. Shows the effect estimates of the Fisher permutation test- Average Wage

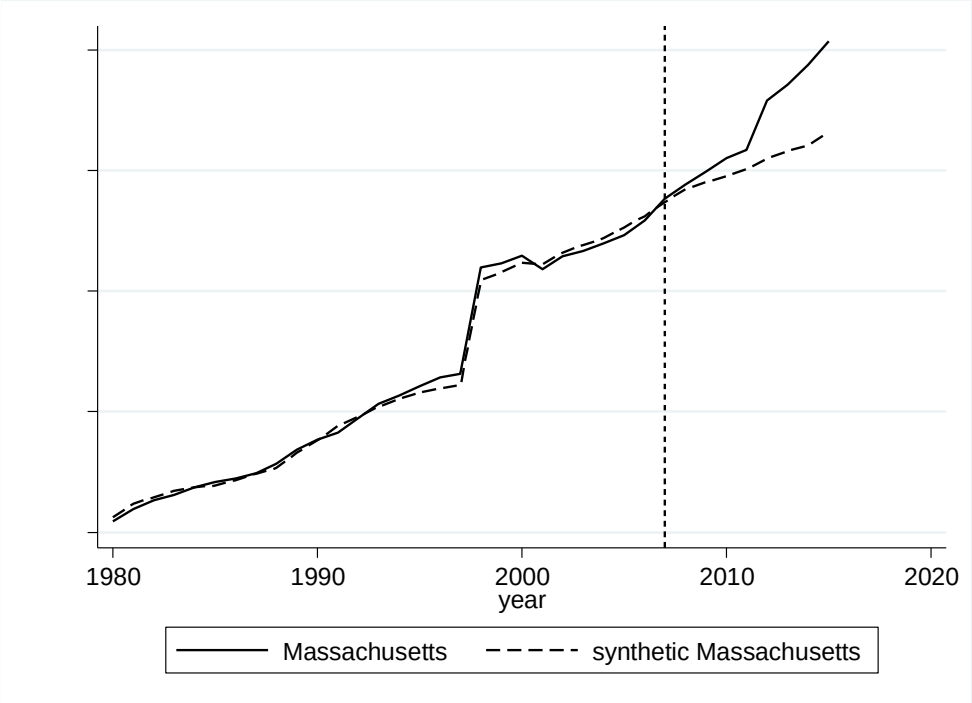


