

THE FEDERAL RESERVE BANK *of* KANSAS CITY  
RESEARCH WORKING PAPERS

---

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

Thealexa Becker and Didem Tüzemen

November 2014

RWP 14-16

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

Thealexa Becker and Didem Tüzemen\*

November 25, 2014

## Abstract

We study the effect of the Massachusetts health care reform on the uninsured rate and the self-employment rate in the state. The reform required all individuals to obtain health insurance, required most employers to offer health insurance to their employees, formed a private marketplace that offered subsidized health insurance options and expanded public insurance. We examine data from the Current Population Survey (CPS) for 1994-2012 and its Annual Social and Economic (ASEC) Supplement for 1996-2013. We show that the reform led to a dramatic reduction in the state's uninsured rate due to increased enrollment in both public and private health insurance. Estimation results from difference-in-differences models and the synthetic control method indicate that the aggregate self-employment rate was higher in the state after the implementation of the reform. We conclude that easier access to health insurance encouraged self-employment in Massachusetts. There are many similarities between the Massachusetts health care reform and the national health care reform, the Patient Protection and Affordable Care Act (PPACA). Based on Massachusetts' experience, the PPACA will lower the national uninsured rate and may lead to a higher self-employment rate in the nation.

*Keywords: Massachusetts health care reform, Patient Protection and Affordable Care Act, self-employment, health insurance, difference-in-differences model, synthetic control method*

*JEL Classification: C100, C150, E240, I130, I180, I380, L260*

---

\*The Federal Reserve Bank of Kansas City. Economic Research Department, 1 Memorial Drive, Kansas City, MO 64198. Corresponding author's e-mail address: Didem.Tuzemen@kc.frb.org. We thank Jon Willis, Willem Van Zandweghe, Meltem Daysal, Meta Brown, Giacomo Di Giorgi, Maxim Pinkovskiy, Donghoon Lee, and the seminar participants at the Federal Reserve Banks of New York and Kansas City. The views expressed in this paper are solely of the author's, and do not necessarily reflect the views of the Federal Reserve Bank of Kansas City, or the Federal Reserve System.

# 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 might prevent individuals from becoming or remaining self-employed.

In 2006, Massachusetts passed a health care reform law which brought major changes to the health care system in the state. The reform required all individuals to obtain health insurance, required most employers to offer health insurance to their employees, formed a private marketplace (called an exchange) that offered subsidized health insurance options and expanded public insurance. The changes stipulated by the Massachusetts health care reform severed the traditional link between employment and health insurance by providing greater access to health insurance options beyond employer-provided health insurance. The improved access to health insurance could have an impact on the self-employment rate in the state as more individuals could move away from paid-employment without losing access to health insurance.

We use monthly data from the Current Population Survey (CPS) and its Annual Social and Economic (ASEC) Supplement to examine the impact of the Massachusetts health care reform on the uninsured rate, composition of health insurance types and self-employment rate in the state. We compare the uninsured rate and self-employment rate in Massachusetts after the reform to the rates in Massachusetts before the reform as well as to other states in the U.S. and to other Northeastern states.

We find evidence that the Massachusetts health care reform dramatically decreased the uninsured rate in the state due to increased enrollment in both public and private insurance plans. Moreover, the self-employment rate in Massachusetts in the post-reform period was significantly higher compared to the pre-reform period. We extend our analysis by examining the effects of the 2001 recession and the Great Recession on Massachusetts, as well as

examining changes in the construction and services industries, two industries that have a large portion of self-employed. Robust to different specifications, our results indicate that the self-employment rate in Massachusetts was significantly higher after the reform compared to before the reform and compared to the self-employment rate in the rest of the U.S. and the other Northeastern states. Furthermore, we use the synthetic control method to simulate the unobserved counterfactual of Massachusetts to confirm that the reform led to an increased self-employment rate in the state.

The evidence from Massachusetts can have implications for the possible effects of the Patient Protection and Affordable Care Act (PPACA), which is the largest health care reform in the United States. The Massachusetts health care reform is considered the primary blueprint of the national reform, and the PPACA shares many similarities with the reform in Massachusetts. While the PPACA 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. Our results suggest that the reform can potentially encourage and support self-employment as well.

The remainder of the paper is structured as follows. Section 2 presents related literature on the topics of self-employment, health care reform and job lock. Section 3 explains the basics of the reform in Massachusetts and the data used for our analysis. Section 4 presents the main empirical analysis on the effects of the reform on the state's uninsured rate, composition of health insurance types and self-employment. Section 5 discusses how self-employment would fare in Massachusetts without the reform. Section 6 uses the results for Massachusetts to discuss the likely effects of the PPACA on the national self-employment rate. Lastly, Section 7 concludes.

## **2 Related Literature**

Our paper is related to two strands of literature. The first studies the effects of access to and cost of health insurance on individuals' employment decisions, such as switching jobs,

leaving paid-employment and becoming self-employed. The second is an emerging literature analyzing the effect of a specific health care legislation, such as the Massachusetts health care reform.

Research shows that access to health insurance is an important factor determining workers' labor market decisions. Madrian (1994) uses the 1987 National Medical Expenditure Survey to show that if an individual is at a job that offers health insurance he is 25 percent less likely to separate from that job. In a way, the worker is locked in that job while covered by employer-provided health insurance. Gruber & 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 drops significantly from 89.3 percent to 48.9 percent.

Individuals' employment decisions can also be affected when they gain access to health insurance through alternative means, such as their spouses. If an individual's spouse has health insurance that would extend to him, he might be more willing to switch jobs without worrying about the continuation of his health insurance. Wellington (2001) studies how individuals' self-employment decisions are affected by the availability of health insurance through their spouses. He exploits the 1993 CPS Annual Social and Economic (ASEC) Supplement, and a sample of white prime age (ages 25-62) married workers. He uses age to proxy for the value of health insurance, with age 40 being the cutoff for a higher valuation of health insurance. Results in Wellington (2001) indicate that the presence of spousal insurance increases the probability of self-employment by 2.3 to 4.4 percent for husbands and 1.2 to 4.6 percent for wives.

Beyond spousal benefits, changes in the tax policy can impact the decision to become or remain self-employed. Several studies have examined the impact 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% tax credit, but further amendments to the bill raised this to 100% tax credit. The papers studying the effects of the TRA86 and its amendments find that

increasing tax deductibility of health insurance boosted the rate of self-employment either by increasing the likelihood of self-employment (entry rate) or by reducing the likelihood of leaving self-employment (exit rate). For example, Heim & Lurie (2010) uses income tax data from the 1999-2004 Continuous Work History Subsample to show that a higher tax deductibility of health insurance 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.

Gurley-Calvez (2011) looks at the consequences of the TRA86 as well as the Self-Employment Contributions Act.<sup>1</sup> She uses a panel of tax return data and a discrete choice framework to quantify the effects of health insurance tax incentives on the exit rate from self-employment. She finds that allowing households to take higher deductions results in a 7 percent decrease in the probability of exit from self-employment.

Another study, Gumus & Regan (2014) focuses 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. They find that having either individual or spousal insurance decreases the rate of entry into self-employment by 18 to 34 percent. Their results also indicate that there is a small, limited effect of the after-tax health insurance premium on the entry rate into self-employment.

The second stand of literature relevant to our paper evaluates the effect of the health care reform in Massachusetts on the state's uninsured rate and labor market outcomes. Long et al. (2009) documents that following the adoption of the reform, the uninsured rate in Massachusetts declined significantly. They use data from the 2005-2008 CPS ASEC on adults ages 19 to 64 and using a difference-in-differences model find a 5.6 percentage point decrease in the uninsured rate with a 2.9 percentage point increase in enrollment in employer-

---

<sup>1</sup> This 1954 Act required the self-employed to pay 15.3% of their net income to cover their own benefits like Social Security, Medicare, etc.

provided health insurance.

A few studies have addressed the effect of the health care reform in Massachusetts on self-employment. Heim & Lurie (2012) uses annual income tax returns from 2004-2006 to assess whether or not individuals were more likely to report self-employment income after the health care reform was implemented. Specifically, they focus on the effects of subsidized insurance made available on the health insurance exchange. They find mixed results. Individuals who were eligible for subsidies and those who filed joint tax returns did not experience a decline in self-employment after the reform. However, those who filed taxes individually and did not receive subsidies did see a decline in self-employment following the reform.

Niu (2012) uses data from the CPS and the CPS ASEC to also show that the reform in Massachusetts led to a significant decline in the overall uninsured rate of 8 percentage points for individuals ages 25 to 54 during the 2004-2009 period. She also finds a 4.1 percent increase in the likelihood of self-employment. This comes from a 1-percentage point increase in the share of the self-employed during the reform and 0.3 percentage point increase in the share of the self-employed after the reform.

