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Evidence from Massachusetts

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Abstract

We examine the effects of the employer mandate of Massachusetts Health Care Reform, using Current Population Survey data covering the years 2003 to 2013. Relying on a variation of the classical Fisher permutation test, we find that Massachusetts' employer mandate increased insurance coverage over time compared to other states. We find no statistically significant support for the hypothesized labor market contractions in aggregate due to the mandate. Instead its primary detectable effects were on a group of people with low rates of coverage in the voluntary market in the form of increased reliance on exempt part-time workers and decreased working hours.

Key words: health mandate, health insurance coverage, labor market

JEL codes: H51, J23, J31

Introduction

Health reform remains a top priority on the national agenda, with many proposals drawing on Massachusetts' 2006 health reform. The passage of the federal health reform, Affordable Care Act (ACA), provides a promising experiment that would allow a nationwide assessment of the tradeoff between near-universal health insurance coverage and possible contraction in the labor market. While most key provisions have been effective since 2013, one of the more controversial aspect— the employer mandate, was delayed until 2015. Most federal government forecasts of ACA effects draw on evidence from Massachusetts by pointing out that Massachusetts' health reform is also designed to expand insurance coverage. As Jonathan Gruber (2011a) put it 'We actually ran this experiment in Massachusetts.' Although much is known about the initial impacts of reform in Massachusetts, the initiatives continue to evolve. More formal econometric analysis other than pre-post comparison is necessary to disentangle changes under health reform and factors beyond health reform that changed over the same period.

The purpose of this paper is to study the impacts of Massachusetts' employer health insurance mandate on health insurance coverage and labor market outcomes in Massachusetts. We use repeated cross sectional data from the Current Population Survey (CPS) for the period 2003-2013. We make two primary contribution to the literature. Our analysis considers several outcomes— employer-sponsored health insurance coverage, hourly wage, weekly hours of work, and part-time status. Second, using a difference-in-differences setting we compare Massachusetts ('treatment group') to the rest of the US ('control group')[1] over a long range of time period to control for common trends across the country while providing a more thorough analysis of the

[1] Rest of the US does not include Hawaii. Hawaii Prepaid Health Care Act has a similar employer mandate which may bias the average trend in the US.

impact of the health reform in one state compared to the rest of the country. In addition to improving previous pre-post comparisons by estimating policy effect in difference-in-differences models, we provide an updated view of the Massachusetts' Health Care Reform. Previous studies on similar topic have used data till 2009 to our knowledge. And since the employer mandate in Massachusetts was repealed in 2013, our analysis would provide the most complete picture of the mandate on employers. Thus, a comparison with earlier results would help us understand how the effect of the employer health insurance mandate in Massachusetts has evolved over time. Given that the mandate's targeted population are those who are unlikely to receive health benefits in the absence of the mandate, our analysis examines, specifically, policy effects on this group of individuals.

Given the likely influence of unobserved state level effects, we infer statistical significance based on a stringent standard which relies on a variant of R.A.Fisher (1935) permutation test. Our tests involve usual estimation of difference-in-differences between Massachusetts and the rest of the nation, but statistical references are based on a distribution of placebo estimates. These placebo estimates are estimated difference-in-differences as we treat each of the other 49 states (and DC) as a hypothetical experiment state with the employer mandate.

Summarizing our main results, we find that, as expected, Massachusetts has a significantly high fraction of individuals with employer-sponsored health insurance coverage compared with other states. Interesting, though, we find limited labor market distortions in Massachusetts. We find that Massachusetts's distribution of hourly wages had not diverged significantly from that in other states during the study period. We also find that neither the weekly hours of work fell nor the fraction of part-time employees[2] rose significantly, on average, in response to the mandate. However, significant effects on working schedules begin to emerge once the data is partitioned

[2] Part-time employees defined as workers with less than 35 hours under Massachusetts Health Care Reform.

into groups based on individual's probability of receiving employer-sponsored health insurance. We are able to detect a decrease in weekly hours and an increase in the fraction of part-time workers among individuals who are young, nonwhite, and with lower educational attainment in Massachusetts.

The paper proceeds as follows. Section 2 reviews the background of the Massachusetts Health Care Reform and related literature. Section 3 introduces the data and provides descriptive evidence of the effects of the Massachusetts Health Care Reform on insurance coverage and labor market. Section 4 discusses our econometric strategy and Section 5 presents results. Section 6 concludes.