Figure A.5. Synthetic Control of Massachusetts Healthcare-Employment

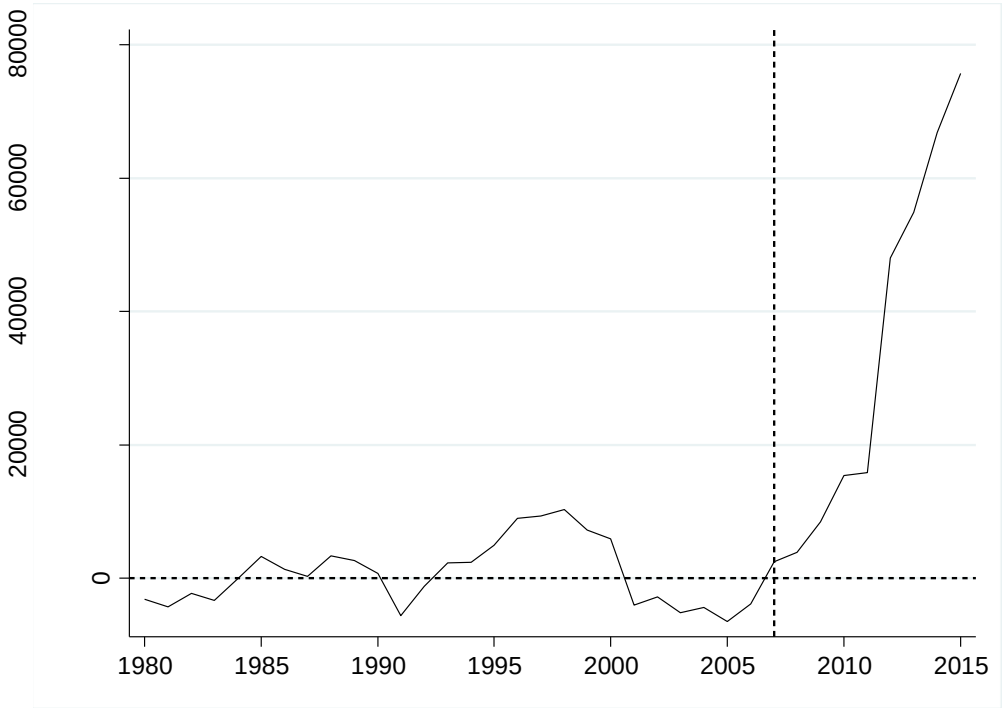
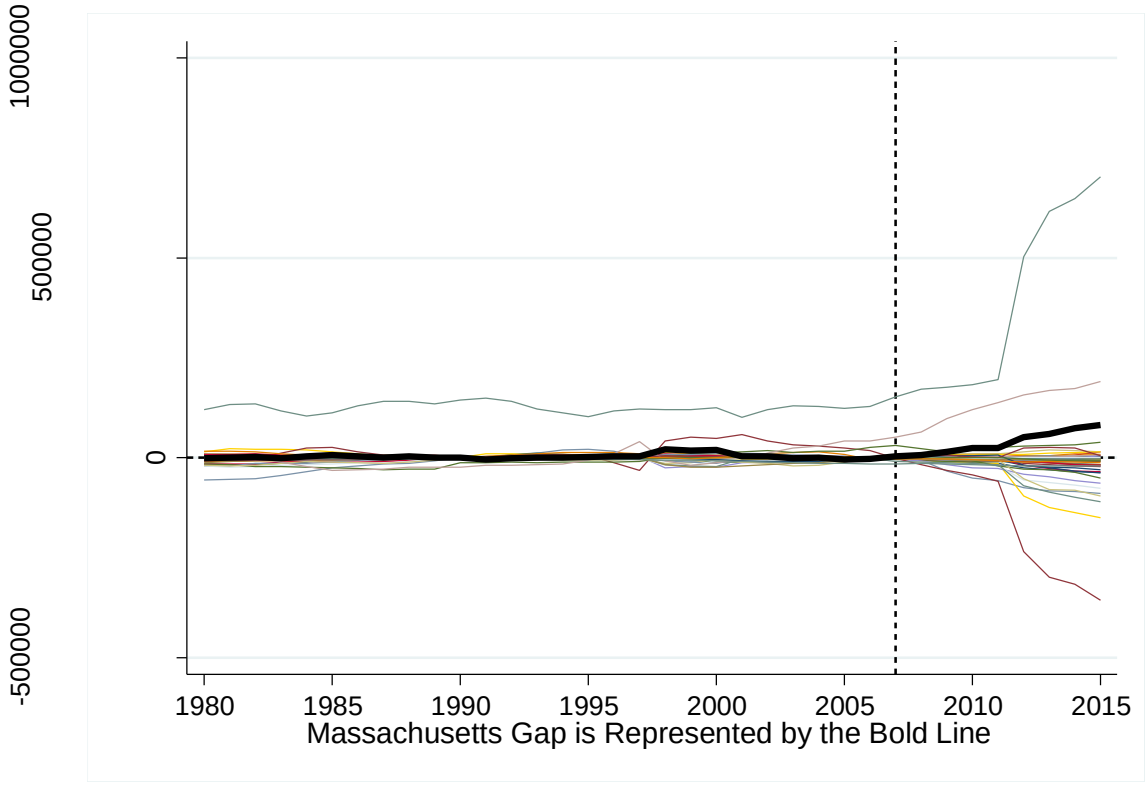


