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# Self-Employment and Health Care Reform: Evidence from Massachusetts

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## Abstract

Access to health insurance is an important factor in the decision to become or remain self-employed. We study the effect of the 2006 Massachusetts health care reform on self-employment. Examining data from the CPS for 1995-2012, we show that the reform led to a dramatic reduction in the state's uninsured rate, and increased insurance enrollment encouraged self-employment in the state. At the individual level, likelihood of self-employment increased. The positive impact of the reform was more pronounced among women, younger individuals, and prime-age adults with kids. Massachusetts's experience can be informative about the potential impact of the ACA on self-employment.

*Keywords:* Massachusetts health care reform, Affordable Care Act, self-employment, health insurance

*JEL Classification:* E24, I13, I18, I38, L26

## 1 Introduction

In the United States, a majority of workers obtain health insurance through their employers, which has established a strong link between paid-employment and access to health insurance. Some economists have argued that this association between employment and health insurance access might have prevented individuals from becoming or remaining self-employed.

In 2006 Massachusetts passed a health care reform law which brought major changes to the state's health care system. The reform required all individuals to obtain health insurance (individual mandate) or pay a penalty, required most employers to offer health insurance to their employees (employer mandate) or pay a penalty, formed a private marketplace that offered subsidized health insurance options, and expanded public insurance. The changes stipulated by the Massachusetts health care reform severed the traditional link between paid-employment and health insurance by easing access to health insurance.

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There were two potential opposing effects of the Massachusetts health care reform on self-employment in the state. First, by establishing a private marketplace that offered subsidized health insurance and by expanding public coverage, the reform decreased individuals' reliance on employers for health insurance and might have encouraged them to become self-employed. Second, the penalties associated with the individual mandate might have made self-employment more expensive since, compared to paid-employment, the mandate brought an obligation to obtain health insurance as an additional business cost. Given the two possible opposing effects of the reform, the net effect of the reform on self-employment is an empirical question and it is the main question we tackle in this paper.

This paper builds upon the existing literature that studies the effects of the Massachusetts health care reform, particularly, the labor market. We use monthly data for 1995-2012 from the Current Population Survey (CPS) and annual data from its Annual Social and Economic (ASEC) Supplement to investigate the impact of the Massachusetts health care reform on self-employment in the state. Our prediction is that the main channel through which the health care reform affected the self-employment rate is by decreasing the uninsured rate as the availability and affordability of health insurance increased after the reform's passage. We use a two-stage least squares model, where in the first stage, we estimate the effect of the reform on decreasing the state's uninsured rate. In the second stage, we estimate the effect of the decline in the uninsured rate on self-employment. We also use the Synthetic Control Method to create a "synthetic" Massachusetts to discern how the self-employment rate would have changed without the reform. Additionally, we perform individual level analyses to determine which groups of individuals had increases in likelihood of self-employment after the reform.

Confirming results from Long, Stockley and Yemane (2009) and Kolstad and Kowalski (2012a), we show that the Massachusetts health care reform dramatically decreased the uninsured rate in the state by 8.6 to 8.9 percentage points. This was primarily due to increased enrollment in Medicaid and private health insurance plans. A 1-percentage point decline in the uninsured rate was associated with 0.07 to 0.09 percentage point higher self-employment rate. In total, the reform led to a 10 percent increase in self-employment rate in the state. We extend the analysis by examining the effects of the 2001 recession and the Great Recession in Massachusetts as well as changes in the employment shares of the construction and services industries. Robust to different specifications and different definitions of self-employment, the reform had a statistically significant and positive effect on the self-employment rate in Massachusetts. Using the synthetic control method, we show that the self-employment rate would have been 1.2 to 1.5 percentage points lower in the state without the reform. Our methods and findings differ from the existing literature that investigates the effect of the Massachusetts reform on self-employment. For example, Niu (2012) finds that reform affected self-employment in the state, but that the sign of this effect is ambiguous and Heim and Lurie (2012) find that the overall likelihood of self-employment declined, but that there was not a decline in self-employment for those filing joint tax returns.

At the individual level, the likelihood of self-employment was 6.3 percent greater in the state after the reform. The positive impact of the reform was particularly pronounced for women, whose self-employment probability rose by 15 percent, compared to 3.2 percent increase for men. Among women, the reform had a greater impact for unmarried women who were 25 percent more likely to be self-employed post-reform. The effect of the reform was also large for childless women, who were 29 percent more likely to be self-employed in the post-reform period. The positive effect on self-employment was greater for younger individuals. Likelihood of self-employment rose around 10

percent among prime-age adults with kids, where the increase was more pronounced among fathers. Evidence from Massachusetts could have implications for the possible effects of the 2010 Patient Protection and Affordable Care Act (ACA). The two reforms share many similarities, as the health care reform in Massachusetts is considered a blueprint for the national reform. While the ACA will not be in full effect until 2016 due to various delays in its implementation, there has already been a large decline in the national uninsured rate from 18 percent in the fourth quarter of 2013 to 11.4 percent in the second quarter of 2015.<sup>1</sup> Our results suggest that the reform may potentially encourage and support self-employment at the national level as well.

The remainder of the paper is structured as follows. Section 1 presents related literature on self-employment, job lock, and the health care reform in Massachusetts. Section 2 explains the main mandates of the reform. Section 3 describes the data used for our analyses. Section 4 presents the main empirical results on the effects of the reform on the state's uninsured rate, composition of health insurance types, and self-employment, as well as the results from the synthetic control method. Section 5 uses the results for Massachusetts to discuss the likely effects of the ACA on the national self-employment rate. Lastly, Section 6 concludes.

## 2 Related Literature

Our paper is related to two strands of literature. The first one studies the effects of access to and the cost of health insurance on individuals' employment decisions, such as switching jobs, leaving paid-employment, and becoming self-employed. The second one is an emerging literature examining the effects of the Massachusetts health care reform on the labor market.

Research shows that access to health insurance is an important factor in determining individuals' employment decisions, as workers who separate from their jobs are less likely to retain their health insurance. Gruber and Madrian (1997) find evidence in the Survey of Income and Program Participation (SIPP) 1984-1989 panel that for men ages 25 to 54 who voluntarily separate from their jobs the probability of staying insured dropped significantly from 89.3 percent to 48.9 percent.

For workers who value health insurance highly, leaving a job that offers health insurance would not be preferable. The literature refers to this phenomenon as "job-lock." Madrian (1994) finds evidence in the 1987 National Medical Expenditure Survey that if an individual was at a job that offered health insurance he was 25 percent less likely to separate from that job.

Access to health insurance is also a very important factor in the decision to become or remain self-employed. Wellington (2001) studies how individuals' self-employment decisions are affected by the availability of health insurance through their spouses. She exploits a sample of white prime-age married workers in the 1993 CPS Annual Social and Economic (ASEC) Supplement and uses age to proxy for the value of health insurance, where age 40 is the cutoff for a higher valuation of health insurance. Her results indicate that the presence of spousal insurance increased the probability of self-employment by 2.3 to 4.4 percent for husbands and 1.2 to 4.6 percent for wives.

While spousal health insurance coverage is one factor that can encourage self-employment, changes in an individual's eligibility for health insurance can also impact the decision to be self-employed. Fairlie, Kapur and Gates (2011) examine the relationship between business creation and access to health insurance by studying the impact of the age 65 qualification for Medicare on self-employment. Using a panel of matched CPS ASEC data from 1996 to 2006, the authors examine the change in the

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<sup>1</sup> See: <http://www.gallup.com/poll/184064/uninsured-rate-second-quarter.aspx>

likelihood of owning a business for men just before and just after age 65. They find a 2 percentage point increase in the likelihood of owning a business after turning 65. Their results provide evidence that becoming eligible for Medicare at age 65 encouraged self-employment for the newly eligible.

Beyond spousal benefits and changes in the availability of health insurance, changes in the tax policy can impact individuals' decisions to become or remain self-employed. Several studies have examined the consequences of the Tax Reform Act of 1986 (TRA86), which included a health insurance tax credit for the self-employed. The original act featured a 25 percent tax credit, but further amendments to the bill raised this to a 100 percent tax credit. The work studying the effects of the TRA86 and its amendments find that increasing tax deductibility of health insurance boosted self-employment either by increasing the likelihood of becoming self-employed (entry rate) or by reducing the likelihood of leaving self-employment (exit rate). For example, Heim and Lurie (2010) use income tax data from the 1999-2004 Continuous Work History Subsample to show that a higher tax deductibility of health insurance included in TRA86 increased the probability of self-employment by 1.5 percentage points for individuals ages 25 to 64. In addition, the study reports an increased probability of entry into self-employment by 0.8 percentage point and a decreased probability of exit by 2.8 percentage points after the TRA86 reform.

Gurley-Calvez (2011) looks at the consequences of both the TRA86 and the Self-Employment Contributions Act on the exit rate from self-employment. She uses a panel of tax return data from 1979-1990 and a discrete choice framework to quantify the effects of health insurance tax incentives on the exit rate from self-employment. Her results indicate that allowing households to take higher deductions resulted in a 7 percent decrease in the probability of exit from self-employment.

Gümüş and Regan (2014) focus on the effect of the TRA86 on the entry rate into self-employment. The authors use data from the outgoing rotation groups in the CPS for the 1996-2007 period and limit their sample to men ages 25 to 60. Since TRA86 made health insurance more tax deductible for the self-employed, the authors calculate a "relative" health insurance premium which is the ratio of the premium an individual would pay if he became self-employed over the premium he would pay if he remained a wage and salary worker. They show that a 15 percent decrease in the relative premium measure increased the rate of entry into self-employment by 3.7 percent, meaning that more affordable health insurance options incentivized individuals to become self-employed.

Changes in state specific health insurance policy can also impact self-employment decisions. One such policy change was the 1993 New Jersey Individual Health Coverage Plan (IHCP), with main features such as guaranteed issue, community ratings, limited pre-existing conditions exclusions, standardization of plan offerings, portability of coverage, and guaranteed renewability. DeCicca (2010) uses a difference-in-differences framework to examine the effect of this law on self-employment in New Jersey. He shows that relative to the comparison groups of Pennsylvania, the mid-Atlantic, the Northeast, and the US, New Jersey's IHCP reform increased self-employment by 14-20 percent.

The second stand of literature relevant to our paper evaluates the effects of the health care reform in Massachusetts on the state's uninsured rate and labor market outcomes. Long, Stockley and Yemane (2009) find that following the adoption of the reform, the uninsured rate in Massachusetts declined significantly. Using data from the 2005-2008 CPS ASEC for adults ages 19 to 64, they report a 5.6 percentage point decrease in the uninsured rate with a 2.9 percentage point increase in enrollment in employer-provided health insurance.