Background and Previous Literature

The Massachusetts Health Care Reform was passed in April 2006, with the "pay-or-play" employer mandate becoming effective on October 1, 2006 and then repealed in 2013 in anticipation of the ACA's employer mandate. The "pay-or-play" or "fair share" provision in Massachusetts requires employers with 11-50 full-time equivalent (FTE) employees to offer their full-time employees a group health plan or pay a fair share of premium contribution to individual coverage, and employers with 50 or more FTE employees to offer a group health plan and contribute to insurance premiums. Health coverage options must at minimum include a plan that allows employees to purchase health insurance using pre-tax wages, and employers must contribute at least 33% of the value of the premium or they will be assessed a penalty. Summers (1989) uses a simple supply and demand framework used to analyze the labor market effects of

an employer mandate, and concludes that a mandate causes the labor demand curve to shift back and the labor supply curve to shift out, causing wages to fall. The magnitude of wage change, and the effects on hours and employment, will depend on workers' valuation of the benefit compared to employers' cost of provision. In the absence of any preexisting market failures, the benefit will be voluntarily provided to those workers whose valuation exceeds employers' cost. Therefore, these workers should not be directly affected by a mandate. Instead, the most important effect of a mandate will be on workers who would not otherwise receive the benefit, either because their valuation falls short of its cost or because their wage is close to the minimum wage and, therefore, cannot be reduced enough to offset the cost of the benefit. Thus, the effects of the mandate on employer-sponsored insurance should be largest for low-wage, low-skill workers who generally exhibit low rates of coverage in a voluntary market. For workers most affected by the mandate, who earn minimum wage or close to minimum wage, wage reduction is not a possible source for employers to pass the cost of benefit, but adjustment along hours of work is possible. Employers will, therefore, face incentives to substituted exempt part-time workers for covered full-time employees.

We begin by providing a brief synopsis of studies that assess the effect of the Massachusetts Health Care Reform on overall insurance coverage. Based on a difference-in-differences analysis of Current Population Survey (CPS) data from 2005-2008, Long, Stockley, and Yemane (2009) find a substantial drop in uninsurance rate for non-elderly adults in Massachusetts, with a 3.1 percentage points increase in employer-sponsored insurance. Other studies, which use pre-post comparisons using data from various sources, find that employer-sponsored insurance rate rose from 2006-2009 in Massachusetts, while over the same period the employer-sponsored insurance rate fell in the rest of the nation in response to rising health insurance premiums (for instance,

Long (2008), Gruber (2011b)). Using the Massachusetts Health Reform Survey data, Long and Masi (2009) find gains in access to health care and affordability of health care due to insurance coverage obtained under the reform, especially among lower-income adults. However, the most severe limitation in papers that use simple pre-post comparisons is that such a method cannot exclude the possibility that the estimated impact of health reform on insurance coverage reflect both the changes under health reform and factors beyond health reform that change over the same period, leading to biased estimates of the impacts of the reform. Although difference-in-differences models hold the promises to potentially disentangle the impacts of health reform from other underlying factors, the dependence on a single state raises concerns on statistical inference. Some research argue that inference is extremely problematic in a setting with a single experimental unit because the comparison of a single state with all others collapses the degrees of freedom in the model and creates much larger sampling variance than is captured by the conventional asymptotic approximations (Donald and Lang 2007). We address this limitation by estimating in a difference-in-differences model and implement a variant of Fisher's (1935) permutation test proposed by Buchmueller, DiNardo, and Valletta (2011) that addresses the insufficiently conservative inferences based on underestimated standard errors from difference-in-differences models.

One common speculation, in response to rising health insurance premiums, is that employers could drop insurance coverage. Some evidence of this comes from aggregation national level data. Over the last decade employer-sponsored health insurance coverage eroded every year from 2000 to 2013 (Gould 2012), while at the same time health insurance premiums have increased. Massachusetts' employer mandate essentially prevents Massachusetts' employers to drop coverage, thus we would expect to see adjustments along other margins. The cost of the

employer-provided health insurance could be passed onto employees in the form of reduced wages whenever possible (Gruber 1994, Gruber and Krueger 1991, Olson 2002). However, studies on enforced employer mandates from Massachusetts and Hawaii provide mixed evidence for wage reductions. Kolstad and Kowalski (2012) find evidence of a substantial compensation differential for employer-sponsored health insurance in their study of Massachusetts' employer mandate. They suggest that full-time employees that gained coverage due to the Massachusetts' reform earned wages that were lower than what they would have earned had they not gained employer-sponsored health insurance, while Thurston (1997) and Buchmueller, DiNardo, and Valletta (2011) indicate no discernible wage reductions arising from a similar employer mandate in Hawaii.