Our paper is most closely related to Niu (2012), Heim & Lurie (2012), and Long et al. (2009). Different from these studies, we use a more comprehensive data set covering monthly information for years 1994 to 2012 from the CPS, along with annual information related to health insurance from the ASEC supplement. We employ a more careful econometric analysis by running several difference-in-differences estimations where we address the autocorrelation problem associated with the standard errors. In regressions, we include controls for state fixed effects, time fixed effects as well as dummies to account for the effects of 2001 recession and the Great Recession in Massachusetts. We observe that many self-employed individuals working are in construction and services industries. Accordingly we account for the changes in the sizes of these industries on the self-employment rate in the state. Lastly, we employ the synthetic control method to assess how the self-employment rate would have progressed in Massachusetts without the health care reform.

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

### **3.1 Basics of the Reform**

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 PPACA, the Massachusetts Health Care Reform'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 an health insurance exchange called The Connector. The Connector allowed individuals to shop for health insurance that met the minimum requirements dictated by the Health Reform Act. The Connector offered both subsidized and non-subsidized plans for those who did not have access to 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% 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% of the FPL. The Kaiser Family Foundation (2012) 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.

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. Those with no access to employer-provided health insurance could obtain coverage through the Connector. Individuals with incomes up to 150% of the FPL received no penalty, while penalties for those with incomes above 150% of the FPL were indexed to their income.



Health insurance was filed on tax returns.<sup>2</sup>

The third component of the reform was an employer mandate, which required employers with more than 10 full-time-equivalent employees to provide health insurance for 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. The employer mandate took effect on July 31, 2007, but was repealed in July 2013 to better facilitate the transition to the requirements in the national health care reform.

Lastly, Massachusetts expanded Medicaid and other public health insurance programs, mostly for children and their parents. Medicaid was expanded for children with family incomes up to 300% of the FPL and for parents with incomes up to 133% of the FPL, for pregnant women with incomes up to 200% of the FPL, and for the long-term unemployed with incomes up to 100% of the FPL. According to the Kaiser Family Foundation, by 2011 around 61,000 residents gained coverage through Medicaid due to the expansions under the reform.

### **3.2 Data**

The primary data sources for this study are the Current Population Survey (CPS) and its annual supplement called 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 population’s demographic characteristics and detailed labor force status. The ASEC is an annual supplement which collects additional information from a set of CPS respondents about sources of income, earnings and health insurance during the previous calendar year. We use monthly

---

<sup>2</sup> Individuals are now required to declare that they have health insurance, and assess the appropriate penalty if they do not have insurance on their income tax returns.

CPS data for the 1994-2012 period.<sup>3</sup> Because the ASEC did not include health insurance questions prior to 1996, we use the ASEC supplement for the 1996-2013 period, which covers the reference period of 1995-2012.

The ASEC asks respondents about their employment and insurance status during the previous year. In the case of labor market statistics, the questions are specifically asked about the respondents' longest job during the reference year. In the case of insurance 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. However, we do not place these individuals in any category when we discuss changes in enrollment in different types of health insurance. More information on the survey and our categorization is reported in Appendix A.

Our sample is limited to the working-age population, corresponding to individuals ages 16 to 64, who were not employed in agriculture or in the military. Individuals older than 65 qualify for Medicare. The reform did not make any changes on Medicare. Since availability of health insurance did not change for individuals older than 65, they are not included in 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

---

<sup>3</sup> The sample ends in August 2012.

of self-employment in their monthly Employment Report, the level of unincorporated self-employment is reported. The second category of self-employment defined by the BLS is incorporated self-employment, or those individuals who own corporations. While the BLS classifies unincorporated self-employed as self-employed, incorporated self-employed are classified as private wage and salary workers. We will refer to them collectively as total self-employed. While our main focus is on the unincorporated self-employment, we repeat our analysis for the incorporated self-employment and total self-employment. These results are reported in Appendix B.

## **4 Empirical Analysis**

Our main goal is to study the effect of the Massachusetts health care reform on the uninsured rate and the self-employment rate in the state. First, we evaluate the impact of the Massachusetts health care reform on the state's uninsured rate and the composition of health insurance types. Second, we focus on the self-employed individuals only and report the compositional shifts in their health insurance choices after the reform. Lastly, we quantify the effect of the reform on the self-employment rate in the state.

### **4.1 Uninsured Rate and Composition of Health Insurance in Massachusetts**

The main objective of the health care reform in Massachusetts was to reduce the uninsured rate in the state. We find evidence that the uninsured rate in Massachusetts fell dramatically in the post-reform period. Figure 1 shows the uninsured rate for the working-age population (ages 16 to 64) who are not employed in agriculture or the military in Massachusetts, the rest of the United States and the other Northeastern states. After 2006 and following the implementation of the reform, the uninsured rate in Massachusetts dropped from 14 percent to 5 percent. While the uninsured rate in the other Northeastern states decreased only one percentage point to 15 percent, the uninsured rate in the United States increased from 20 percent to 21 percent. Massachusetts has historically had a lower uninsured rate compared

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



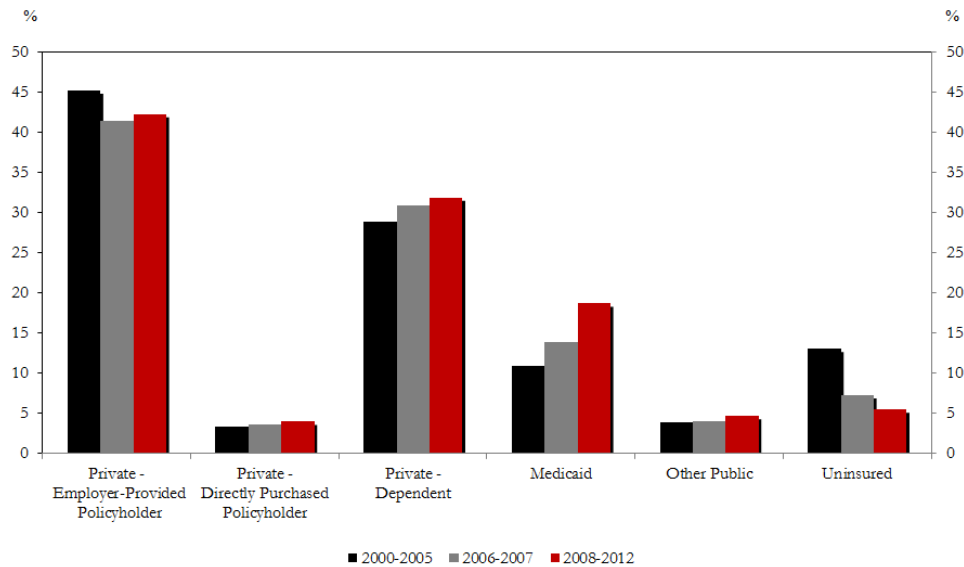
**Notes:** The comparison groups (other Northeastern states and the United States) do not include Massachusetts. Data are restricted to individuals ages 16 to 64 who do not work in agriculture or the military. Source: CPS Annual Social and Economic Supplement (ASEC) and authors' calculations.

to most other states, however, visual inspection clearly shows a dramatic decrease in the already low uninsured rate after the reform.

Figure 2 shows the composition of health insurance among the working-age population in Massachusetts. We consider averages for the years before the reform (2000-2005), the years during the reform (2006-2007), and the years after the reform (2008-2012). In the pre-reform period 77 percent of the population had some form of private health insurance. We group individuals with private insurance into three categories: policy-holders on employer-provided health insurance, policy-holders on directly purchased private insurance, and dependents on any private health insurance. In the pre-reform period, 45 percent of the population was policy-holders on employer-provided insurance or 29 percent were dependents.

Following the implementation of the reform, the uninsured rate declined from 14 percent to 5 percent in Massachusetts. The share of dependents increased from 29 percent to 32 percent. As the reform expanded Medicaid, the share of the population on Medicaid rose

**Figure 2: Composition of Health Insurance Among the Working-Age Population in Massachusetts**



Notes: Shares are of the working-age population in Massachusetts ages 16 to 64 who do not work in agriculture or the military. Some individuals may be double-counted in multiple categories due to the format of the CPS ASEC. Some individuals do not indicate which type of private insurance they have, so they are not included in a category. However, they remain in the total population. Source: CPS Annual Social and Economic Supplement (ASEC) and authors' calculations.

from 11 percent in the pre-reform period to 19 percent in the post-reform period. However, it must be noted that the increase in Medicaid enrollment was not unique to Massachusetts. Over the same time period the share of individuals enrolled in Medicaid increased in the nation as well, from 7.6 percent in the pre-reform period to 10.5 percent in the post-reform period.