The Massachusetts reform required employers with more than 10 employees to provide health insurance to their employees. Kolstad and Kowalski (2012*b*) examine the potential welfare gains or losses

caused by the employer mandate. They find that employers who offered health insurance to their full-time employees paid those employees on average \$6,055 less in wages which was almost equal to the entire cost of the health insurance. Welfare losses were less than 5 percent of what they would have been if the Massachusetts health care reform had instead provided health insurance through a tax on an individual's wages. Employees were willing to accept these lower wages because they valued health insurance. Hackmann, Kolstad and Kowalski (2015) similarly examines the welfare gains of individuals after the implementation of individual mandate. Through a reduction in adverse selection, as well as decreases premiums and average costs, the annual welfare gain per person was 4.1 percent, which aggregated to \$51.1 million annually in the state of Massachusetts.

A few studies have also addressed the effect of the reform on self-employment in Massachusetts. Using data from the CPS ASEC for 2005-2010, Niu (2012) shows that the reform led to an 8 percentage point decline in the state's uninsured rate among prime-age individuals. She also finds a 0.3 percentage point increase in an individual's likelihood of self-employment after the reform.

Focusing on the effects of subsidized private health insurance made available on the state exchange, Heim and Lurie (2012) use annual income tax returns from 2004-2010 to assess whether individuals in Massachusetts were more likely to report self-employment income after the health care reform was implemented. Their results were mixed. The individuals who were less likely to be self-employed after the reform were either those not eligible for subsidies on the exchanges or those who did not file joint income tax returns. However, for individuals who did file their income taxes jointly and for individuals who received subsidies, there was not a decline in self-employment following the reform.

Our paper is most closely related to Long, Stockley and Yemane (2009) Niu (2012), and Heim and Lurie (2012). Different from these studies, we use a more comprehensive data set covering monthly information for years 1995 to 2012 from the CPS, along with annual information related to health insurance from the ASEC supplement. We perform a two-stage least squares estimation at the state level to assess the impact of the health care reform on the self-employment rate in the state, controlling for state and time fixed effects as well as the effects of the 2001 and 2008 recessions on Massachusetts. Additionally, we implement several robustness checks on our main results controlling for the changes in the shares of employment in the construction and services industries, and alternative definitions of self-employment. We also employ the synthetic control method to assess how the self-employment rate would have progressed in Massachusetts without the health care reform. Lastly, we estimate the impact of the reform on different groups of individuals' likelihood of being self-employed.

### **3 Health Care Reform in Massachusetts**

In 2006, a comprehensive health care reform legislation was passed in Massachusetts. The law overhauled much of the existing health care system in the state. Often cited as the blueprint for the ACA, the Massachusetts Health Reform Act's main goal was to provide health insurance for all residents. The key components of the reform were a state health insurance exchange, an individual mandate, an employer mandate and expansions to Medicaid and Children's Health Insurance Program (CHIP).

The first component of the reform was formation of a health insurance exchange called The Connector, which allowed individuals to shop online for health insurance that met the minimum requirements dictated by the Health Reform Act. The Connector offered both subsidized and non-subsidized plans, expanding access for those who did not have health insurance through their family

or employer. Subsidized insurance options were offered through the Commonwealth Care Health Insurance Program, while the non-subsidized insurance was offered through the Commonwealth Choice Health Insurance Program. In order to receive any kind of subsidy for insurance, the participant's income had to be below 300 percent of the Federal Poverty Level (FPL). In 2007, the FPL was \$10,210 for an individual and \$20,650 for a family of four. Fully subsidized health insurance was provided to individuals with incomes up to 150 percent of the FPL. The Kaiser Family Foundation reported that by the fall of 2011, over 158,000 low-income adults were enrolled in Commonwealth Care plans and nearly 40,000 residents were enrolled in Commonwealth Choice plans.<sup>2</sup>

The second component of the reform was an individual mandate, which required all residents of the state to obtain some form of health insurance or pay a penalty of up to 50 percent of the lowest cost premium they would have qualified for on the Connector. Those with no access to employer-provided health insurance could obtain coverage through the Connector. Individuals with incomes up to 150 percent of the FPL received no penalty, while penalties for those with incomes above 150 percent of the FPL were indexed to their income. Health insurance was filed on tax returns.<sup>3</sup>

The third component of the reform was an employer mandate, which required employers with more than 10 employees to provide health insurance to their employees. Employers were given two options. They could offer a standard group plan to their employees and contribute to the premium costs. Alternatively, they could pay an Employer Fair Share Contribution, which was essentially a tax of up to \$295 per employee. Employers were additionally required to let their employees pay their insurance premiums with pre-tax dollars.

Lastly, Massachusetts expanded Medicaid and other public health insurance programs, mostly for children and their parents. Medicaid and CHIP were expanded for children with family incomes up to 300 percent of the FPL. Medicaid was expanded for parents with incomes up to 133 percent of the FPL and for pregnant women with incomes up to 200 percent of the FPL. By 2011 around 61,000 residents gained coverage through Medicaid due to the expansions under the reform.<sup>4</sup>

## 4 Data

The primary data sources for this study are the Current Population Survey (CPS) and its annual supplement, the Annual Social and Economic Supplement (ASEC). The CPS, sponsored jointly by the U.S. Census Bureau and the U.S. Bureau of Labor Statistics (BLS), is the primary source of labor force statistics for the population of the United States. Every month, 60,000 households are surveyed to collect information on a representative sample's demographic characteristics and detailed labor force statuses. We use monthly CPS data for the 1995-2012 period, with the sample ending in August 2012. We use the ASEC supplement for the 1996-2013 period, which covers the reference period of 1995-2012. Our sample ends in 2012 because it is the last year before the health insurance exchanges for the ACA began sign-ups making 2012 the last year with the effects of the Massachusetts health care reform only.

The ASEC is an annual supplement which collects additional information from a set of CPS re-

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<sup>2</sup> These results come from the 2012 Kaiser Family Foundation analysis, "Massachusetts Health Care Reform: Six Years Later" found here: <http://kff.org/health-costs/issue-brief/massachusetts-health-care-reform-six-years-later/>.

<sup>3</sup> Individuals were required to declare that they have health insurance, and assess the appropriate penalty if they did not have insurance.

<sup>4</sup> Again, from the Kaiser Family Foundation's 2012 analysis, "Massachusetts Health Care Reform: Six Years Later" found here: <http://kff.org/health-costs/issue-brief/massachusetts-health-care-reform-six-years-later/>.

spondents about sources of income, earnings, and health insurance during the previous calendar year. For labor market statistics, the questions are specifically asked about the respondents' longest jobs during the previous year. For insurance coverage status, respondents are asked whether they had any type of health insurance in the reference year, which leads to some idiosyncratic or inconsistent responses to some questions. Some individuals claim that they had health insurance but do not reveal what kind of health insurance they had, while some individuals state that they had multiple types of insurance. For simplicity, we classify an individual as uninsured if he reports having no health insurance. Individuals who report having insurance but do not specify which type of insurance are considered insured when calculating the insured rates. However, we do not place these individuals in any category when we discuss changes in enrollment in different types of health insurance. We make two corrections to the ASEC insurance data. First, we make an adjustment to individuals' weights if they had more than one type of insurance (for example, if they had two types of insurance their weight is halved when making calculations related to insurance). Second, we impose a rule that an individual did not have Medicaid if they had more than \$50,000 in personal income and also reported having private insurance coverage. More information on the survey and our categorization is reported in detail in Appendix B.

Our sample is limited to the working-age population, who were not employed in agriculture or in the military. This corresponds to individuals ages 16 to 64, with the aim of excluding individuals who have little attachment to the labor force. Table 1 presents the summary statistics on demographic characteristics, industry, and occupation details for our sample. We use two comparison groups: all the states in the United States except Massachusetts, and the states in the Northeast excluding Massachusetts. These Northeastern states consist of Vermont, Rhode Island, New Hampshire, Connecticut, Maine, New York, New Jersey, and Pennsylvania.

The BLS considers two types of self-employment. The first category, unincorporated self-employed, corresponds to individuals who own businesses that are sole proprietorships, partnerships, or Limited Liability Corporations (LLCs). When the BLS publishes the level of self-employment in their monthly Employment Report, they report the level of unincorporated self-employment. The second category of self-employment defined by the BLS is incorporated self-employment, or those individuals who are self-employed in their own corporations. While the BLS classifies unincorporated self-employed as the self-employed, incorporated self-employed are classified as private wage and salary workers. We will refer to the unincorporated self-employed as "self-employed" in the remainder of the paper.

## 5 Empirical Analysis

The main goal of this paper is to assess the impact of the Massachusetts health care reform on the self-employment rate in the state. Our prediction is that the main channel through which the health care reform impacted the self-employment rate is through decreasing the uninsured rate as the availability and affordability of health insurance increased after the reform's passage. First, we evaluate the impact of the health care reform on the uninsured rate in the state by performing a state-level difference-in-differences analysis using yearly ASEC data. Then, we use two-stage least squares estimation (2SLS) to conduct a state-level analysis of the impact of the health care reform on the self-employment rate using both the ASEC and monthly CPS data. We also use the synthetic control method to create a "synthetic" Massachusetts and show how the state's self-employment rate would have progressed without the health care reform. Lastly, we conduct individual level analyses to determine the effect of the reform on likelihood of self-employment for groups of individuals by

**Table 1: Summary Statistics (1995-2012)**

	MA	NE (excl. MA)	US (excl. MA)
Female	51%	51%	51%
White	88%	81%	81%
Married	53%	55%	57%
Young (Ages 15-24)	18%	19%	19%
Prime-Age (Ages 25-54)	67%	65%	66%
Older (Ages 55-64)	15%	16%	15%
Less than High School Degree	13%	15%	17%
High School Degree	28%	32%	30%
Some College	24%	24%	28%
Bachelor's or more	35%	28%	25%
<b>Occupation</b>			
Management	12%	11%	10%
Professional	19%	15%	14%
Services	11%	12%	11%
Sales	8%	8%	8%
Administration	10%	10%	10%
Construction, Extraction, Laborers, etc.	11%	11%	13%
Transportation	3%	4%	4%
<b>Industry</b>			
Construction	5%	4%	5%
Manufacturing	9%	9%	9%
Wholesale Retail Trade	12%	12%	13%
Transportation and Utilities	5%	6%	5%
Financial	6%	6%	5%
Education and Health	18%	16%	14%
Other Services	18%	15%	16%
Public	3%	3%	3%

Notes: Data are restricted to individuals ages 16-64 who are not employed in agriculture or the military. The mining industry is excluded from the table, not the sample, as it's share is almost 0%. The Northeastern states include: Vermont, New Hampshire, Maine, Connecticut, Rhode Island, New Jersey, New York, Pennsylvania and New York. Source: CPS basic monthly data and authors' calculations.