Figure A.6. Gap in Prediction Error Massachusetts Healthcare-Employment



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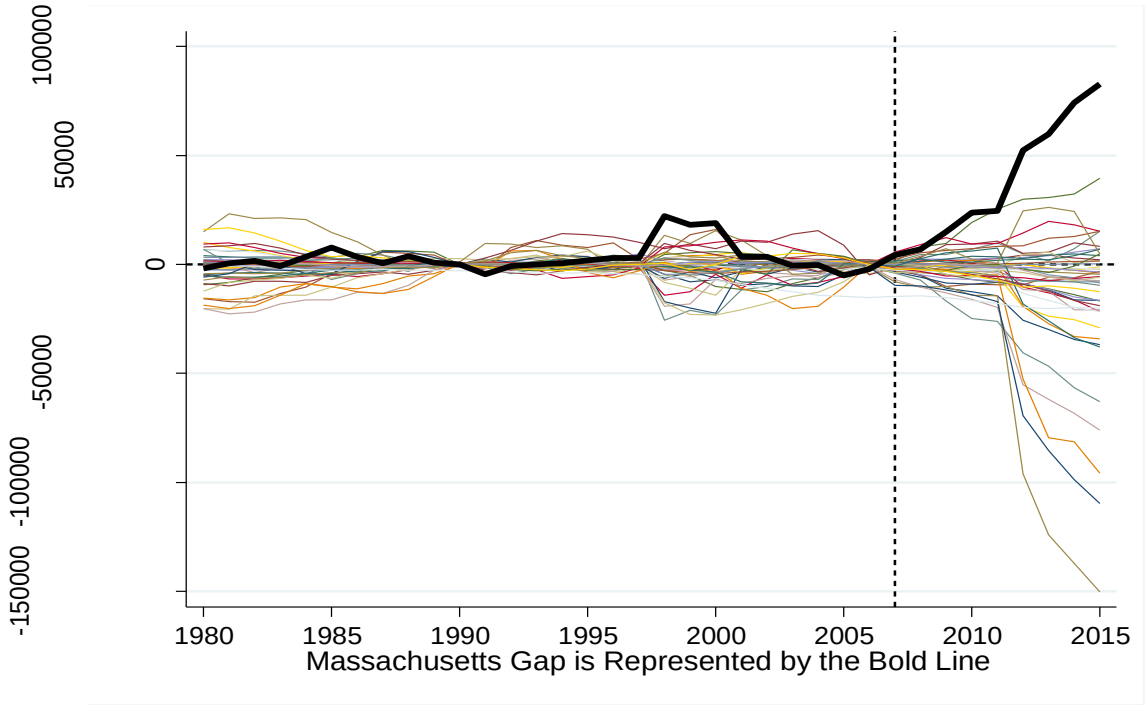