#### 4.2 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, public health insurance, and Medicaid, we estimate a difference-in-differences regression of the following form:

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

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

where  $z_{sy}$  is the outcome of interest in a state  $s$  and year  $y$ . The outcome variables for this estimation are the uninsured rate, the share of individuals with private insurance, the share of individuals with public insurance, and the share of individuals with Medicaid. The model also includes state fixed effects  $\alpha_s$  and year fixed effects  $\gamma_y$  as well as 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, which are defined as years after 2006. This is the first model that we consider. The sample is from the ASEC and covers the period 1994-2012, 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. This is the second model that we consider. The effect of the 2001 recession in Massachusetts is represented by  $\beta_2$  and that 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 key coefficient of interest is  $\beta_1$ , which is the difference-in-differences estimate for the effect of the Massachusetts health care reform. 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 rest of the U.S. or to the other Northeastern states without the reform.

The difference-in-differences estimation is a standard technique used in the literature

studying the impacts of policy changes. As such, the problems related to inference are well-known. Bertrand et al. (2002) provides a great summary of the serial correlation problem which leads to biased standard errors in difference-in-differences estimations. In order to address this issue, we calculate standard errors clustered by state, and alternatively, we block bootstrap standard errors.

Table 1 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-point 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 percentage points in the uninsured rate.

Results are qualitatively very 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 reports a decline of 7.8 percentage points in the uninsured rate. Moreover, the uninsured rate declined by 2.4 percentage points due to the impact of the 2001 recession on Massachusetts.

Next, we consider changes in enrollment in private health insurance and Medicaid separately. Table 2 reports the regression results for the share of the working-age population with private health insurance. With the U.S. as the control group, both models show that the reform led to increased enrollment in private health insurance. After the reform, the share of the working-age population with private insurance in Massachusetts was 4.9 percentage points higher in the first model, and 5.1 percentage points higher in the second model. While enrollment rose 0.9 percentage points during the 2001 recessions, enrollment

**Table 1: The Effect of the Massachusetts Health Care Reform on the Uninsured Rate (1995-2012)**

	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	-8.556***	-8.938***	-7.522***	-7.786***
Cluster Robust SE	0.267	0.293	0.739	0.850
Block Bootstrap SE	0.246	0.271	0.679	0.780
MA * Recession (2001)		-2.103***		-2.382***
Cluster Robust SE		0.193		0.413
Block Bootstrap SE		0.187		0.383
MA * Recession (2008)		0.621***		0.195
Cluster Robust SE		0.184		0.489
Block Bootstrap SE		0.175		0.451
No. of Observations	918	918	162	162
$R^2$	0.867	0.867	0.783	0.786

**Note:** 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. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$ .

declined 0.5 percentage point as a result of the detrimental effects of the Great Recession in Massachusetts.

The results are very similar when the control group is changed to states in the Northeast. In the post-reform period, the share of the working-age population with private insurance in Massachusetts was 4.6 percentage points higher according to the first model and 4.7 percentage points higher according to the second model. Compared to the other Northeastern states, Massachusetts was not negatively affected by the 2001 recession, during which enrollment in private health insurance rose by 1.2 percentage points.

The effect of the reform on Medicaid enrollment is reported in Table 3. With the U.S. as the control group, the share of the working-age population on Medicaid in Massachusetts after the reform was 5.8 percentage points higher in the first model, and 6.1 percentage points higher in the second model. While Medicaid enrollment rose 1.4 percentage point due to the effect of the 2001 recession in Massachusetts, enrollment in Medicaid declined by 0.7



**Table 2: The Effect of the Massachusetts Health Care Reform on Private Health Insurance Enrollment (1995-2012)**

	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	4.888***	5.135***	4.561***	4.686***
Cluster Robust SE	0.257	0.251	0.565	0.594
Block Bootstrap SE	0.246	0.241	0.510	0.537
MA * Recession (2001)		0.899***		1.188**
Cluster Robust SE		0.223		0.430
Block Bootstrap SE		0.209		0.382
MA * Recession (2008)		-0.516**		-0.079
Cluster Robust SE		0.199		0.411
Block Bootstrap SE		0.191		0.378
No. of Observations	918	918	162	162
$R^2$	0.912	0.912	0.889	0.890

**Note:** 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. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$ .

percentage point due to the impact of the Great Recession in Massachusetts.

The results are largely unchanged when the control group is the other Northeastern states. The share of the working-age population on Medicaid rose by 4.3 percentage points after the reform according to the first model, and it rose 4.6 percentage points according to the second model. Due to the the impact of the 2001 recession in Massachusetts, Medicaid enrollment increased 1.2 percentage points.

To summarize, whether we compare Massachusetts with the rest of the nation or with the other Northeastern states, we find evidence that the reform has played a role in lowering the uninsured rate in the state 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 our main result that the reform played a statistically significant role in increasing health insurance enrollment in the state.

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

	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	5.751***	6.109***	4.312***	4.604***
Cluster Robust SE	0.268	0.287	0.843	0.947
Block Bootstrap SE	0.254	0.273	0.777	0.854
MA * Recession (2001)		1.382***		1.234**
Cluster Robust SE		0.150		0.305
Block Bootstrap SE		0.147		0.275
MA * Recession (2008)		-0.731***		-0.567
Cluster Robust SE		0.160		0.509
Block Bootstrap SE		0.154		0.432
No. of Observations	918	918	162	162
$R^2$	0.795	0.795	0.851	0.851

**Note:** 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. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$ .

### 4.3 Uninsured Rate and Composition of Health Insurance Among the Self-Employed in Massachusetts

In this section we focus only on the uninsured self-employed individuals. The uninsured rate for the self-employed was, on average, higher than the working-age population, primarily because the self-employed did not have access to employer-provided insurance or were not eligible for public health insurance programs. Averaging for the years before the reform (2000-2005), the years during the reform (2006-2007), and the years after the reform (2008-2012), Table 4 reports the uninsured rate for the self-employed in Massachusetts, the rest of the country, and the other Northeastern states. The uninsured rate for the self-employed in Massachusetts was cut in half from 20 percent before the reform to 10 percent after the reform. However, the uninsured rate for the rest of the nation and the other Northeastern states increased, suggesting that the Massachusetts health care reform led to a lower uninsured rate for the self-employed.

**Table 4: Uninsured Rates for the Self-Employed in Massachusetts, the other Northeastern States, and the United States**

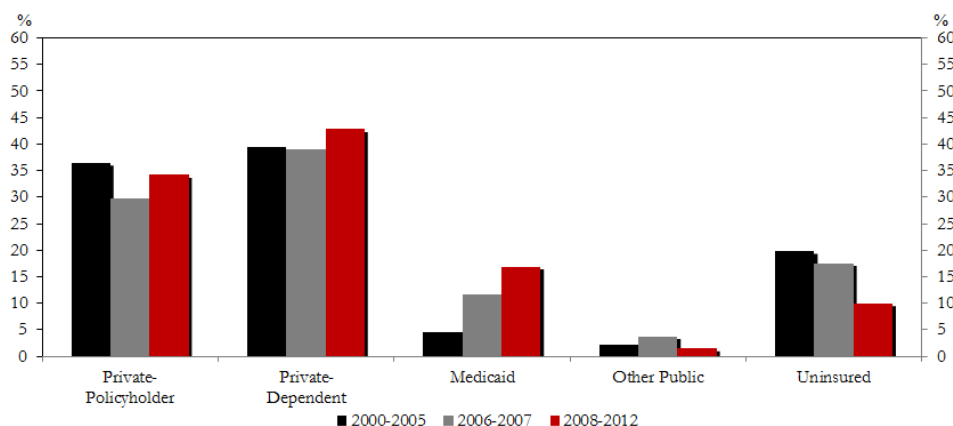
	Before Reform (2000-2005)	During Reform (2006-2007)	After Reform (2008-2012)
Massachusetts	20%	18%	10%
Northeastern States	26%	25%	28%
United States	31%	33%	36%

**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. Source: CPS Annual Social and Economic Supplement (ASEC) and authors' calculations.

Figure 3 shows the composition of health insurance types for the unincorporated self-employed individuals in Massachusetts. The self-employed individuals mostly relied on the private market for health insurance in the pre-reform period (2000-2005). They obtained private insurance either by purchasing an insurance policy directly from the private insurance market or by becoming a dependent on a family members health insurance policy. Pre-reform, 77 percent of the self-employed were privately insured: 37 percent had a plan in their own name and 40 percent were dependents. Public insurance was less common among the self-employed, but some obtained insurance through programs such as Medicaid, Medicare, or the Civilian Health and Medical Program of the Department of Veterans Affairs (CHAMPVA). Medicaid insured 5 percent of the self-employed, and other public insurance covered 2 percent of the self-employed.