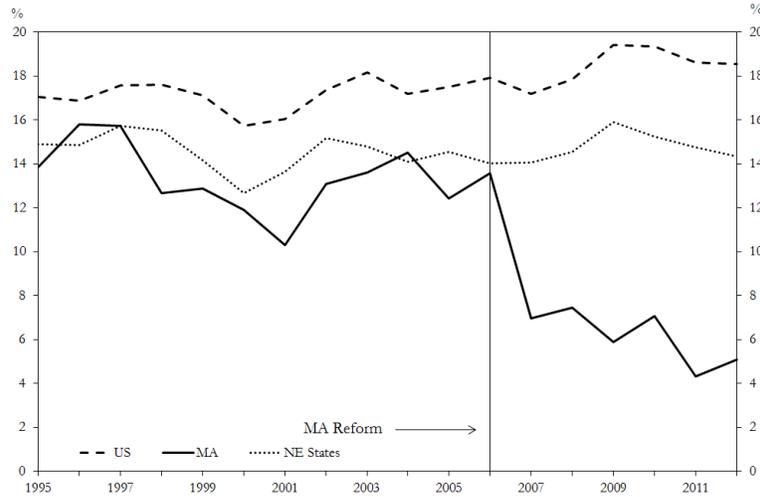
gender, age, marital status, and parenthood.

## 5.1 The Uninsured Rate in Massachusetts

The main objective of the health care reform in Massachusetts was to reduce the uninsured rate in the state. Figure 1 shows the uninsured rate for the working-age population in Massachusetts, the rest of the United States and other Northeastern states. The average yearly uninsured rate for each group was calculated by taking the average of the uninsured rates for states in each group.

Massachusetts has had a historically lower uninsured rate compared to other states; however, visual inspection clearly shows a dramatic decrease in the already lower uninsured rate post-reform. After the implementation of the reform, the uninsured rate in Massachusetts dropped from 13.6 percent in 2006 to 5.1 percent in 2012. During the same time, the average uninsured rate in other Northeastern states increased by 0.3 percentage points to 14.3 percent, the uninsured rate in the U.S. increased from 17.9 percent in 2006 to 18.6 percent in 2012.

**Figure 1: Uninsured Rates of the Working-Age Population in Massachusetts, the Northeastern states, and the United States**



Notes: The comparison groups (other Northeastern states and the United States) do not include Massachusetts. Data are restricted to individuals ages 16 to 64 who do not work in agriculture or the military. The averages for the Northeast and for the U.S. are calculated by taking the average of the states' uninsured rates in each group in each period. Source: CPS Annual Social and Economic Supplement (ASEC) and authors' calculations.

## 5.2 The Effect of the Reform on Insurance Enrollment in Massachusetts

In order to quantify the effect of the Massachusetts health care reform on the uninsured rate, as well as on the share of individuals on private health insurance and public health insurance, we estimate difference-in-differences regressions of the following forms:

$$z_{sy} = \alpha_s + \gamma_y + \beta_1(s = MA) * (y > 2006) + \epsilon_{sy} \quad (1)$$

$$z_{sy} = \alpha_s + \gamma_y + \beta_1(s = MA) * (y > 2006) + \beta_2(s = MA) * (y = 2001) + \beta_3(s = MA) * (y = 2008, 2009) + \epsilon_{sy} \quad (2)$$

where  $z_{sy}$  is the outcome of interest in state  $s$  and year  $y$ . The model includes state fixed effects  $\alpha_s$ , year fixed effects  $\gamma_y$ , and an error term  $\epsilon_{sy}$ .

The effect of the Massachusetts reform is represented by the coefficient  $\beta_1$ , which is the interaction term between Massachusetts and the years after the implementation of the reform (after 2006). This is the first model we consider.

The sample is from the ASEC and covers the period 1995-2012, which includes two recessions. In order to control for the effects of the recessions on the outcome variable, we run a second version of the model where recession dummies are interacted with a dummy for Massachusetts. The effect of the 2001 recession in Massachusetts is represented by  $\beta_2$  and the effect of the Great Recession in Massachusetts is represented by  $\beta_3$ . The model is estimated with two different control groups: all U.S. states excluding Massachusetts and the Northeastern states excluding Massachusetts. The Northeastern states include Vermont, New Hampshire, Maine, Connecticut, Rhode Island, New Jersey, Pennsylvania and New York.

The key coefficient of interest is  $\beta_1$ , which is the difference-in-differences estimate for the effect of the Massachusetts health care reform on the uninsured rate. This coefficient is identified by comparing outcomes in Massachusetts after the reform to outcomes in Massachusetts before the reform and to the rest of the U.S. or the other Northeastern states. The identifying assumption is that outcomes in Massachusetts would not have evolved differently than the the control group without the reform. Standard errors are clustered by state.

Table 2 shows the regression results for the uninsured rate, which is the share of the working-age population that reports having no form of health insurance. With the U.S. as the control group, both models show that the reform had a negative and statistically significant effect on the uninsured rate in Massachusetts. After the reform, the uninsured rate in Massachusetts was 8.6 percentage points lower according to the first model, and it was 8.9 percentage points lower according to the second model. It seems that the Great Recession had a more detrimental effect in Massachusetts compared to the rest of the nation, which led to a 0.6 percentage points increase in the uninsured rate. On the contrary, the 2001 recession was easier on Massachusetts compared to other states, which resulted in a decline of 2.1 percentage points in the uninsured rate.

The results are qualitatively similar when the control group is changed to the states in the Northeast. The uninsured rate in Massachusetts was 7.5 percentage points lower as a result of the reform in the first model, while the second model estimates a decline of 7.8 percentage points in the uninsured rate. Moreover, the uninsured rate was 2.4 percentage points lower amid the 2001 recession in Massachusetts.

### 5.2.1 Private Insurance

Next, we examine the effect of the reform on the share of individuals with private insurance. Employer-provided health insurance is the largest subset of private insurance. In our sample, 94 percent of individuals with private health insurance reported being either a policyholder or dependent on an employer-provided health insurance.

Table 3 reports the effects of the reform on enrollment in private health insurance. With the U.S. as the control group, both models indicate increased enrollment in private health insurance in Massachusetts. Post-reform, the share of working-age population with any private insurance was 3.8 percentage points higher in the first model, and 4.0 percentage points higher in the second model. Private health insurance enrollment rose 1.5 percentage points even during the 2001 recession in

**Table 2: The Effect of the Massachusetts Health Care Reform on the Uninsured Rate (1995-2012)**

	Control Group: U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	-8.556*** (0.267)	-8.938*** (0.293)	-7.522*** (0.739)	-7.786*** (0.850)
MA* Recession (2001)		-2.103*** (0.193)		-2.382*** (0.413)
MA * Recession (2008)		0.621*** (0.184)		0.195 (0.489)
Constant	17.70*** (0.312)	17.70*** (0.312)	13.53*** (0.676)	13.51*** (0.682)
No. of Observations	918	918	162	162
R-squared	0.867	0.867	0.783	0.786

Notes: Data are restricted to individuals ages 16-64 who are not employed in agriculture or the military. The Northeastern states include: Vermont, New Hampshire, Maine, Connecticut, Rhode Island, New Jersey, New York, Pennsylvania and New York. \*\*\*p<0.01, \*\*p<0.05, \*p<0.10.

Massachusetts.

The results are very similar when the control group is states in the Northeast. In the post-reform period, the share of the working-age population with private insurance was 3.9 percentage points higher according to the first model, and 4 percentage points higher according to the second model. Compared to the other Northeastern states, enrollment in private health insurance rose by 1.7 percentage points during the 2001 recession.

When considering the effect of the reform on enrollment in employer-provided health insurance, we make a distinction between policyholders and dependents. The individual and employer mandates are expected to have an impact on enrollment in employer-provided insurance. The employer mandate could lead more firms to offer insurance to their employees and their dependents. Similarly, the individual mandate could lead to a higher take-up rate of individuals at firms that offered insurance.

First, we consider the effect of the Massachusetts health care reform on enrollment of policyholders on employer-provided health insurance plans. With the U.S. as the control group, the reform led to a 0.5 to 0.6 percentage point increase in enrollment in employer-provided health insurance for policyholders. Enrollment rose amid both recessions in Massachusetts.

The effect of the reform was greater when the Northeastern states were the control group. The reform led to a 1.4 to 1.6 percentage points increase in enrollment for policyholders.

Enrollment of dependents on employer-provided health insurance has also increased following the reform. We estimate increases of 3.3 to 3.4 percentage points in enrollment of dependents after the reform. However, enrollment of dependents on employer-provided insurance declined during recessions. With the Northeastern states as the control group, the reform led to a 2.6 to 2.8 percentage points increase in dependent enrollment on employer-provided health insurance.

Overall, estimation results indicate increased enrollment in private health insurance in general, and increased enrollment in employer-provided health insurance in particular. This was due in part to

**Table 3: The Effect of the Massachusetts Health Care Reform on Private Health Insurance Enrollment (1995-2012)**

A: All Private Health Insurance				
	Control Group: U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	3.774*** (0.250)	3.955*** (0.243)	3.907*** (0.568)	3.951*** (0.594)
MA* Recession (2001)		1.532*** (0.233)		1.666*** (0.334)
MA * Recession (2008)		-0.159 (0.170)		0.286 (0.454)
Constant	68.05*** (0.349)	68.05*** (0.349)	77.89*** (0.907)	77.90*** (0.913)
No. of Observations	918	918	162	162
R-squared	0.914	0.914	0.906	0.906
B: Employer-Provided Health Insurance (Policyholders)				
	Control Group: U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	0.586** (0.291)	0.506* (0.287)	1.571** (0.490)	1.400** (0.531)
MA* Recession (2001)		2.355*** (0.177)		1.310* (0.573)
MA * Recession (2008)		0.830*** (0.134)		0.839* (0.411)
Constant	42.59*** (0.299)	42.60*** (0.300)	47.81*** (0.423)	47.82*** (0.430)
No. of Observations	918	918	162	162
R-squared	0.856	0.857	0.881	0.882
C: Employer-Provided Health Insurance (Dependents)				
	Control Group: U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	3.307*** (0.144)	3.425*** (0.149)	2.637*** (0.399)	2.786*** (0.398)
MA* Recession (2001)		-0.859*** (0.143)		-0.157 (0.477)
MA * Recession (2008)		-0.569*** (0.120)		-0.484 (0.324)
Constant	20.37*** (0.193)	20.37*** (0.193)	24.70*** (0.566)	24.70*** (0.570)
No. of Observations	918	918	162	162
R-squared	0.894	0.895	0.777	0.777

Notes: Data are restricted to individuals ages 16-64 who are not employed in agriculture or the military. The Northeastern states include: Vermont, New Hampshire, Maine, Connecticut, Rhode Island, New Jersey, New York, Pennsylvania and New York. \*\*\*p<0.01, \*\*p<0.05, \*p<0.10.