Implicit in the wage adjustment hypothesis is that the worker's wage will be sufficiently high to absorb the entire cost of employer's provision. The problem arises when the worker's wage is not high enough to absorb this cost without going below the minimum wage. In such a situation, a third option could be to reduce hours of work. Much of the discussion and critique of employer mandates has centered on their potential disemployment effects. Baicker and Levy (2008), for instance, claim that for workers near the minimum wage, the effect of an employer mandate will be similar to an increase in the minimum wage. They state that a significant portion of the targeted population of uninsured employees have hourly wages close to the minimum wage, and these workers face a risk of unemployment or underemployment since employers will not be able to lower their wages enough to accommodate fully the increase in compensation costs that employer mandates would impose. On the other hand, studies focusing on existing employer mandates in the United States provide limited support for these arguments. Pre-post comparisons between Massachusetts and the rest of United States suggest no indication of negative job

consequences as a result of the health reform (Dubay, Long, and Lawton, 2012), and similar results are obtained since the implementation of Hawaii's Prepaid Health Care Act (PHCA) (Dick 1994). Employment did not noticeably contract after employer health mandates were implemented in these two states.

This study contributes an important missing piece to the analysis: the empirical evidence of whether employers might substitute away from full-time employees toward part-time employees. Accounting for these adjustments is a crucial component in the evaluation of enacted employer mandates since they only apply to full-time workers. Buchmueller, DiNardo, and Valletta (2011) test for an effect on part-time work, and find an increase in the percentage of individuals working less than 20 hours per week, which is the threshold distinguishing covered and exempt employees under Hawaii's mandate. However, the Massachusetts' mandate differs from Hawaii's mandate in two ways. Under PHCA employer mandate, any employee who works more than 20 hours per week has to be offered insurance coverage. While under the Massachusetts' Health Care Reform, first the size of the business is estimated by examining the number of full-time equivalent (FTE) employees[3], and then the employer mandate is applied to those employers who have 11 or more FTE employees. In addition, the definition of a 'full-time worker' differs between the two states. In Massachusetts, a full-time worker is defined as one who works 35 or more hours in a typical week. These differences make Buchmueller et al.'s results less informative in predicting the effect on part-time labor in Massachusetts since the implementation of the health reform.

[3] Full-time equivalent (FTE) employee is calculated by adding payroll hours of every employee by a quarter and dividing total payroll hours by 500.

Data and Descriptive Evidence

A. Sample Construction

The analysis uses data from the CPS March files. We construct repeated cross-sections for years starting 2003 to 2013 (survey years 2003-2013, correspond to reference years 2002-2012). We restrict our sample to 18-64 year old individuals and those who were employed in private sector (excluding the self-employed because their wage and hours are usually not comparable to other individuals in different job classes) at the time of the survey.

We use supplemental data on minimum wage by state and year from United States Department of Labor. While the federal minimum wage was $5.15 since 2002, and was raised to $7.25 in 2011, Massachusetts enacted higher minimum wages, which were $6.75 in 2002 and $8.00 since 2009.

We also add data on health insurance premium by state, year, and policy type (family or single) from the Medical Expenditure Panel Survey (MEPS) from 2002 to 2012. CPS respondents who reported being married or with children were assigned the family policy premium while others were assigned the single policy premium. We deflate all dollar amounts to year 2006 dollar using the Consumer Price Index (CPI)[4].

B. Descriptive Evidence

We start with a descriptive comparison of trends in health insurance coverage in Massachusetts and the rest of the United States sans Hawaii (rest of the US, henceforth, for brevity). Figure 3-1

[4] We use the CPI for all urban consumers to deflate dollar-denominated figures, using the CPI for the Boston-Brockton-Nashua metro area to deflate the Massachusetts figures and the all-US series for other states.

displays the percentage of private sector employees who received health insurance coverage through employer-sponsored plan, for the years 2003 to 2013 in Massachusetts (solid line) and the rest of the US (dashed line). At the beginning of the sample frame the coverage rate in Massachusetts was about 3 percentage points higher compared to the rest. Starting in 2007, the gap widens, as the coverage rate in Massachusetts increased but fell elsewhere. At the end of the sample frame, the employer-sponsored insurance coverage rate was about 10 percentage points higher in Massachusetts (73 percent versus 63 percent in 2012).

To complement the discussion on rising coverage rates in Massachusetts, we now turn to the costs of health insurance. The rising coverage rate in Massachusetts is not necessarily an outcome of low health insurance costs in Massachusetts; in fact, Massachusetts has higher than average health insurance costs throughout the sample frame. In response to rising insurance costs, employers can stop sponsoring insurance coverage as we noted in Figure 3-1in rest of the country. However, in presence of a mandate, Massachusetts employers cannot do so.