Figure A.8. Pre-MSPE removing Placebos 5x Greater then Massachusetts

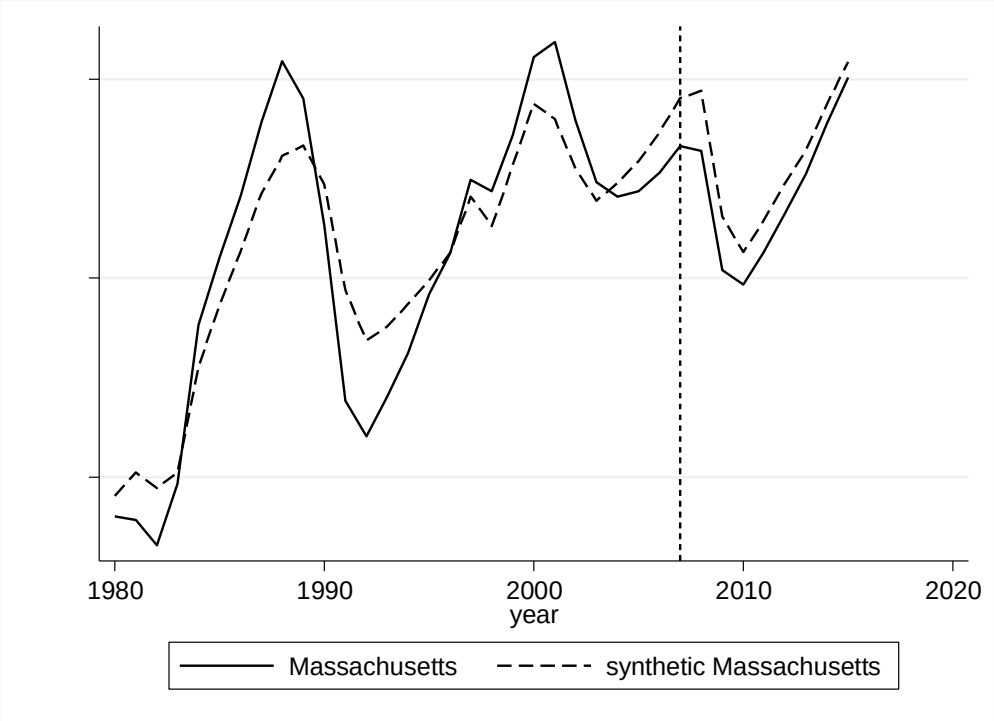


Figure A.9. Falsification Test- Synthetic Control Total Employment 22

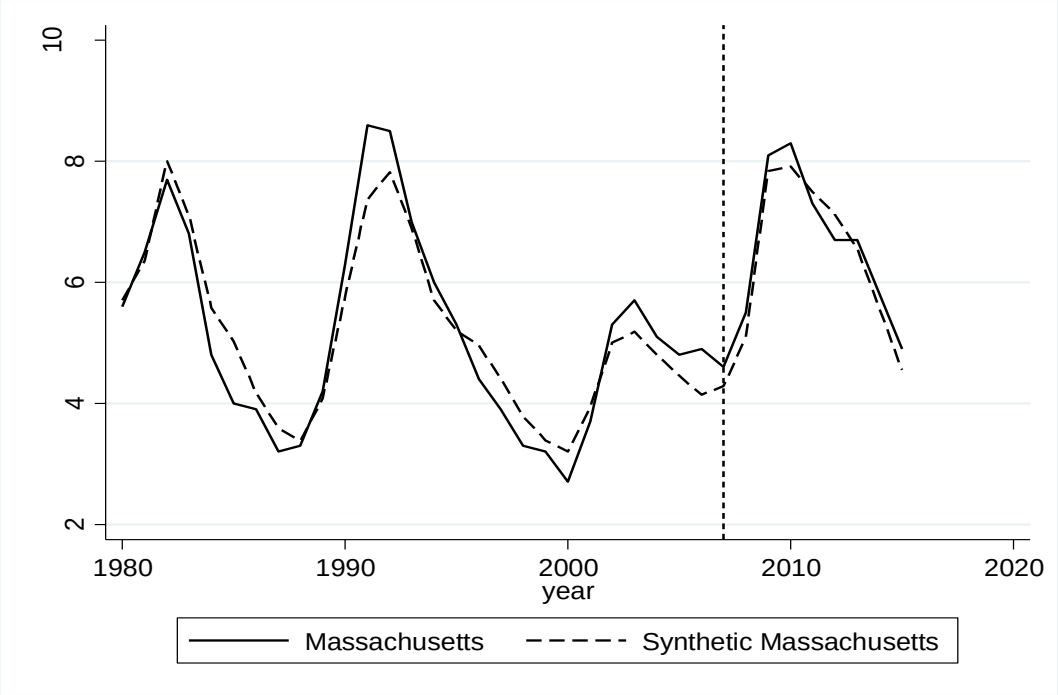
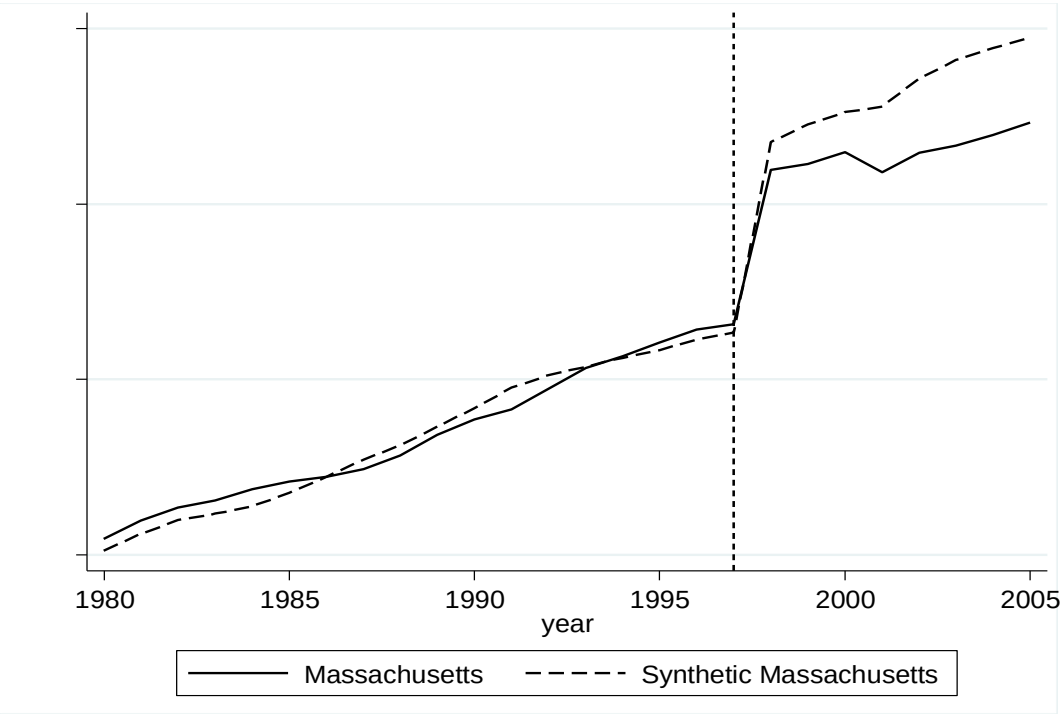


Figure A.10. Falisfication Test- Unemployment Synthethic Control



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