**Table 4: Percent of Private Sector Establishments in Massachusetts Offering Health Insurance by Firm Size (2006, 2008, and 2011)**

	Total	<10	10 to 24	25 to 99	100 to 999	1000 +	<50	>50
2006	66.2%	50.3%	74.7%	83.6%	91.9%	100.0%	55.5%	97.3%
2008	68.7%	50.7%	78.8%	95.9%	99.3%	100.0%	58.9%	99.8%
2011	64.6%	44.4%	82.0%	94.6%	95.2%	100.0%	39.4%	97.3%

Notes: Data are from the Medical Expenditure Panel Survey Insurance Component.

**Table 5: Share of the Paid-Employed with Employer-Provided Health Insurance in Massachusetts (2006, 2008, and 2011)**

	Policyholders	Dependents	Total
2006	52.8%	27.0%	79.7%
2008	57.6%	27.5%	85.1%
2011	54.0%	29.3%	83.3%

Notes: Data are restricted to individuals ages 16-64 who are not employed in agriculture or the military. The sample is limited to individuals who are employed in the public or private sector but are not self-employed.

the employer-mandate, which required all employers with more than 10 employees to offer insurance and in part to the individual mandate, which required every individual to obtain coverage.

Table 4 shows the share of Massachusetts firms offering health insurance right before the reform, right after the reform, and a few years after the reform. In 2008, right after the reform, the share of firms offering health insurance to their employees rose from 66 percent to 69 percent, mostly due to increases in the share of firms offering health insurance in the group with 25-100 employees. This is consistent with the employer mandate which required firms with more than 10 employees to offer health insurance. In 2011, the share of firms offering insurance was slightly reduced, likely due to the detrimental effects of the Great Recession, but for large firms, this share was higher in 2011 than in 2006. The main category depressing the overall share was the share of firms offering insurance in the group with less than 10 employees. These employers were not subject to the employer mandate and were likely hit hardest by the recession.

Table 5 shows the share of the employed individuals (excluding incorporated and unincorporated self-employed) who had employer-provided insurance. Because of the requirements in the individual mandate, we would expect this share to increase after the reform and this is indeed the case. In 2008, there is a marked increase in this share with the total rising from 80 percent to 85 percent. There was a decline in the take-up rate in 2011 due to the recession, but the share of the employed on employer-provided health insurance remained higher than its 2006 level.<sup>5</sup>

These results are consistent with our findings in Table 3. The increase in employer-provided insurance was associated both with an increase in the share of private sector establishments offering insurance to their employees and with an increased take-up rate by employees.

<sup>5</sup> According to the Medical Expenditure Panel Survey Insurance Component, the total take up rate or the “percent of private-sector employees eligible for health insurance that are enrolled in health insurance at establishments that offer health insurance” was 76 percent in 2006 and then rose to 78 percent in 2008, right after the reform. This rate fell in 2011 to 73 percent, likely due to effects of the recession.

### 5.2.2 Medicaid

Medicaid enrollment has been increasing in the U.S. for over a decade. In 2000, 5.2 percent of the population was on Medicaid, but that share rose to 9.3 percent by 2012. In addition to this national trend in Medicaid enrollment, the Massachusetts reform made changes to the eligibility for Medicaid that might have a large impact on Medicaid enrollment in the state compared to the rest of the nation.

The effect of the reform on Medicaid enrollment is reported in Table 6. With the U.S. as the control group, the share of the Massachusetts working-age population on Medicaid after the reform was 5 percentage points higher in the first model, and 5.3 percentage points higher in the second model. Medicaid enrollment rose 1.5 percentage points due to the effect of the 2001 recession in Massachusetts. Compared to the rest of the U.S., enrollment in Medicaid declined by 0.7 percentage point due to the impact of the Great Recession in Massachusetts.

The results are largely unchanged when the control group is other Northeastern states. The share of the working-age population on Medicaid rose by 3.8 percentage points after the reform according to the first model, and it rose 4.2 percentage points according to the second model. Due to the the impact of the 2001 recession in Massachusetts, Medicaid enrollment increased 1.4 percentage points.

**Table 6: The Effect of the Massachusetts Health Care Reform on Medicaid Enrollment (1995-2012)**

	Control Group: U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	4.966*** (0.234)	5.313*** (0.250)	3.830*** (0.697)	4.157*** (0.790)
MA* Recession (2001)		1.516*** (0.124)		1.383*** (0.218)
MA * Recession (2008)		-0.663*** (0.138)		-0.634 (0.433)
Constant	6.358*** (0.245)	6.361*** (0.245)	3.892*** (0.891)	3.905*** (0.897)
No. of Observations	918	918	162	162
R-squared	0.813	0.814	0.850	0.851

Notes: Data are restricted to individuals ages 16-64 who are not employed in agriculture or the military. The Northeastern states include: Vermont, New Hampshire, Maine, Connecticut, Rhode Island, New Jersey, New York, Pennsylvania and New York. \*\*\*p<0.01, \*\*p<0.05, \*p<0.10.

To summarize, compared with the rest of the nation and with other Northeastern states, the reform lowered the uninsured rate in Massachusetts due to increases in enrollment in both private health insurance and Medicaid. Accounting for the possible detrimental effects of the 2001 recession and the Great Recession further strengthen the main result that the reform played a statistically significant role in increasing health insurance enrollment in the state. Our results are consistent with those found in Kolstad and Kowalski (2012a), Niu (2012), and Long, Stockley and Yemane (2009), who also find a decrease in the uninsured rate in Massachusetts following the implementation of the reform.

### 5.3 The Effect of the Reform on the Self-Employment Rate in Massachusetts

In this section we study the effect of the Massachusetts health care reform on the state's self-employment rate. There are two ways the reform might have influenced the relative cost and attractiveness of self-employment compared to paid-employment.

On the one hand, the reform might have encouraged self-employment by providing easier access to health insurance. Historically, fewer individuals were subscribed to directly purchased private health insurance as it has been usually more expensive than employer-provided group health insurance. Subsidized insurance options at the exchange might have changed the relative cost of directly purchased private health insurance. Alternatively, individuals have gained access to public insurance programs that were expanded with the reform. Increase in the share of employees with employer-provided insurance might have also supported their dependents' choices to become or remain self-employed. If access to health insurance had been a barrier to entrepreneurship and self-employment, then the reform's provisions might have removed that barrier. This would have decreased individuals' reliance on employers for access to health insurance and might have encouraged self-employment.

On the other hand, the individual mandate, which required all individuals to obtain health insurance, might have led to a decline in self-employment. The cost of health insurance might have increased business costs for the self-employed individuals who were uninsured prior to the reform. As the relative cost of self-employment increased, some individuals might have preferred paid-employment to self-employment.

Given the possible opposing effects of the reform's provisions on individuals' decisions to become or remain self-employed, the net effect of the reform on self-employment is an empirical question. We examine this net effect in this section.

Table 7 compares the average self-employment rates in Massachusetts, the rest of the country, and the other Northeastern states during three time periods. The first period, 2000-2005, corresponds to the years prior to the reform's implementation. The second period, 2006-2007, represents the years the reform was being implemented. The final period, 2008-2012, marks the Great Recession and the years before the ACA took effect.

As documented in Hipple (2010), the share of the self-employed in total employment in the U.S. has trended downward since the 1990s. Recently, the Great Recession contributed to this decline. During the recent economic downturn, both the share and the level of self-employment declined. In the 2000-2005 period, the average share of the self-employed in total employment was 6.5 percent nationwide. This average share fell to 6.0 percent in the 2008-2012 period. The Northeastern states (excluding Massachusetts) followed a similar pattern, as the average share of the self-employed declined from 6.7 percent in the 2000-2005 period to 6.4 percent in the 2008-2012 period. Massachusetts' experience differed from the rest of the country and other Northeastern states. The average share of the self-employed in total employment rose from 6.4 in the 2000-2005 period percent to 6.5 percent in the 2008-2012 period.

It is possible that the self-employment shares have been affected more by changes in the level of total employment than changes in the level of self-employment. An alternative measure is the average share of the self-employed in the total working-age population, which corresponds to individuals ages 16 to 64. This average share is likely to be more stable and less affected by the business cycle. From 2000 to 2005, the average share of the self-employed in the total working-age population was 4.8 percent in the United States. The average share in other Northeastern states was 5.0 percent,

**Table 7: Self-Employment Rate in Massachusetts, Northeastern States, and the United States**

A. Share of Self-Employment in Total Employment

	Massachusetts	Northeastern States	United States
2000-2005	6.4%	6.7%	6.5%
2006-2007	6.4%	6.8%	6.5%
2008-2012	6.5%	6.4%	6.0%

B. Share of Self-Employment in Total Working-Age Population

	Massachusetts	Northeastern States	United States
2000-2005	4.8%	5.0%	4.8%
2006-2007	4.7%	5.1%	4.7%
2008-2012	4.6%	4.6%	4.1%

Notes: The comparison groups (Northeastern states and the United States) do not include Massachusetts. The Northeastern states include: Vermont, New Hampshire, Maine, Connecticut, Rhode Island, New Jersey, New York, Pennsylvania and New York. Percentages are averages over the period. Data are restricted to individuals ages 16 to 64 who do not work in agriculture or the military. The averages for the Northeast and for the US are calculated by taking the average of the states' self-employment rate in each group over the specified time period.

which was higher than the average share of 4.8 percent in Massachusetts.<sup>6</sup> In the post-reform period (2008-2012), the average share of the self-employed declined at the national level, dropping 0.7 percentage point to 4.1 percent. The average share of the self-employed in other Northeastern states declined similarly from 5.0 to 4.6 percent. However, Massachusetts experienced a much smaller decline from 4.8 percent in the 2000-2005 period to 4.6 percent in the 2010-2012 period.

These results suggest that improved access to health insurance due to the health care reform might have supported self-employment in the state, preventing a sharp decline in the self-employment rate that other states have experienced.

To determine whether the Massachusetts health care reform supported self-employment in the state, we estimate a two-stage least squares (2SLS) model. The data for this model is a combination of health insurance variables from the CPS ASEC survey and labor market variables from the CPS monthly survey.