After the health care reform was implemented in Massachusetts, the share of the self-employed individuals on private insurance plans as dependents and the share on public insurance programs rose. Private insurance still covered 77 percent of the self-employed, but the share corresponding to policyholders declined to 34 percent, and the share corresponding to dependents increased to 43 percent. The share of the self-employed on Medicaid rose to 17 percent. It must be noted that the increase in the share of the self-employed on Medicaid

**Figure 3: Composition of Health Insurance Among the Unincorporated Self-Employed in Massachusetts**



Notes: Shares are of the unincorporated self-employed in Massachusetts ages 16 to 64 who do not work in agriculture or the military. Some individuals may be double-counted in multiple categories due to the format of the CPS ASEC. Some individuals do not indicate which type of private insurance they have, so they are not included in a category. However, they remain in the total population. Source: CPS Annual Social and Economic Supplement (ASEC) and authors' calculations.

was not a phenomenon unique to Massachusetts. Over the same period, the share of the self-employed on Medicaid rose nationwide, from 3.8 percent in the pre-reform period to 7.1 percent in the post-reform period.

#### 4.4 The Effect of the Reform on the Self-Employment Rate

We discussed earlier the importance of access to health insurance on individuals' labor market decisions, such as whether they choose to work for an employer or establish their own businesses. In this section we study the effect of the Massachusetts health care reform on the state's self-employment rate.

The provisions of the reform might have influenced the relative cost and attractiveness of self-employment compared to paid-employment in two opposing ways. On one hand, the reform might have encouraged self-employment by providing easier access to other insurance options as alternatives to employer-provided 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. If employer-provided health insurance had been a barrier to entrepreneurship and self-employment, then the reform's provisions might have removed the barrier. This would decrease individuals' reliance on employers for access to health insurance and encourage self-employment. An increase in the number of employees with employer-provided insurance might have also supported their dependents who became or remained self-employed.

On the other hand, penalties for the uninsured individuals and for employers not offering insurance to their employees might have led to a decline in self-employment. The penalty for the uninsured individuals might have increased business costs for the self-employed individuals who were uninsured prior to the reform. At the same time, the penalty for employers not offering insurance might have led more employers to offer insurance, thus expanding the pool of jobs with employer-provided insurance. As insurance options for employees grew and 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 here.

5 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 PPACA took effect.

As documented in Hipple (2010), the share of the self-employed in total employment in

the United States 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 6.4 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 5.8 percent in the 2000-2005 period to 5.5 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 percent to 6.5 percent.

It is possible that changes in the self-employment share 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 4.6 percent in the United States. The average share in other Northeastern states was 4.2 percent, which was lower than the average share of 4.8 percent in Massachusetts. In the post-reform period (2008-2012), the average share of the self-employed declined at the national level, dropping 0.5 percentage point to 4.1 percent. The average share of the self-employed in other Northeastern states declined similarly from 4.2 to 3.8 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 might have supported self-employment in the state, preventing a sharp decline in the self-employment rate that other states have experienced. Earlier, we showed that more self-employed individuals obtained coverage in the forms of private health insurance and Medicaid after the reform was implemented. This easier access to health insurance might have been an underlying factor that supported self-employment in the state.

**Table 5: Self-Employment Rate in Massachusetts, Northeastern States, and the United States**

A. Share of Unincorporated Self-Employment in Total Employment

	Massachusetts	Northeastern States	United States
2000-2005	6.4%	5.8%	6.4%
2006-2007	6.4%	5.7%	6.4%
2008-2012	6.5%	5.5%	6.0%

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

	Massachusetts	Northeastern States	United States
2000-2005	4.8%	4.2%	4.6%
2006-2007	4.7%	4.1%	4.6%
2008-2012	4.6%	3.8%	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. Source: CPS and authors' calculations.

To determine whether the Massachusetts health care reform supported self-employment in the state, we estimate a slightly modified version of the difference-in-differences model used in the previous section. This time the data come from the monthly CPS survey. The regression we estimate is:

$$z_{smy} = \alpha_s + \gamma_m + \delta_y + \beta_1(s = MA) * (m > 200604) + \epsilon_{smy} \quad (3)$$

$$z_{smy} = \alpha_s + \gamma_m + \delta_y + \beta_1(s = MA) * (m > 200604) + \beta_2(s = MA) * (200103 < m < 200112) + \beta_3(s = MA) * (200712 < m < 200907) + \epsilon_{smy} \quad (4)$$

where  $z_{smy}$  represents the share of unincorporated self-employment in either total employment or the working-age population in a state  $s$  at month  $m$  and year  $y$ . As before, the model includes state fixed effects  $\alpha_s$ , year fixed effects  $\gamma_y$  and month fixed effects  $\delta_m$  and  $\epsilon_{smy}$  is the error term.

The effect of the Massachusetts reform is captured by the coefficient  $\beta_1$ , which is the

interaction term of Massachusetts and the months after the reform. In a second version of the model, we also account for the impacts of the 2001 recession and the Great Recession. The effects of the recessions in Massachusetts are captured by  $\beta_2$  and  $\beta_3$ , which are the coefficients of the interaction terms of Massachusetts with recession months. The model is estimated with two control groups: the U.S., excluding Massachusetts and the Northeastern states, excluding Massachusetts.

The key coefficient of interest is again,  $\beta_1$ , which is the difference-in-differences estimate of the effect of the Massachusetts Health Care Reform on the state's self-employment rate. This coefficient is identified by comparing the outcomes in Massachusetts after the reform to Massachusetts before the reform and to the control group. The identifying assumption is that the outcomes in Massachusetts for self-employment would not have evolved differently compared to the two control groups without the reform. As before, we calculate standard errors with clustering and bootstrapping.

Regression results presented in Table 6 show that the share of unincorporated self-employment in total employment in Massachusetts increased 0.5 percentage point after the reform when the control group is the rest of the U.S. Similarly, the share of unincorporated self-employment in total working-age population in Massachusetts, a definition less likely to be affected by the business cycle, increased 0.3 percentage point after the reform. The interaction terms of Massachusetts with recession dummies indicate that Massachusetts has been affected more by the negative effects of both the 2001 recession and the Great Recession compared to the rest of the nation. The estimates are not statistically significant when the other Northeastern states are used as the control group.

We repeat the estimation for the total self-employment rate. Results in Table 7 indicate that the reform led to a 0.5-percentage-point increase in the share of total self-employment (in total employment) when the control group is the rest of the nation. Controlling for the negative effects of the recessions in Massachusetts, the effect of the reform on the total self-employment rate becomes even stronger corresponding to an increase of 0.7 percentage point.



**Table 6: The Effect of Massachusetts Health Care Reform on Unincorporated Self-Employment (1995-2012)**

A. Dependent Variable: Share of Unincorporated Self-Employment in Total Employment				
	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(3)	(4)
MA * After	0.473***	0.509***	0.240	0.286
Cluster Robust SE	0.095	0.097	0.192	0.199
Block Bootstrap SE	0.094	0.096	0.178	0.183
MA * Recession (2001)		-0.203**		-0.131
Cluster Robust SE		0.081		0.248
Block Bootstrap SE		0.084		0.233
MA * Recession (2008)		-0.197***		-0.226
Cluster Robust SE		0.054		0.148
Block Bootstrap SE		0.051		0.135
No. of Observations	11424	11424	2016	2016
$R^2$	0.701	0.701	0.785	0.785

B. Dependent Variable: Share of Unincorporated Self-Employment in Total Working-Age Population				
	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(3)	(4)
MA * After	0.313***	0.344***	0.132	0.167
Cluster Robust SE	0.068	0.069	0.153	0.158
Block Bootstrap SE	0.067	0.068	0.142	0.146
MA * Recession (2001)		-0.147**		-0.095
Cluster Robust SE		0.060		0.200
Block Bootstrap SE		0.062		0.188
MA * Recession (2008)		-0.162***		-0.167
Cluster Robust SE		0.038		0.102
Block Bootstrap SE		0.036		0.093
No. of Observations	11424	11424	2016	2016
$R^2$	0.734	0.734	0.810	0.810

**Note:** 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. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$ .

The positive and statistically significant effect of the reform on the total self-employment rate in Massachusetts remains when the control group is changed to other Northeastern states and/or when the self-employment rate is defined as a share in total working-age population.

#### **4.5 Construction and Services**

More than 60 percent of the unincorporated self-employed worked in construction and services industries in Massachusetts. The services industry corresponds to all service industries excluding health and education services and financial services. Any trends or cyclical changes in 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, then our earlier results would not reflect the impact of the health care reform correctly.

Figure 4 shows the time series of the employment share of the construction industry in Massachusetts, the rest of the U.S. and the other Northeastern states. The national pattern is a steady increase throughout the 2000s until a big decline during the Great Recession. While the 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 2004, four 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 the positive effect of the health care reform on self-employment in the state. There seems to be a jump in the employment share of construction in Massachusetts after 2011, which is surprising.