We are interested in understanding the relationship between the decline in the uninsured rate and the rate of self-employment, which can be endogenous. The implementation of the reform was an exogenous change in access to health insurance. We use this as an instrument. In the first stage we estimate the effect of the Massachusetts reform on the uninsured rate and use these predicted values in the second stage to estimate the effect of the decline in the uninsured rate due to the reform on the self-employment rate in the state.

The data for the CPS basic monthly survey was aggregated to yearly frequency so it could be merged with the CPS ASEC data.

<sup>6</sup> The states that are distorting this average are Maine, New Hampshire, and Vermont, three states with small populations. When we pool the population of all the Northeastern states into one group and calculate the average self-employment rate over each time period for that large group, the self-employment rate for the Northeastern states is lower than Massachusetts's self-employment rate.

The 2SLS model we estimate is:

$$v_{sy} = \alpha_s + \gamma_y + \beta_1(s = MA) * (y > 2006) + \epsilon_{sy} \quad (3)$$

$$z_{sy} = \alpha_s + \gamma_y + \beta_2 \hat{v}_{sy} + \mu_{sy} \quad (4)$$

In the first stage,  $v_{sy}$  represents the uninsured rate in state  $s$  and year  $y$ . The first stage includes state fixed effects  $\alpha_s$ , year fixed effects  $\gamma_y$ , and an error term  $\epsilon_{sy}$ .  $\beta_1$  captures the interaction of Massachusetts and the post-reform period. In the second stage,  $z_{sy}$  represents the share of unincorporated self-employed in either total employment or the working-age population in state  $s$  and year  $y$ .  $\hat{v}_{sy}$  represents the predicted values for the uninsured rate after the reform from the first stage.  $\beta_2$  represents the effect of the predicted uninsured rate on the self-employment rate in the state. Again, the second stage includes state fixed effects  $\alpha_s$ , year fixed effects  $\gamma_y$ , and an error term  $\mu_{sy}$ . Reported standard errors are clustered by state.

**Table 8: The Effect of Massachusetts Health Care Reform on Unincorporated Self-Employment (1995-2012), 2SLS Model**

	(1)	(2)	(3)	(1)	(2)	(3)
	Uninsured Rate	SE/Emp	SE/Pop	Uninsured Rate	SE/Emp	SE/Pop
MA * After	-8.556*** (0.267)			-8.938*** (0.293)		
MA * Recession (2001)				-2.103*** (0.193)	0.033 (0.079)	0.054 (0.059)
MA * Recession (2008)				0.621*** (0.184)	-0.495*** (0.0561)	-0.372*** (0.0381)
Uninsured Rate		-0.070*** (0.012)	-0.049*** (0.008)		-0.089*** (0.012)	-0.064*** (0.008)
Constant	17.70*** (0.312)	7.564*** (0.303)	5.243*** (0.220)	17.70*** (0.312)	7.911*** (0.301)	5.509*** (0.217)
Observations	918	918	918	918	918	918
R-squared	0.867	0.865	0.885	0.867	0.865	0.886

Notes: Data are from the CPS basic monthly files and ASEC are restricted to individuals ages 16-64 who are not employed in agriculture or the military. The control group is the U.S. \*\*\*p<0.01, \*\*p<0.05, \*p<0.10.

The health care reform in Massachusetts lowered the uninsured rate by 8.6 percentage points, as show in Table 8 (and in Table 2 earlier). Moreover, a 1 percentage point decline in the uninsured rate was associated with a 0.07 percentage point increase in the self-employment in total employment rate. Since the reform in Massachusetts lowered the uninsured rate by 8.6 percentage points, this translates to a 0.6 percentage point increase in the self-employment rate. The conclusion is similar if we consider the self-employment to working-age population ratio. In this case, a decrease in the uninsured rate of 1 percentage point increases the self-employment rate by 0.05 percentage points. With the uninsured rate decreasing by 8.6 percentage points after the reform, this corresponds to a 0.4 percentage point increase in the self-employment in total working-age population rate.

Controlling for the two recessions, the model predicts that the uninsured rate decreases by 8.9 percentage points after the reform. A 1 percentage point decrease in the uninsured rate leads to an increase in the self-employment rate in total employment by 0.09 percentage points. With the 8.9 percentage point decrease in the uninsured rate, this means the self-employment rate in total

employment in Massachusetts was 0.8 percentage points higher. Similarly, for the self-employment in total working-age population rate, the 8.9 percentage point decrease in the uninsured rate would be associated with an increase in the self-employment in total working-age population rate by 0.6 percentage points.

We could also present these results using a difference-in-differences model of the following forms:

$$z_{sy} = \alpha_s + \gamma_y + \beta_1(s = MA) * (y > 2006) + \epsilon_{sy} \quad (5)$$

$$z_{sy} = \alpha_s + \gamma_y + \beta_1(s = MA) * (y > 2006) + \beta_2(s = MA) * (t = 2001) + \beta_3(s = MA) * (y = 2008, 2009) + \epsilon_{sy} \quad (6)$$

where  $z_{sy}$  is the outcome of interest in a state  $s$  and year  $y$ . The models also include state fixed effects  $\alpha_s$ , year fixed effects  $\gamma_y$  and error term,  $\epsilon_{sy}$ .

The effect of the Massachusetts reform is represented by the coefficient  $\beta_1$ , which is the interaction term between Massachusetts and the years after the implementation of the reform (after 2006). In order to control for the effects of the recessions on the outcome variable, an alternative version of the model includes recession dummies that are interacted with a dummy for Massachusetts. The effect of the 2001 recession in Massachusetts is represented by  $\beta_2$  and the effect of the Great Recession in Massachusetts is represented by  $\beta_3$ .

We consider, again, two versions, with the U.S. as the control group and estimate the effect of the Massachusetts reform on the self-employment in total employment rate and the self-employment in total working-age population rate. The results are reported in Table 9.

**Table 9: The Effect of Massachusetts Health Care Reform on Unincorporated Self-Employment (1995-2012), Difference-In-Differences Model**

	(1)	(2)	(1)	(2)
	SE/Emp	SE/Pop	SE/Emp	SE/Pop
MA * After	0.602*** (0.099)	0.416*** (0.071)	0.804*** (0.103)	0.569*** (0.073)
MA * Recession (2001)			0.222** (0.083)	0.188*** (0.063)
MA * Recession (2008)			-0.551*** (0.057)	-0.412*** (0.0385)
Constant	6.319*** (0.126)	4.383*** (0.092)	6.319*** (0.126)	4.384*** (0.092)
Observations	918	918	918	918
R-squared	0.865	0.885	0.865	0.886

Notes: Data are from the CPS basic monthly files and ASEC are restricted to individuals ages 16-64 who are not employed in agriculture or the military. Control group is the U.S. \*\*\*p<0.01, \*\*p<0.05, \*p<0.10.

In the first model, the self-employment in total employment rate was 0.6 percentage points higher in Massachusetts after the reform compared with Massachusetts before the reform and the U.S. control group before and after the reform. Similarly, the self-employment rate in the total working-age population was 0.4 percentage points higher after the reform. The second model provided similar results. The reform increased the self-employment rate in total employment in Massachusetts by

0.8 percentage points compared to Massachusetts before the reform and the U.S. control group and increased the self-employment rate in the total population by 0.6 percentage points.

According to the second model, the 2008 recession had a negative effect on the self-employment rate in Massachusetts relative to other states, resulting in a 0.4 to 0.6 percentage point decline in the self-employment rate. However, the self-employment rate in Massachusetts rose 0.2 percentage point during the 2001 recession.

As expected, the results of the difference-in-difference analysis confirm the earlier results from the 2SLS estimation; the Massachusetts health care reform was associated with a statistically significant 10 percent increase in the self-employment rate in the state compared to the state’s pre-reform average.

#### 5.4 Synthetic Control Method

In the previous section, we compared Massachusetts to two different control groups, the rest of the U.S. and other Northeastern states. Even though these control groups are reasonable, neither group is an ideal comparison group for Massachusetts. For example, looking at demographic characteristics, the population in Massachusetts has higher educational attainment and more white individuals compared to the rest of the Northeast and the nation (Table 1).

As a better way to choose the control group for Massachusetts, we use the Synthetic Control Method (SCM). We create a “synthetic” Massachusetts in order to discern how the self-employment rate would have changed in the state without the reform. This method was introduced in Abadie and Gardeazabal (2003), Abadie, Diamond and Hainmueller (2010) and Abadie, Diamond and Hainmueller (2014), and is described in detail in Abadie, Diamond and Hainmueller (2011). This method has been applied by Courtemanche and Zapata (2014), who used it to analyze the effects of the Massachusetts health care reform on health outcomes for residents of the state.

A key step in applying the synthetic control method is to form a control group that resembles Massachusetts the most in terms of its self-employment rate in the pre-reform period. For this purpose, we search for the variables that are the potential determinants of the state’s self-employment rate in the pre-reform period of 2000-2005. Table 10 compares the demographic characteristics of the unincorporated self-employed to the characteristics of the employees (including the incorporated self-employed) in Massachusetts. On average, the self-employed were more likely to be married, male, and prime-age or older compared to the employees in the state. While industry and occupation shares for the self-employed and employees were similar, there were a few key differences. The self-employed were less likely to have administrative occupations and more likely to have construction or trade occupations compared to employees in the state. Similarly, self-employed were more likely to work in the construction and services industries compared to employees, but were less likely to work in education and health services or manufacturing than employees.<sup>7</sup>

We use the following information from the CPS monthly survey and the ASEC supplement as predictors of the pre-reform self-employment rate. First, there are the labor market indicators from the monthly CPS survey averaged for each year: unemployment rate, employment to population ratio, the share of employment in trade occupations, and the share of employment in the construction and in the services industries. Second, there are the insurance variables from the ASEC: uninsured rate, share of individuals with Medicaid, share of individuals who were policyholders on an employer-provided plan, dependents on an employer-provided plan, policyholders on a directly purchased

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<sup>7</sup> The services industry corresponds to all services excluding health and education services and financial services.