Next, we consider the employment share of the services industries. Figure 5 shows that the services share of employment has been increasing steadily since 1995 in all states. Note that the share for all three groups shifts upward around 2003 due to the 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 and the average share in the other

**Table 7: The Effect of Massachusetts Health Care Reform on Total Self-Employment (1995-2012)**

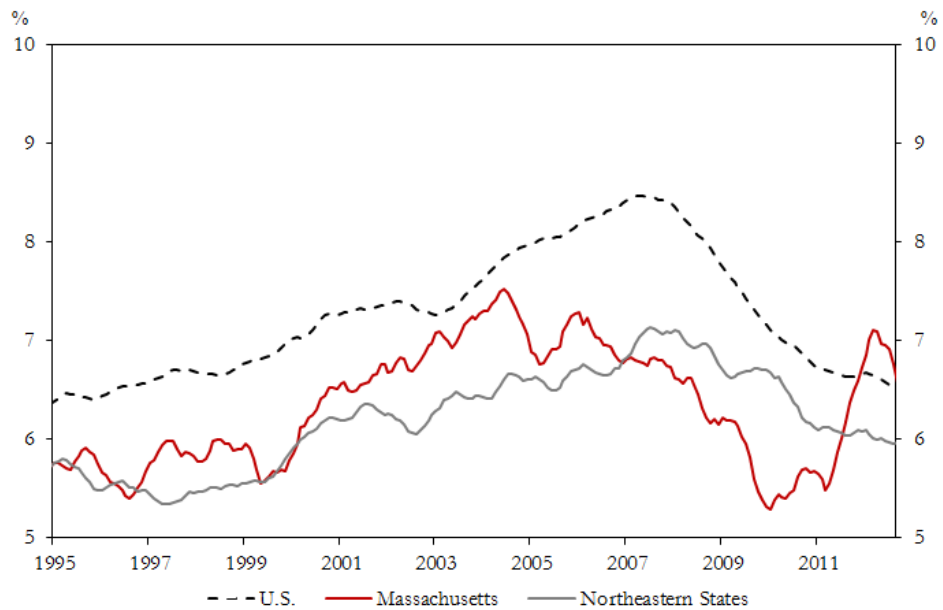
A. Dependent Variable: Share of Total Self-Employment in Total Employment				
	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(3)	(4)
MA * After	0.463***	0.673***	0.601***	0.822***
Cluster Robust SE	0.100	0.104	0.176	0.180
Block Bootstrap SE	0.097	0.102	0.167	0.168
MA * Recession (2001)		0.079		0.308
Cluster Robust SE		0.097		0.236
Block Bootstrap SE		0.102		0.222
MA * Recession (2008)		-0.871***		-0.868***
Cluster Robust SE		0.070		0.148
Block Bootstrap SE		0.068		0.132
No. of Observations	11424	11424	2016	2016
$R^2$	0.685	0.685	0.754	0.755

B. Dependent Variable: Share of Total Self-Employment in Total Working-Age Population				
	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(3)	(4)
MA * After	0.325***	0.488***	0.400**	0.564**
Cluster Robust SE	0.067	0.069	0.142	0.142
Block Bootstrap SE	0.066	0.068	0.135	0.134
MA * Recession (2001)		0.069		0.226
Cluster Robust SE		0.071		0.199
Block Bootstrap SE		0.075		0.187
MA * Recession (2008)		-0.673***		-0.647***
Cluster Robust SE		0.051		0.107
Block Bootstrap SE		0.048		0.098
No. of Observations	11424	11424	2016	2016
$R^2$	0.731	0.731	0.797	0.797

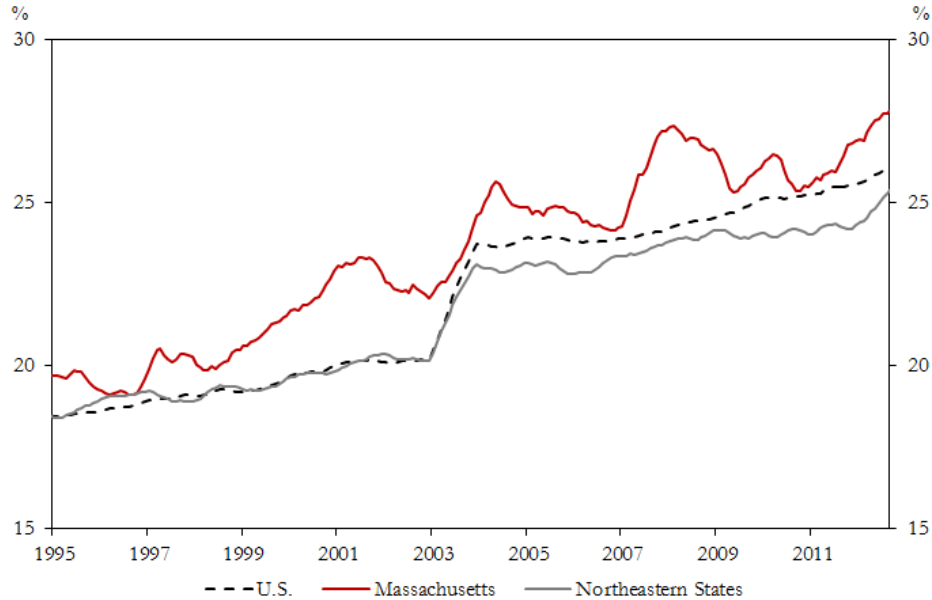
**Note:** Data are restricted to individuals ages 16-64 who are not employed in agriculture or the military. The Northeastern states include: Vermont, New Hampshire, Maine, Connecticut, Rhode Island, New Jersey, New York, Pennsylvania and New York. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$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

Figure 4: 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. Shares are calculated as 12-month-moving-averages. 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 5: 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. Shares are calculated as 12-month-moving-averages. 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.

Northeastern states. The expansion of the services industries might be associated with the aggregate self-employment share in Massachusetts. If this is the case, then again, our earlier results would be strengthened.

In order to control for the effects of the changes in the construction and services industries, we add the employment share of these industries as regressors to our earlier regressions. Tables 8, 9 and 10 report the estimated coefficients. The expansions in construction and services industries had statistically significant effects on the aggregate self-employment rate in the state. However, the impact was small, with the coefficient estimate falling between 0.08 to 0.2 percentage point, varying based on the model and the control group. More importantly, the statistically significant and positive effect of the health care reform on the self-employment rate in Massachusetts remained in all regressions. While only unincorpo-

rated self-employed are considered in these regressions, we also repeat the analysis for the share of total self-employed. The results are unchanged and the estimates are reported in Appendix B.

## **5 What would have happened to Self-Employment Rate in Massachusetts without the reform?**

The previous section showed evidence that the health care reform in Massachusetts led to a higher self-employed rate in the state. In this section, we use the synthetic control method to create a “synthetic” Massachusetts in order to discern how the state would have progressed without the reform. This method was introduced in Abadie & Gardeazabal (2003), Abadie et al. (2010) and Abadie et al. (2014), and is described in detail in Abadie et al. (2011).

A key step in applying the synthetic control method is to form a control unit 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 potential determinants of the state’s self-employment rate in the pre-reform period of 2000-2005. Table 11 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 are more likely to be married, male, and prime aged or older compared to the employees in the state. Additionally Table 12 shows the distribution of the unincorporated self-employed and employees in industries and occupations. Most of the self-employed are concentrated in the services and construction industries relative to the employees in the state.

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: the labor force participation rate, the employment to population ratio and the unemployment rate. Second, there are the insurance variables from the ASEC: the uninsured rate, the share of individuals

**Table 8: Accounting for the Effect of Construction Industry on Unincorporated Self-Employment (1995-2012)**

A. Dependent Variable: Share of Unincorporated Self-Employment in Total Employment

	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	0.495***	0.514***	0.333*	0.354*
Cluster Robust SE	0.096	0.098	0.186	0.193
Block Bootstrap SE	0.095	0.097	0.174	0.179
Construction	0.102***	0.102***	0.189***	0.189***
Cluster Robust SE	0.025	0.025	0.039	0.040
Block Bootstrap SE	0.025	0.025	0.034	0.035
MA * Recession (2001)		-0.223***		-0.117
Cluster Robust SE		0.079		0.271
Block Bootstrap SE		0.082		0.255
MA * Recession (2008)		-0.131**		-0.118
Cluster Robust SE		0.079		0.271
Block Bootstrap SE		0.053		0.153
No. of Observations	11424	11424	2016	2016
$R^2$	0.705	0.705	0.792	0.792

B. Dependent Variable: Share of Unincorporated Self-Employment in Total Working-Age Population

	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	0.331***	0.348***	0.203	0.219
Cluster Robust SE	0.068	0.069	0.149	0.153
Block Bootstrap SE	0.067	0.068	0.140	0.143
Construction	0.084***	0.084***	0.144**	0.144***
Cluster Robust SE	0.017	0.017	0.035	0.036
Block Bootstrap SE	0.017	0.017	0.031	0.031
MA * Recession (2001)		-0.163***		-0.084
Cluster Robust SE		0.059		0.216
Block Bootstrap SE		0.060		0.204
MA * Recession (2008)		-0.107***		-0.086
Cluster Robust SE		0.059		0.216
Block Bootstrap SE		0.037		0.109
No. of Observations	11424	11424	2016	2016
$R^2$	0.738	0.738	0.815	0.815

**Note:** 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 9: Accounting for the Effect of Services Industry on Unincorporated Self-Employment (1995-2012)**

A. Dependent Variable: Share of Unincorporated Self-Employment in Total Employment

	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	0.448***	0.472***	0.186	0.220
Cluster Robust SE	0.088	0.090	0.163	0.166
Block Bootstrap SE	0.087	0.089	0.153	0.155
Services	0.102***	0.102***	0.117***	0.117***
Cluster Robust SE	0.013	0.013	0.025	0.025
Block Bootstrap SE	0.013	0.013	0.023	0.023
MA * Recession (2001)		-0.355***		-0.261
Cluster Robust SE		0.087		0.227
Block Bootstrap SE		0.091		0.215
MA * Recession (2008)		-0.183***		-0.204
Cluster Robust SE		0.087		0.227
Block Bootstrap SE		0.051		0.136
No. of Observations	11424	11424	2016	2016
$R^2$	0.710	0.710	0.793	0.793

B. Dependent Variable: Share of Unincorporated Self-Employment in Total Working Age Population

	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	0.295***	0.317***	0.090	0.115
Cluster Robust SE	0.063	0.064	0.129	0.130
Block Bootstrap SE	0.063	0.064	0.122	0.123
Services	0.073***	0.073***	0.091***	0.092***
Cluster Robust SE	0.010	0.010	0.022	0.022
Block Bootstrap SE	0.010	0.010	0.020	0.020
MA * Recession (2001)		-0.256***		-0.196
Cluster Robust SE		0.064		0.182
Block Bootstrap SE		0.067		0.172
MA * Recession (2008)		-0.152***		-0.150
Cluster Robust SE		0.064		0.182
Block Bootstrap SE		0.036		0.095
No. of Observations	11424	11424	2016	2016
$R^2$	0.741	0.741	0.817	0.817

**Note:** 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 10: Accounting for the Effects of Construction and Services Industries on Unincorporated Self-Employment (1995-2012)**

A. Dependent Variable: Share of Unincorporated Self-Employment in Total Employment				
	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	0.472***	0.475***	0.283*	0.289*
Cluster Robust SE	0.088	0.090	0.153	0.156
Block Bootstrap SE	0.088	0.090	0.146	0.148
Construction	0.123***	0.123***	0.207***	0.207***
Cluster Robust SE	0.024	0.024	0.038	0.039
Block Bootstrap SE	0.088	0.024	0.146	0.036
Services	0.111***	0.123***	0.126***	0.207***
Cluster Robust SE	0.013	0.024	0.026	0.039
Block Bootstrap SE	0.013	0.024	0.024	0.036
MA * Recession (2001)		-0.392***		-0.256
Cluster Robust SE		0.084		0.253
Block Bootstrap SE		0.088		0.238
MA * Recession (2008)		-0.102*		-0.084
Cluster Robust SE		0.084		0.253
Block Bootstrap SE		0.051		0.155
No. of Observations	11424	11424	2016	2016
$R^2$	0.715	0.715	0.801	0.801

B. Dependent Variable: Share of Unincorporated Self-Employment in Total Working Age Population				
	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	0.315***	0.320***	0.164	0.168
Cluster Robust SE	0.063	0.064	0.123	0.123
Block Bootstrap SE	0.063	0.064	0.117	0.118
Construction	0.099***	0.099***	0.158***	0.158***
Cluster Robust SE	0.016	0.016	0.034	0.035
Block Bootstrap SE	0.063	0.016	0.117	0.031
Services	0.080***	0.099***	0.099***	0.158***
Cluster Robust SE	0.010	0.016	0.022	0.035
Block Bootstrap SE	0.010	0.016	0.021	0.031
MA * Recession (2001)		-0.286**		-0.193
Cluster Robust SE		0.062		0.200
Block Bootstrap SE		0.065		0.189
MA * Recession (2008)		-0.086**		-0.059
Cluster Robust SE		0.062		0.200
Block Bootstrap SE		0.037		0.111
No. of Observations	11424	11424	2016	2016
$R^2$	0.747	0.747	0.823	0.823

**Note:** 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 11: Demographic Characteristics for Unincorporated Self-Employed and Employees (2000-2005 Average)**

	Uninc.SE	Employees
Married	70%	56%
White	95%	89%
Female	37%	49%
Young (16-24 yrs old)	3%	15%
Prime (25-54 yrs old)	77%	73%
Older (55-64 yrs old)	20%	12%
Less than High School	6%	9%
High School	28%	28%
Some College	22%	24%
Bachelor's or higher	44%	39%

**Note:** Data are restricted to individuals ages 16-64 who are residents of Massachusetts and not employed in agriculture or the military.

**Table 12: Industry and Occupation Distribution for Unincorporated Self-Employed and Employees (2000-2005) average**

	Uninc. SE	Employees
<b>Industry</b>		
Construction	25%	6%
Mfg	4%	13%
Retail	12%	17%
Transportation	5%	6%
Financial	6%	8%
Health/Ed	11%	24%
Other Svc.	38%	23%
<b>Occupation</b>		
Mgmt	16%	17%
Professional	25%	25%
Services	12%	15%
Sales	13%	11%
Admin	3%	14%
Trades	28%	15%
Transportation	3%	4%

**Note:** Data are restricted to individuals ages 16-64 who are residents of Massachusetts and not employed in agriculture or the military.

with Medicaid, the share of individuals who were policyholders on an employer-provided plan, dependents on an employer-provided plan, who were policyholders on a directly purchased private plan, or who were dependents on a directly purchased private plan. Third, there are the demographic characteristics summarized above: the share of individuals who were married, prime age, older age, white, male, employed in construction, and employed in services.

We estimate the effect of the health care reform in Massachusetts on the state's self-employment rate as the difference in rates between Massachusetts and its synthetic version in the years after the passage of the reform.

Figure 6 shows the divergence between the data for Massachusetts and the generated series for the synthetic control unit in the post-reform period. 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 declined by 1.3 percentage point to 5.1 percent in the synthetic version. This result is in line with our earlier results indicating that the Massachusetts health care reform did have a positive effect on the self-employment rate in the state.

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

The Massachusetts Health Care Reform Act of 2006 and the PPACA share the four key provisions: an individual mandate, an employer mandate, an insurance exchange with subsidies, and public health insurance expansions. Based on Massachusetts's experience, we can argue that the PPACA may have similar effects at the national level. For example, given that there was a steep decline in the uninsured rate in Massachusetts, we can 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 declined from 18 percent in the fourth quarter of 2013 to 13.4 percent in the second quarter of 2014.

**Figure 6: Unincorporated Self-Employment Rate in Massachusetts vs. the Synthetic Control Group**



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

The PPACA may also encourage self-employment at the national level as the law expands health insurance options for the self-employed, and may remove a barrier to self-employment. A recent report by the Congressional Budget Office indicates that the discouraging influence of the reform on self-employment could be even weaker 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.

That being said, the national experience can also be different from Massachusetts's experience. First of all, Massachusetts is not representative of the whole nation. Second, there are some differences between the two health care reforms. For example, the employer mandate threshold for the PPACA is 50 full-time-equivalent employees, which is less restrictive than the 10 full-time-equivalent employees threshold in Massachusetts. The PPACA's Medicaid expansion (to all individuals below 133% of the FPL) is less generous than the expansion in the reform in Massachusetts. Additionally, 24 states have not accepted the Medicaid expansion, leaving a gap that was not originally intended in the law's creation. Furthermore, there have been some obstacles in the implementation of the PPACA. Aside from numerous attempts to repeal the entire legislation, there have been two Supreme Court cases addressing the constitutionality of various aspects of the law, evolving guidance from the White House and the Internal Revenue Service (IRS) over the interpretation of the law and its enforcement. There have also 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.

## 7 Conclusion

This paper studied the effects of the health care reform in Massachusetts on the the uninsured rate and the aggregate self-employment rate in the state. Massachusetts has historically had a lower uninsured rate compared to most other states, however, there was a dramatic decrease in the already low uninsured rate in Massachusetts 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 14 percent to 5 percent after 2006. During the same period, the uninsured rate in the other Northeastern states decreased only one percentage point to 15 percent, and the uninsured rate in the United States increased from 20 percent to 21 percent.

Next, we focused only on the unincorporated self-employed individuals in the state. Historically, the uninsured rate for the self-employed has been higher compared to the working-age population, primarily because the self-employed did not have access to employer-provided insurance or were not eligible for public health insurance programs. Following the implementation of the reform, the uninsured rate for the self-employed was cut in half from 20 percent to 10 percent in Massachusetts. On the contrary, the uninsured rate for the self-employed rose in the rest of the nation and other Northeastern states during the same period.