**Table 10: Summary Statistics for Pre-Reform Massachusetts**

	Self-Employed, Uninc.	Employees
Female	37%	49%
White	95%	89%
Married	70%	56%
Young (Ages 15-24)	3%	15%
Prime-Age (Ages 25-54)	77%	73%
Older (Ages 55-64)	20%	12%
Less than High School Degree	6%	9%
High School Degree	28%	28%
Some College	22%	24%
Bachelor's or more	45%	39%
<b>Occupation</b>		
Management	16%	17%
Professional	26%	25%
Services	12%	15%
Sales	13%	11%
Administration	3%	14%
Construction, Extraction, Laborers, etc.	27%	15%
Transportation	3%	4%
<b>Industry</b>		
Construction	25%	6%
Manufacturing	4%	12%
Wholesale Retail Trade	12%	17%
Transportation and Utilities	5%	6%
Financial Services	6%	8%
Education and Health Services	11%	24%
Other Services	38%	23%
Public	0%	4%

Notes: Data are restricted to individuals ages 16-64 who are not employed in agriculture or the military. The mining industry is excluded from the table, not the sample, as it's share is almost 0%. Source: CPS basic monthly files from January 2000 to April 2006.

private plan, or dependents on a directly purchased private plan. Third, there are the demographic characteristics: the share of individuals who were married, had a bachelor’s degree or more, prime-age (25-54 years old), older (55-64 years old), white, and male.

The synthetic Massachusetts is the convex combination of states in the donor pool that most closely resemble Massachusetts in the pre-reform period. We construct the synthetic Massachusetts in two ways. The first specification controls for time effects only, meaning we attempt to match the self-employment rate in the treated state in each year of the pre-reform period.<sup>8</sup> The second specification picks the states from the donor pool that match average self-employment rate in the treated state for the years 2004-2006. This specification includes the labor market indicators, insurance variables, and demographic controls explained above.

**Figure 2: Self-Employment Rate in Massachusetts vs. the Synthetic Control Group — First Specification**



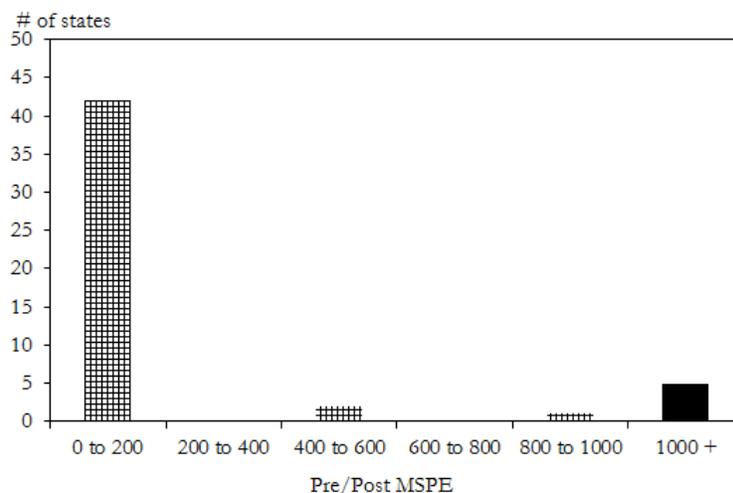
Notes: States used to create synthetic control group were Alabama, Arkansas, Idaho, Mississippi, Ohio, Virginia, and Wyoming. Source: CPS Annual Social and Economic Supplement (ASEC), CPS monthly survey and authors’ calculations.

Figure 2 shows the divergence between the data for Massachusetts and the generated series for the synthetic control unit in the post-reform period using the first specification. In 2006, the unincorporated self-employment rate in total employment was 6.4 percent in Massachusetts. By 2012, the unincorporated self-employment rate in total employment in Massachusetts rose to 7.1 percent, an increase of 0.7 percentage point. On the contrary, the self-employment rate is predicted to decline by 1.2 percentage points to 5.2 percent in the synthetic Massachusetts. The interpretation is that the self-employment rate would be lower in the state without the reform.

Figure 3 shows the ratio of pre- and post-reform mean square prediction errors (pre/post MSPE ratio) for the first specification. This is the ratio of the squared differences in the self-employment rate between Massachusetts and the synthetic Massachusetts. We would expect the pre-reform MSPE to be small if the model is successful in constructing a synthetic Massachusetts that closely resembles Massachusetts in the pre-reform period. A large post-reform MSPE indicates the synthetic

<sup>8</sup> The first specification omitted one state, Montana, due to insufficient data.

**Figure 3: Pre/Post MSPE — First Specification**



Notes: Massachusetts' category is highlighted in solid black. States used to create synthetic control group were Alabama, Arkansas, Idaho, Mississippi, Ohio, Virginia, and Wyoming. The only states with higher MSPE were Iowa, Michigan, New York, and Pennsylvania. Source: CPS Annual Social and Economic Supplement (ASEC), CPS monthly survey and authors' calculations.

data diverges from the actual data. Therefore, a large pre/post MSPE ratio indicates that pre-reform, the SCM did a good job of matching the actual data and that post-reform there was a significant difference between the actual and synthetic data, interpreted as the effect of the reform. As a placebo test, we calculate the pre/post MSPE ratios for every state in the donor pool and compare with Massachusetts. Massachusetts had a pre/post MSPE ratio of 1156, which is the fourth highest ratio of all states included in the sample.

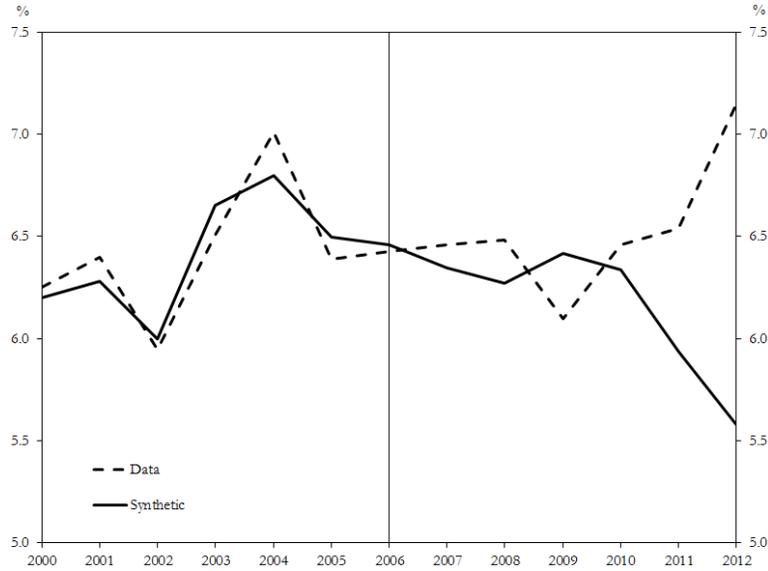
Figure 4 shows the divergence between the data for Massachusetts and the generated series for the synthetic control unit in the post-reform period in the second specification where all controls were used. Once again, by 2012, the synthetic data predicted the self-employment rate would fall to 5.6 percent but the actual data shows the self-employment rate at 7.1 percent, rising 0.7 percentage points post-reform. Similarly, Figure 5 shows that Massachusetts had the highest pre/post MSPE ratio of 36.1, indicating a large difference between the SCM's predicted outcome after the reform and the actual outcome.

In summary, without the health care reform, the self-employment rate in Massachusetts would have been substantially lower. The placebo tests further confirm that this result was not by chance. Massachusetts had the highest pre/post MSPE ratio when all controls were accounted for.

## 5.5 Robustness Checks

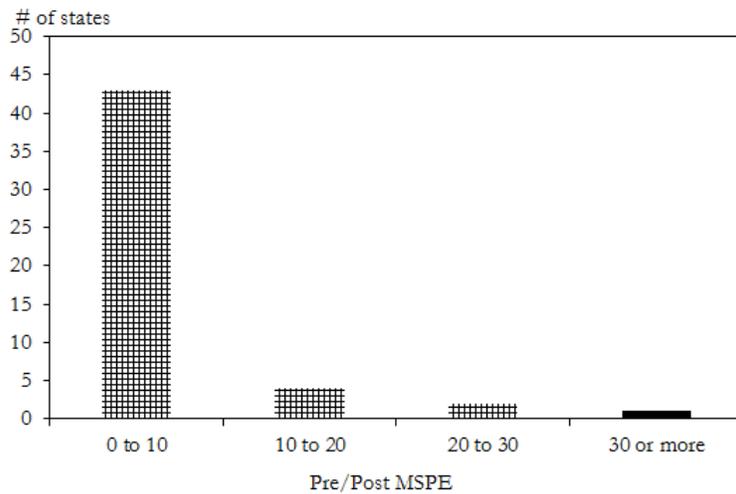
We provide several robustness checks for our main results. First, we include controls for the share of employment in the two industries the self-employed mostly worked in: construction and services. We also provide a few alternative definitions of self-employment and argue that our main results are robust to these changes.

**Figure 4: Self-Employment Rate in Massachusetts vs. the Synthetic Control Group — Second Specification**



Notes: States used to create synthetic control group were Arkansas, Arizona, California, Colorado, DC, New York.  
 Source: CPS Annual Social and Economic Supplement (ASEC), CPS monthly survey and authors' calculations.

**Figure 5: Pre/Post MSPE — Second Specification**



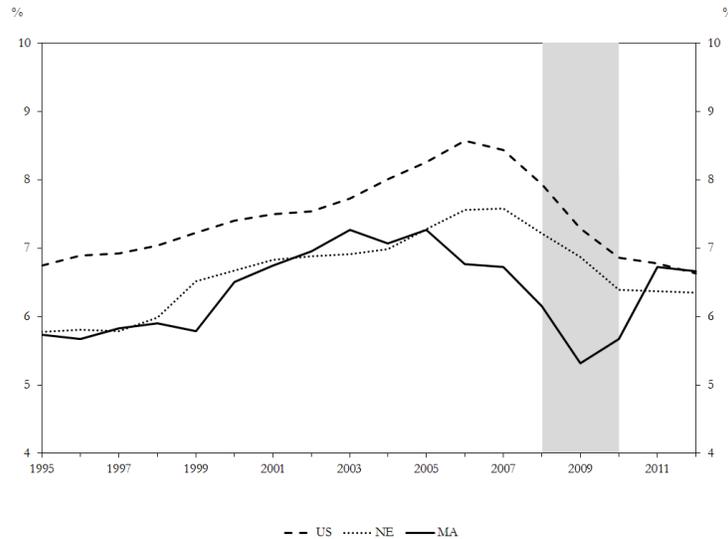
Notes: Massachusetts' category is highlighted in solid black. States used to create synthetic control group were Arkansas, Arizona, California, Colorado, DC, New York. Source: CPS Annual Social and Economic Supplement (ASEC), CPS monthly survey and authors' calculations.

### 5.5.1 Construction and Services

More than 60 percent of the unincorporated self-employed worked in the construction and services industries in Massachusetts.<sup>9</sup> Any trends or cyclical changes affecting these industries might have also affected the aggregate self-employment rate in the state. If such changes have been taking place during the same period as the health care reform, our earlier results on the impact of the health care reform would be biased.