Considering the self-employment rate in the state, the provisions of the reform had two opposing effects on self-employment. On one hand, the reform might have encouraged self-employment by providing easier access to other insurance options as alternatives to employer-provided 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. If employer-provided health insurance had been a barrier to entrepreneurship and self-employment, then the reform's provisions might have removed this barrier. On the other hand, penalties for

the uninsured individuals and for employers not offering insurance to their employees might have led to a decline in self-employment. The penalty for the uninsured individuals might have increased business costs for the self-employed individuals who were uninsured before the reform. At the same time, the penalty for employers not offering insurance might have led more employers to offer insurance, thus expanding the pool of jobs with employer-provided insurance. As insurance options for employees grew and the relative cost of self-employment increased, some individuals might have preferred paid-employment to self-employment.

To quantify the effect of the reform on the self-employment rate in the state, we used data from the monthly CPS for the period 1994-2012. Employing difference-in-differences regressions that control for state and time fixed effects, along with the effects of the recessions on Massachusetts, we found that the first effect dominated and that the reform had a statistically significant positive effect on the state's self-employment rate. Additionally, we used the synthetic control method to confirm that the self-employment rate in Massachusetts following the reform was in fact higher than it would have been without the reform.

The Massachusetts reform and the PPACA share many core features. As such, Massachusetts's experience can be informative about the potential impact of the PPACA on the national uninsured rate and the self-employment rate. Eventhough there have been delays and difficulties in implementing the full breadth of the PPACA, the national uninsured rate has already declined in 2014. Evidence from Massachusetts suggests that the PPACA may lead to a higher self-employment rate in the nation as well.

## References

- Abadie, A., Diamond, A., & Hainmueller, J. (2010). Synthetic control methods for comparative case studies: Estimating the effect of california’s tobacco control program. *Journal of the American Statistical Association*, *105*(490), 493–505.
- Abadie, A., Diamond, A., & Hainmueller, J. (2011). Synth: An r package for synthetic control methods in comparative case studies. *Journal of Statistical Software*, *42*(13).
- Abadie, A., Diamond, A., & Hainmueller, J. (2014). Comparative politics and the synthetic control method. *American Journal of Political Science*, *00*(0), 1–16.
- Abadie, A., & Gardeazabal, J. (2003). The economic costs of conflict: A case study of the basque country. *American Economic Review*, *93*(1), 113–132.
- Bertrand, M., Duflo, E., & Mullainathan, S. (2002). How much should we trust differences-in-differences estimates? *NBER Working Paper*, No. w8841.
- Gruber, J., & Madrian, B. C. (1997). Employment separation and health insurance coverage. *Journal of Public Economics*, *66*(3), 349–382.
- Gumus, G., & Regan, T. L. (2014). Self-employment and the role of health insurance in the us. *Journal of Business Venturing*.
- Gurley-Calvez, T. (2011). Will tax-baed health insurance reform help the self-employed stay in business? *Contemporary Economic Policy*, *29*(3), 441–460.
- Heim, B. T., & Lurie, I. Z. (2010). The effect of self-employed health insurance subsidies on self-employment. *Journal of Public Economics*, *94*(11), 995–1007.
- Heim, B. T., & Lurie, I. Z. (2012). Did the 2006 massachusetts health reform affect the decision to be self-employed? evidence from tax data. *Working Paper*.
- Hipple, S. F. (2010). Self-employment in the united states. *Monthly Labor Review*.



- Long, S. K., Stockley, K., & Yemane, A. (2009). Another look at the impacts of health reform in massachusetts: Evidence using new data and a stronger model. *American Economic Review: Papers Proceedings*, 99(2), 508–511.
- Madrian, B. C. (1994). Employment-based health insurance and job mobility: Is there evidence of job-lock? *The Quarterly Journal of Economics*, 109(1), 27–54.
- Niu, X. (2012). Essays in applied microeconomics (unpublished doctoral dissertation). *Princeton University, New Jersey*.
- Wellington, A. J. (2001). Health insurance coverage and entrepreneurship. *Contemporary Economic Policy*, 19(4), 465–478.

## 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 in the survey 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 has TRICARE, CHAMPUS, or military health care, OTYP\_2 asks 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. A similar categorization is done for private 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 PPACA, 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 by 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.

## **9 Appendix B: Incorporated and Total Self-Employment**

While we presented the main results for the unincorporated self-employed in the text, in this Appendix we repeat the regressions for the incorporated self-employed and total self-employed.

**Table 13: Results for share of incorporated self-employment (1995-2012)**

A. Dependent Variable: Incorporated Self-Employed as a Share of Total Employment				
	US Control Group		NE States Control Group	
	(1)	(2)	(3)	(4)
MA * After	-0.010	0.164***	0.361***	0.536***
Cluster Robust SE	0.059	0.058	0.099	0.084
Block Bootstrap SE	0.056	0.056	0.094	0.079
MA * Recession (2001)		0.282***		0.439**
Cluster Robust SE		0.047		0.101
Block Bootstrap SE		0.047		0.096
MA * Recession (2008)		-0.674***		-0.643***
Cluster Robust SE		0.045		0.107
Block Bootstrap SE		0.043		0.102
No. of Observations	11424	11424	2016	2016
$R^2$	0.494	0.495	0.396	0.400

B. Dependent Variable: Incorporated Self-Employed as a Share of working-age Population				
	US Control Group		NE States Control Group	
	(1)	(2)	(3)	(4)
MA * After	0.012	0.145***	0.267***	0.398***
Cluster Robust SE	0.042	0.040	0.074	0.062
Block Bootstrap SE	0.040	0.039	0.070	0.058
MA * Recession (2001)		0.216***		0.321***
Cluster Robust SE		0.034		0.073
Block Bootstrap SE		0.035		0.070
MA * Recession (2008)		-0.511***		-0.479***
Cluster Robust SE		0.033		0.082
Block Bootstrap SE		0.031		0.078
No. of Observations	11424	11424	2016	2016
$R^2$	0.519	0.519	0.428	0.432

**Note:** 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 14: Results for share of incorporated self-employment with construction(1995-2012)**

A. Dependent Variable: Incorporated Self-Employed as a Share of Total Employment				
	US Control Group		NE States Control Group	
	(1)	(2)	(3)	(4)
MA * After	-0.005	0.166***	0.382***	0.550***
Cluster Robust SE	0.060	0.058	0.109	0.091
Block Bootstrap SE	0.057	0.056	0.103	0.086
Construction	0.026	0.026	0.043	0.039
Cluster Robust SE	0.016	0.016	0.030	0.032
Block Bootstrap SE	0.016	0.016	0.030	0.032
MA * Recession (2001)		0.277***		0.442***
Cluster Robust SE		0.047		0.101
Block Bootstrap SE		0.047		0.096
MA * Recession (2008)		-0.658***		-0.621***
Cluster Robust SE		0.047		0.101
Block Bootstrap SE		0.042		0.109
No. of Observations	11424	11424	2016	2016
$R^2$	0.495	0.496	0.398	0.402

B. Dependent Variable: Incorporated Self-Employed as a Share of working-age Population				
	US Control Group		NE States Control Group	
	(1)	(2)	(3)	(4)
MA * After	0.018	0.146***	0.282***	0.408***
Cluster Robust SE	0.042	0.041	0.081	0.067
Block Bootstrap SE	0.040	0.039	0.076	0.063
Construction	0.027**	0.026**	0.031	0.029**
Cluster Robust SE	0.012	0.012	0.022	0.023
Block Bootstrap SE	0.012	0.012	0.022	0.023
MA * Recession (2001)		0.212***		0.323***
Cluster Robust SE		0.034		0.073
Block Bootstrap SE		0.035		0.070
MA * Recession (2008)		-0.494**		-0.463***
Cluster Robust SE		0.034		0.073
Block Bootstrap SE		0.031		0.083
No. of Observations	11424	11424	2016	2016
$R^2$	0.520	0.521	0.430	0.434

**Note:** 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 15: Results for share of incorporated self-employment with other services(1995-2012)**

A. Dependent Variable: Incorporated Self-Employed as a Share of Total Employment				
	US Control Group		NE States Control Group	
	(1)	(2)	(3)	(4)
MA * After	-0.016	0.156***	0.348***	0.521***
Cluster Robust SE	0.060	0.059	0.106	0.093
Block Bootstrap SE	0.057	0.057	0.099	0.087
Other Services	0.023**	0.023**	0.027**	0.026
Cluster Robust SE	0.010	0.010	0.025	0.025
Block Bootstrap SE	0.010	0.010	0.022	0.022
MA * Recession (2001)		0.248***		0.410***
Cluster Robust SE		0.048		0.104
Block Bootstrap SE		0.048		0.098
MA * Recession (2008)		-0.671***		-0.638***
Cluster Robust SE		0.048		0.104
Block Bootstrap SE		0.043		0.098
No. of Observations	11424	11424	2016	2016
$R^2$	0.496	0.496	0.398	0.402