Figure 6 shows the time series for the employment shares of the construction industry in Massachusetts, the rest of the U.S. and other Northeastern states. The national pattern is a steady increase throughout the 2000s until a big decline during the Great Recession. While the level of construction share has been lower in the states in the Northeast compared to the national share, the time series pattern is very similar. However, Massachusetts' experience seems to be very different. The employment share of construction was on an upward trend until it started to decline in 2005, three years prior to the Great Recession. If the changing size of the construction sector were to have an effect on the aggregate self-employment rate in the state, it must be in the negative direction, which strengthens our earlier result of a positive effect of the health care reform on self-employment in the state.

**Figure 6: Share of Construction Employment in Total Employment (1995-2012)**

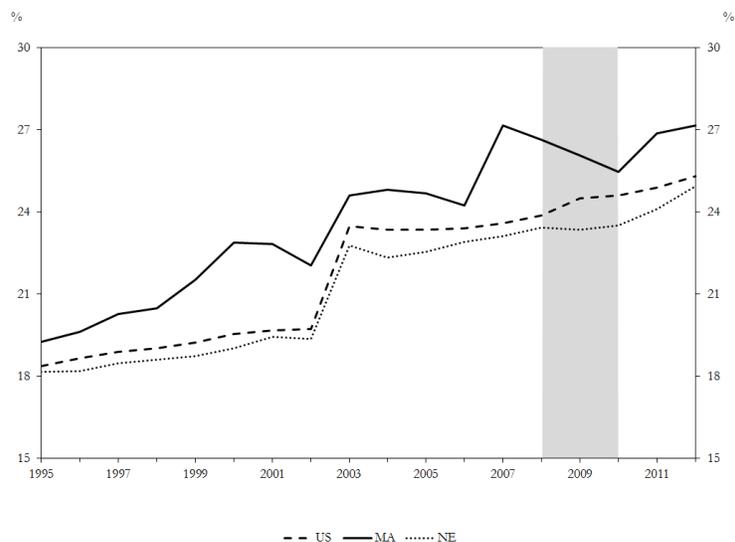


Notes: Shares are of the employed ages 16 to 64 who do not work in agriculture or the military. Calculations for the U.S. and the Northeast do not include Massachusetts. The Northeastern states include: Vermont, New Hampshire, Maine, Connecticut, Rhode Island, New Jersey, New York, Pennsylvania, and New York. Source: CPS monthly survey and authors' calculations.

Figure 7 shows that the services share of employment has been increasing steadily since 1995 in all states. Note that the shares for all three groups shift upward around 2003 due to a recode of industries in the CPS. It is important to point out that the services employment share in Massachusetts has always been larger compared to the rest of the nation. The expansion of the services industries might have led to an increase in the aggregate self-employment share in Massachusetts. If this were the case, then again, our earlier results would be biased.

<sup>9</sup> The services industry corresponds to all services excluding health and education services and financial services.

**Figure 7: Share of Services Employment in Total Employment (1995-2012)**



Notes: Shares are of the employed ages 16 to 64 who do not work in agriculture or the military. Calculations for the U.S. and the Northeast do not include Massachusetts. The Northeastern states include: Vermont, New Hampshire, Maine, Connecticut, Rhode Island, New Jersey, New York, Pennsylvania, and New York. Source: CPS monthly survey and authors' calculations.

In order to control for the effects of the changes in the construction and services industries, we add the employment shares of these industries as additional regressors to our earlier 2SLS and difference-in-differences regressions.

Our main results were largely unaffected by controlling for employment shares in construction and services industries. In both cases, with and without recession controls, a decrease in the uninsured rate in Massachusetts was associated with a statistically significant increase in the self-employment rate in the state. The effects of changes in the employment shares in the construction and services industries were statistically significant. A 1 percentage point increase in the employment shares of construction or services industries were associated with a 0.1 to 0.2 percentage point increases in the self-employment rate in the state.<sup>10</sup>

### 5.5.2 Changing the Definition of Self-Employment

So far, we have defined self-employment exclusively as the group of unincorporated self-employed, a definition consistent with the BLS's interpretation. In this section, we consider alternative definitions of self-employment.

The first alternative definition for self-employment is total self-employment, which is the combination of incorporated and unincorporated self-employment. The next alternative definition for self-employment is full-time unincorporated self-employment. An individual is considered full time self-employed in one of two ways: if they report being full-time employed and work more than 35 hours a week or if they report being full-time, but with varied hours each week. Lastly, we consider self-employed individuals who report working at least 10 hours per week.<sup>11</sup>

<sup>10</sup> Results are available upon request.

<sup>11</sup> We created two versions of this definition. One in which the individuals working more than 10 hours per week

In all alternative definitions of self-employment, our main results remain unchanged. In each case, the decreased uninsured rate in Massachusetts after the reform was associated with an increase in the self-employment rate, confirming the results of our earlier analysis. These are robust to controlling for the effects of the recessions in Massachusetts.

## 5.6 Individual Level Analysis

The Massachusetts health care reform had a positive impact on the state level self-employment rate, which suggests that individuals were more likely to become or remain self-employed after the reform. This section explores which groups of individuals were more affected by the reform.

Up to this point, we analyzed only state-level data to ascertain the effect of the health care reform on the self-employment rate. Now, in order to determine the direct effect of the reform on individuals, we perform an individual-level analysis, similar to those performed by Niu (2012) and Heim and Lurie (2010). Utilizing the CPS monthly data, we create a binary variable indicating whether an individual was unincorporated self-employed or not in a given month. We estimate the following linear probability model:

$$\begin{aligned}
 SE_{ismy} = & \alpha_s + \mu_m + \gamma_y + X_i + \beta_1(s = MA) * (y > 2006) \\
 & + \beta_2(s = MA) * (2001Recession) \\
 & + \beta_3(s = MA) * (2008Recession) + \epsilon_{ismy}
 \end{aligned} \tag{7}$$

where  $SE_{ismy}$  is these binary variable indicating if an individual  $i$  is unincorporated self-employed in state  $s$ , in month  $m$ , and in year  $y$ .  $X_i$  is a vector of demographic characteristics (gender, education, race, age, marital status, industry, occupation),  $\alpha_s$  captures state fixed effects,  $\mu_m$  captures month fixed effects,  $\gamma_y$  captures year fixed effects, and  $\epsilon_{ismy}$  is the error term.  $\beta_1$  is the coefficient corresponding to the effect of the Massachusetts reform on the individual's self-employment likelihood.  $\beta_2$  is the effect of the 2001 recession in Massachusetts and  $\beta_3$  is the effect of the Great Recession in Massachusetts. Standard errors are clustered by state.

The first column of Table 11 shows that likelihood of self-employment for an individual in Massachusetts was 0.3 percentage point higher after the reform, which corresponds to a 6.3 percent increase over the pre-reform average likelihood of self-employment. The likelihood of self-employment was lowered by the effects of the recessions in Massachusetts.

Men were 3.2 percent more likely to be self-employed after the reform, indicated by a 0.2 percentage point increase from the pre-reform average. More strikingly, women were 15 percent more likely to be self-employed after the reform (0.5 percentage point increase).

Next, we consider the effect of the Massachusetts reform on individuals by age group. The likelihood that young individuals, ages 16-24, were self-employed was 12.5 percent (0.1 percentage point increase) higher after the reform in Massachusetts. The likelihood of self-employment rose by 5.5 percent (0.3 percentage point increase) among prime-age individuals, ages 25-54, and increased by 7.8 percent (0.5 percentage point increase) for older individuals, ages 55-64, from their pre-reform averages.

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must also identify as full-time and one in which individuals must only be working more than 10 hours per week, either full-time or part-time. The results were qualitatively the same in each case, so we discuss only the strict hours definition in the text.

**Table 11: Effect of the Reform on Likelihood of Self-Employment (2000-2012)**

A: By Gender and Age						
	(1) All	(2) Men	(3) Women	(4) Young	(5) Prime-Age	(6) Older
MA* After	0.003*** (5E-4)	0.002*** (0.001)	0.005*** (4.5E-4)	0.001** (2.8E-4)	0.003*** (0.001)	0.005*** (0.001)
MA * Recession (2001)	-0.002*** (0.001)	-0.006*** (0.001)	0.002*** (0.001)	-0.002*** (4E-4)	-0.004*** (0.001)	0.005*** (0.001)
MA * Recession (2008)	-0.001*** (2.8E-4)	3E-5 (4.3E-4)	-0.001*** (3.1E-4)	-0.003*** (3.2E-4)	0.001*** (3.7E-4)	-0.001 (0.001)
Pre-Reform Mean	0.048	0.062	0.034	0.008	0.055	0.064
Observations	12,980,934	6,230,379	6,750,555	2,342,543	8,414,413	2,223,978
R-squared	0.109	0.127	0.091	0.033	0.113	0.165
B: By Marital Status						
	(1) Married	(2) Unmarried	(3) Married (M)	(4) Married (W)	(5) Unmarried (M)	(6) Unmarried (W)
MA* After	0.003*** (0.001)	0.003*** (4.8E-4)	0.003*** (0.001)	0.004*** (0.001)	4.03E-4 (0.001)	0.005*** (4.4E-4)
MA * Recession (2001)	-0.005*** (0.001)	0.001 (0.001)	-0.009*** (0.001)	-0.001 (0.001)	-0.004** (0.002)	0.005*** (0.001)
MA * Recession (2008)	-0.002*** (4.6E-4)	3.1E-4 (3.4E-4)	-0.002*** (0.001)	-0.001** (4.8 E-4)	0.002*** (0.001)	-0.002*** (4.3 E-4)
Pre-Reform Mean	0.062	0.031	0.079	0.047	0.042	0.020
Observations	7,369,690	5,611,244	3,505,987	3,863,703	2,724,392	2,886,852
R-squared	0.126	0.089	0.138	0.117	0.111	0.063
C: By Parenthood						
	(1) Kids	(2) No Kids	(3) Father	(4) Mother	(5) Childless Men	(6) Childless Women
MA* After	0.006*** (0.001)	-0.001 (0.001)	0.005*** (0.001)	0.001* (0.001)	-0.003*** (0.001)	0.009*** (0.001)
MA * Recession (2001)	-0.005*** (0.001)	-0.004*** (0.001)	-0.007*** (0.001)	0.005*** (0.001)	-0.012*** (0.001)	-0.003*** (0.001)
MA * Recession (2008)	-0.005*** (0.001)	0.008*** (4.5E-4)	-0.003*** (0.001)	0.011*** (0.001)	0.005*** (0.001)	-0.007*** (4.2E-4)
Pre-Reform Mean	0.059	0.042	0.082	0.040	0.053	0.031
Observations	4,036,014	4,378,399	1,757,329	2,122,523	2,255,876	2,278,685
R-squared	0.118	0.111	0.130	0.093	0.126	0.110

Notes: Data from the CPS basic monthly files and ASEC are restricted to individuals ages 16-64 who are not employed in agriculture or the military. For each category, the sample is restricted to the group of interest. For Table 11C, the data is restricted to prime age individuals. The control group is the U.S. \*\*\*p<0.01, \*\*p<0.05, \*p<0.10.