B. Dependent Variable: Incorporated Self-Employed as a Share of working-age Population				
	US Control Group		NE States Control Group	
	(1)	(2)	(3)	(4)
MA * After	0.009**	0.140***	0.258***	0.386***
Cluster Robust SE	0.042	0.041	0.080	0.070
Block Bootstrap SE	0.041	0.040	0.075	0.065
Other Services	0.013***	0.013*	0.020	0.020
Cluster Robust SE	0.007	0.007	0.020	0.020
Block Bootstrap SE	0.007	0.007	0.018	0.017
MA * Recession (2001)		0.197***		0.300***
Cluster Robust SE		0.036		0.076
Block Bootstrap SE		0.036		0.072
MA * Recession (2008)		-0.509***		-0.476***
Cluster Robust SE		0.036		0.076
Block Bootstrap SE		0.031		0.076
No. of Observations	11424	11424	2016	2016
$R^2$	0.519	0.520	0.430	0.434

**Note:** 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 16: Results for share of incorporated self-employment with construction and other services(1995-2012)**

A. Dependent Variable: Incorporated Self-Employed as a Share of Total Employment

	US Control Group		NE States Control Group	
	(1)	(2)	(3)	(4)
MA * After	-0.010	0.157***	0.370***	0.536***
Cluster Robust SE	0.061	0.059	0.115	0.099
Block Bootstrap SE	0.058	0.057	0.108	0.093
Construction	0.031*	0.030**	0.047	0.043
Cluster Robust SE	0.016	0.016	0.030	0.032
Block Bootstrap SE	0.058	0.016	0.108	0.032
Other Services	0.025**	0.030**	0.030	0.043
Cluster Robust SE	0.010	0.016	0.025	0.032
Block Bootstrap SE	0.010	0.016	0.023	0.032
MA * Recession (2001)		0.239***		0.411***
Cluster Robust SE		0.048		0.103
Block Bootstrap SE		0.048		0.098
MA * Recession (2008)		-0.651***		-0.613***
Cluster Robust SE		0.048		0.103
Block Bootstrap SE		0.042		0.105
No. of Observations	11424	11424	2016	2016
$R^2$	0.497	0.497	0.400	0.404

B. Dependent Variable: Incorporated Self-Employed as a Share of working-age Population

	US Control Group		NE States Control Group	
	(1)	(2)	(3)	(4)
MA * After	0.015	0.141***	0.274***	0.397***
Cluster Robust SE	0.043	0.041	0.087	0.075
Block Bootstrap SE	0.041	0.040	0.080	0.069
Construction	0.030**	0.029**	0.034	0.032
Cluster Robust SE	0.012	0.012	0.023	0.024
Block Bootstrap SE	0.041	0.012	0.080	0.024
Other Services	0.015**	0.029**	0.022	0.032
Cluster Robust SE	0.007	0.012	0.021	0.024
Block Bootstrap SE	0.007	0.012	0.018	0.024
MA * Recession (2001)		0.189***		0.300***
Cluster Robust SE		0.036		0.075
Block Bootstrap SE		0.036		0.072
MA * Recession (2008)		-0.490***		-0.457***
Cluster Robust SE		0.036		0.075
Block Bootstrap SE		0.031		0.081
No. of Observations	11424	11424	2016	2016
$R^2$	0.521	0.522	0.432	0.436

**Note:** 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 17: Accounting for the Effect of Construction Industry on Total Self-Employment (1995-2012)**

A. Dependent Variable: Share of Total Self-Employment in Total Employment

	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	0.490***	0.680***	0.715***	0.904***
Cluster Robust SE	0.104	0.107	0.182	0.183
Block Bootstrap SE	0.101	0.104	0.177	0.175
Construction	0.128***	0.128***	0.232***	0.228***
Cluster Robust SE	0.028	0.028	0.062	0.064
Block Bootstrap SE	0.029	0.029	0.057	0.060
MA * Recession (2001)		0.055		0.325
Cluster Robust SE		0.095		0.266
Block Bootstrap SE		0.099		0.250
MA * Recession (2008)		-0.788*		-0.739***
Cluster Robust SE		0.095		0.266
Block Bootstrap SE		0.069		0.156
No. of Observations	11424	11424	2016	2016
$R^2$	0.689	0.689	0.762	0.763

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

	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(3)	(4)
MA * After	0.349***	0.494***	0.486***	0.626***
Cluster Robust SE	0.069	0.070	0.146	0.144
Block Bootstrap SE	0.068	0.069	0.142	0.139
Construction	0.111**	0.110***	0.175***	0.172***
Cluster Robust SE	0.019	0.019	0.053	0.054
Block Bootstrap SE	0.019	0.019	0.048	0.049
MA * Recession (2001)		0.048		0.239
Cluster Robust SE		0.069		0.220
Block Bootstrap SE		0.073		0.207
MA * Recession (2008)		-0.601***		-0.549***
Cluster Robust SE		0.069		0.220
Block Bootstrap SE		0.050		0.117
No. of Observations	11424	11424	2016	2016
$R^2$	0.736	0.736	0.803	0.803

**Note:** 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 18: Accounting for the Effect of Services Industry on Total Self-Employment (1995-2012)**

A. Dependent Variable: Share of Total Self-Employment in Total Employment

	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(3)	(4)
MA * After	0.432***	0.629***	0.534***	0.741***
Cluster Robust SE	0.091	0.095	0.132	0.129
Block Bootstrap SE	0.090	0.095	0.130	0.127
Services	0.125***	0.125***	0.144***	0.143***
Cluster Robust SE	0.014	0.014	0.027	0.027
Block Bootstrap SE	0.014	0.014	0.024	0.024
MA * Recession (2001)		-0.107		0.150
Cluster Robust SE		0.099		0.204
Block Bootstrap SE		0.105		0.196
MA * Recession (2008)		-0.854***		-0.842***
Cluster Robust SE		0.099		0.204
Block Bootstrap SE		0.067		0.126
No. of Observations	11424	11424	2016	2016
$R^2$	0.694	0.694	0.763	0.764

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

	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	0.304***	0.457***	0.348***	0.501***
Cluster Robust SE	0.063	0.064	0.108	0.104
Block Bootstrap SE	0.062	0.063	0.106	0.102
Services	0.086***	0.086***	0.112***	0.111***
Cluster Robust SE	0.010	0.010	0.026	0.026
Block Bootstrap SE	0.010	0.010	0.023	0.023
MA * Recession (2001)		-0.058		0.103
Cluster Robust SE		0.072		0.172
Block Bootstrap SE		0.077		0.165
MA * Recession (2008)		-0.661***		-0.626***
Cluster Robust SE		0.072		0.172
Block Bootstrap SE		0.048		0.094
No. of Observations	11424	11424	2016	2016
$R^2$	0.738	0.739	0.804	0.805

**Note:** 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 19: Accounting for the Effects of Construction and Services Industries on Total Self-Employment (1995-2012)**

A. Dependent Variable: Share of Total Self-Employment in Total Employment

	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	0.462***	0.632***	0.653***	0.825***
Cluster Robust SE	0.095	0.097	0.140	0.134
Block Bootstrap SE	0.094	0.096	0.141	0.134
Construction	0.154***	0.153***	0.254***	0.250***
Cluster Robust SE	0.027	0.027	0.063	0.064
Block Bootstrap SE	0.094	0.028	0.141	0.062
Services	0.137***	0.153***	0.156***	0.250***
Cluster Robust SE	0.014	0.027	0.029	0.064
Block Bootstrap SE	0.014	0.028	0.027	0.062
MA * Recession (2001)		-0.153		0.156
Cluster Robust SE		0.096		0.237
Block Bootstrap SE		0.101		0.226
MA * Recession (2008)		-0.753***		-0.697***
Cluster Robust SE		0.096		0.237
Block Bootstrap SE		0.067		0.151
No. of Observations	11424	11424	2016	2016
$R^2$	0.700	0.700	0.772	0.773

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

	Control Group: the U.S.		Control Group: NE States	
	(1)	(2)	(1)	(2)
MA * After	0.329***	0.460***	0.438***	0.565***
Cluster Robust SE	0.065	0.065	0.116	0.108
Block Bootstrap SE	0.064	0.064	0.115	0.108
Construction	0.129***	0.128***	0.192***	0.189***
Cluster Robust SE	0.018	0.018	0.053	0.054
Block Bootstrap SE	0.064	0.019	0.115	0.051
Services	0.096***	0.128***	0.121***	0.189***
Cluster Robust SE	0.010	0.018	0.027	0.054
Block Bootstrap SE	0.010	0.019	0.025	0.051
MA * Recession (2001)		-0.097		0.108
Cluster Robust SE		0.070		0.194
Block Bootstrap SE		0.074		0.187
MA * Recession (2008)		-0.576***		-0.516***
Cluster Robust SE		0.070		0.194
Block Bootstrap SE		0.049		0.115
No. of Observations	11424	11424	2016	2016
$R^2$	0.745	0.745	0.812	0.812

**Note:** 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. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$ .