Previous literature on self-employment and health insurance has showed that access to health insurance through a spouse's insurance coverage increases the likelihood of self-employment. Accordingly, the reform might have impacted individuals differently based on their marital status. If an individual were married and their spouse gained insurance coverage through their employer, that individual might be more likely to be self-employed after the reform compared to pre-reform.

Indeed, we find that likelihood of self-employment for married individuals rose 4.8 percent (0.3 percentage point higher) after the reform. Married men were 3.8 percent (0.3 percentage point higher) more likely to be self-employed, while married women were 8.5 percent (0.4 percentage point higher) more likely to be self-employed post-reform. While there was no statistically significant effect on unmarried men, there was a statistically significant 25 percent (0.4 percentage point higher) increase in the likelihood of self-employment for unmarried women. We find a similar effect as Niu (2012) on the likelihood of self-employment for all individuals. However, our results are more significant and positive for married and unmarried men and women. Unlike Heim and Lurie (2010), who found no effect for individuals who filed joint tax returns (married individuals), we found they were more likely to be self-employed. Moreover, for unmarried individuals, we found a positive effect of the reform, whereas Heim and Lurie (2012) found a negative effect.

We also estimate the effect of the reform on individuals with and without children. Individuals with children are expected to have a higher valuation of health insurance compared to individuals without children. Our estimation results show that the effect of the reform on the likelihood of self-employment for adults with children was positive and significant. Prime-age adults with children younger than 18 years old were 10.2 percent (0.6 percentage point increase) more likely to be self-employed post-reform (compared to the pre-reform average likelihood). The increase in self-employment was more pronounced for fathers, who were 6.1 percent (0.5 percentage point increase) more likely to be self-employed after the reform. Prime-age mothers experienced a smaller increase in their likelihood of self-employment, which was 2.5 percent higher post-reform. Interestingly, the effect of the reform was also large for childless women, who were 29 percent (0.9 percentage point increase) more likely to be self-employed in the post-reform period.

## **6 Possible Effects of Reform at the National Level**

The Massachusetts Health Care Reform Act of 2006 and the ACA share four key provisions: an individual mandate, an employer mandate, insurance exchanges with subsidies, and public health insurance expansions. Based on Massachusetts's experience, the ACA may have similar effects at the national level. For example, given that there was a steep decline in the uninsured rate in Massachusetts, we expect to see a lower uninsured rate at the national level in the near future. In fact, with the individual mandate being implemented in 2014, the national uninsured rate has already declined from 18 percent in the fourth quarter of 2013 to 11.9 percent in the first quarter of 2015.

The ACA may encourage self-employment at the national level as the law expands health insurance options beyond employer-provided health insurance, removing a barrier to self-employment. However, the ACA may also discourage self-employment as it increases business costs for the self-employed individuals who were uninsured prior to the reform. A recent report by the Congressional Budget Office indicates that the discouraging influence of the reform on self-employment could be weak at the national level (CBO, 2014). According to the report, by 2016, 30 million people in the United States are expected to remain uninsured, but only 4 million will be required to pay the penalty from the individual mandate. While the threat of a financial penalty could be a disincentive

to self-employment, this report's predictions weaken that argument.

Of course, there are several reasons to think that the national experience can be different from Massachusetts's experience. First of all, Massachusetts is not representative of the whole nation as explained earlier. Second, there are several differences between the two health care reforms. For example, the employer mandate threshold for the ACA is 50 full-time-equivalent employees, which is less restrictive than the 10 employees threshold in Massachusetts. There have been delays in the implementation of the employer mandate for smaller firms. The employer mandate was supposed to take effect in 2014, but was delayed until 2015 for employers with more than 100 full-time equivalent employees. Employers with 50-99 full-time-equivalent employees will have until 2016 to be in compliance. More importantly, 21 states have not accepted to expand Medicaid.

## 7 Conclusion

This paper studied the effects of the health care reform in Massachusetts on the uninsured rate and self-employment rate in the state. Massachusetts had a historically lower uninsured rate compared to most other states. However, there was a dramatic decrease in the already lower uninsured rate after the reform. Using annual data from the CPS ASEC for the reference period of 1995-2012, we showed that enrollment in both private and public health insurance rose in the post-reform period. Accordingly, the uninsured rate in Massachusetts dropped from 13.6 percent in 2006 to 5.1 percent in 2012. During the same period, the uninsured rate in other Northeastern states increased 0.3 percentage points to 14.3 percent, and the uninsured rate in the United States increased from 17.9 percent to 18.6 percent. The results in this analysis confirm earlier findings by Long, Stockley and Yemane (2009) and Kolstad and Kowalski (2012*a*) that the uninsured rate declined in Massachusetts following the reform.

The provisions of the reform had two opposing effects on self-employment. On the one hand, the reform might have encouraged self-employment by providing easier access to health insurance. If lack of access to health insurance were a barrier to entrepreneurship and self-employment, then the reform's provisions would be removing this barrier. On the other hand, the individual mandate might have increased business costs for the self-employed individuals who were uninsured before the reform. If the relative cost of self-employment had increased, some individuals might have preferred paid-employment to self-employment.

Robust to different model specifications, our results indicate the reform in Massachusetts led to a 10 percent increase in the self-employment rate from the pre-reform average. Moreover, using the synthetic control method, we show that the self-employment rate in Massachusetts would have been 1.2 to 1.5 percentage points lower without the health care reform. Different from previous work by Niu (2012), who finds an ambiguous effect on self-employment and Heim and Lurie (2012), who find no effect or a negative effect on self-employment, we find the reform had a positive effect on the likelihood of self-employment for individuals across a variety of demographic characteristics. At the individual level, Massachusetts residents were 6.3 percent more likely to be self-employed after the reform. The positive effect of the reform on self-employment was greater for women, younger individuals, and prime-age adults with kids.

The Massachusetts reform and the ACA share many core features and, as such, Massachusetts's experience can be informative about the potential impact of the ACA on the national uninsured rate and self-employment rate. Despite setbacks in implementing the full breadth of the ACA, the national uninsured rate has already declined in 2014 and 2015. Evidence from Massachusetts

suggests that the ACA may potentially encourage self-employment at the national level.

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## 8 Appendix A: Health Insurance Variables in the ASEC

One data source for this paper is the Current Population Survey’s Annual Social and Economic Supplement (ASEC). In addition to collecting labor force statistics like its parent survey the CPS, the ASEC collects data on income, transfer payments (like Social Security or disability) and health insurance. The questions about health insurance have been included in the ASEC since 1996. We consider an individual as insured if he declared to have at least one type of health insurance. This Appendix provides details about which questions we use to categorize health insurance types.

### 8.1 Public Health Insurance

In the ASEC, public health insurance encompasses several different health care programs, such as Medicare, Medicaid, military health insurance, etc. There are a series of questions that are used to assess coverage by these programs. To determine Medicaid coverage, we use the variable MCAID, which asks “was ... covered by medicaid?”. Individuals who answered yes are considered covered by Medicaid. Similarly, the variable MCARE asks “was ... covered by medicare?”. Again, those who answered yes are considered covered by Medicare.

In order to determine coverage by other public health insurance, we use two series of variables, OTHSTYP and OTYP. In the OTYP series of variables, individuals were asked in each iteration of the question about whether they had a specific type of insurance. For instance, OTYP\_1 asks if an individual had TRICARE, CHAMPUS, or military health care, OTYP\_2 asked about coverage under CHAMPVA, etc. In the OTHSTYP series of variables, individuals were asked to list other types of health insurance, which included both private and public forms of coverage. Individuals who answered that they had some form of public insurance are considered as having public insurance.

We group public insurance in two categories: Medicaid and “other public”. Because Medicaid expansions are integral to both the Massachusetts health care reform and the ACA, it was distinguished from the other public programs.

### 8.2 Private Health Insurance

Private health insurance is any type of health insurance that is not obtained through a public insurance program. This includes group (employer-provided) and non-group (directly purchased) private insurance. There are four ways an individual can obtain private health insurance: as a policyholder on employer-provided insurance, as a dependent on employer-provided insurance, as a policyholder on directly purchased private insurance, and as a dependent on directly purchased private insurance. The ASEC has a separate variable for each of these categories. There is also the variable COV-HI, which identifies all individuals who have any type of private insurance (in other words, it is a catch-all variable for private insurance).

Individuals are defined as policyholders on employer-provided insurance if they answered yes to the variable HI which asks whether the individual was “covered by a health plan provided through their current or former employer or union as a policyholder.” Dependents on employer-provided plans were identified as individuals who answered yes to DEPHI which asks if an individual was “covered by a health plan provided through employer or union as a dependent.”

Individuals who purchased non-group insurance were identified with the variables PRIV for policyholders and DEPRIV for dependents. Both questions asked if an individual was “covered by a plan that they purchased directly, that is, a private plan not related to current or past employment,” and specified whether the individual was a dependent or a policyholder.

As was the case for public insurance, the OTHSTYP series of variables, asked individuals about other types of public and private health insurance they have. Individuals who answered that they had some form of private coverage are categorized as having private insurance.

### **8.3 Adjusting Insurance Definition in the ASEC**

In the paper, we discussed the types of insurance that individuals had, however, there are a few idiosyncrasies in the data regarding double counting and self-reporting of insurance types. In this section, we describe the means of classifying individuals' insurance coverage by implementing a few corrections and assumptions.

First, we assume that an individual cannot be both a dependent on private insurance (employer-provided or directly purchased) and a policyholder. If an individual stated that he is both a dependent and a policyholder, we classify him as only a policyholder. This correction accounts for some of the double-counting issue in the data.

In the ASEC survey, an individual can declare that he has multiple types of insurance. This presents double counting issues in the data as one individual who reports having both Medicaid and directly purchase private insurance will be counted in both categories. We impose a second condition which amounts a reweighting of the individual based on how many types of insurance he declares he has. If an individual declares that he has two different types of insurance, his weight is divided in half and counted in both categories. If that individual declares he has three types of insurance, his weight is divided into thirds and counted in all three categories, etc.