Figure 3-2 provides a sense of how the cost of the Massachusetts employer mandate to employers has grown. The graph plots real ($2006) single coverage premiums in Massachusetts and the average of the rest of the US for years 2002 to 2012. In 2002, the annual single coverage premium was $3,806, which for an employee working 40 hours per week (assuming 4.3 weeks per month) translated to $1.84 per hour in 2006 dollars. The cost per hour increased steadily thereafter. By 2012, the annual premium was $5,512 or $2.67 per hour for a full-time employee, an increase of about 45% the real cost in 2002[5]. While the rest of the US experienced similar increasing trend in health insurance costs, coverage rates diverge between Massachusetts and the rest of the nation since the Massachusetts' health reform went into effect in 2006 (survey year

[5] Similar pattern is also present in family coverage premiums. The cost per hour increased about 55% the real cost in 2002.

2007) as shown in Figure 3-1. In considering the possible labor market effects of the Massachusetts' health reform, it is also important to recognize that the burden of the mandate increased over time as the growth in health insurance premiums outstripped growth in prices and wages in general (Romer and Duggan 2010, Minarik 2014).

Finally, we use these data to estimate which workers would be at risk with the imposition of employer mandate in Massachusetts. The likelihood that uninsured workers are to face unemployment depends on whether the minimum wage is binding, that is, if the cost of providing health insurance per hour per worker is greater than the gap between the worker's wage and the minimum wage. While a more detailed calculation requires knowledge of (or assumptions about) workers' family structure, health status, the elasticity of labor supply and demand, workers' valuation of health insurance benefits, long-run labor market dynamics, and the like, we include here several informative back-of-the-envelope benchmarks using aggregate insurance costs.

The average annual premium for employer-sponsored health insurance in our sample is approximately $10,545 in Massachusetts during 2007 to 2012 (after the mandate went into effect in 2006 and before the "pay-or-play" employer mandate was repealed), an average hourly premium of $5.11 for a full-time employee in Massachusetts. If an employer were required to contribute 33% of the premium, average hourly wage for this group of workers would have to be reduced by about $1.70 to fully absorb the cost of providing the average health package. We focus in particular on workers with wage close to the minimum wage, i.e., hourly wage within $1.7 of minimum wage, since it is these workers whose wage may have the least flexibility to be lowered in response to the mandate, and thus, they may be the most likely to face adverse employment consequences.

Approximately 5% of private sector workers are uninsured in Massachusetts in 2007-2012 (Table 3-1), while the fraction of uninsured workers is significantly higher (10%) in 2002-2006. The major source from which insurance coverage increases is own employer-sponsored health insurance. Workers earning minimum wage represent about 10% of the labor force in both 2002-2006 and 2007-2012. Aside from these workers, low-wage workers who earn within $1.7 minimum wage are also "at risk" of experiencing negative employment outcomes. Uninsured low wage workers represent 1% of the labor force on average and about 20% of all uninsured employees in 2007-2012, while they represent 2.5% and 24% of the labor force and all uninsured employees respectively before 2007. Thus, while the overall fraction of private sector employees who are "at risk" is moderate, a fifth of uninsured low-wage earners to benefit from the employer mandate might in fact see reductions in employment or hours in short run.

There are three points worth discussing here. First, the Massachusetts employer mandate only applies to large employers with at least 11 FTE employees. Establishment with fewer than 10 workers hired an average of 27% and 26% of uninsured workers in 2002-2006 and 2007-2012, respectively. Table 3-2 shows a more detailed distribution of establishment size and insurance status. Second, across these two periods, we observe a slight increase in the number of small size firms (<25 employees). Given that the Massachusetts Health Care Reform considers separate firms under common ownership as separate, we are not able to rule out the possibility that employers might divide up their firms to avoid being subject to the employer mandate. Third, labor force dynamics, the substitution toward part-time employees, is not considered in this simple design. If workers at risk are instead hired as part-time employees as the employers' adjustment strategy to avoid the burden of the mandate, the mandate would increase underemployment rate and not unemployment rate.

The combination of large cumulative increase in the cost of employer-sponsored health insurance premiums and a rising coverage gap between Massachusetts and other states implies that the Massachusetts mandate could be quite costly to private-sector employers, and therefore, may have discernible labor market effects. To test this proposition carefully designed statistically tests are needed, which we formally introduce in the next section.

Econometric Strategy

We now provide the econometric framework to examine whether employer-sponsored health insurance coverage increased over time in Massachusetts relative to other states and the consequences on employment and number of working hours. We take a difference-in-differences approach that compares changes in employer-sponsored health insurance coverage and labor market outcomes in Massachusetts to changes in the same outcomes in other states. The CPS is a rotating panel, where individuals would stay in the survey for at most two years. Thus, our estimates are based on analyzing repeated cross-sectional data for the baseline period of 2002-2005 and a "treatment" period 2006-2012[6]. The model is

(1) $Y_{ist} = X_{ist}\beta' + \theta MA_s + \lambda d_t + \delta(MA_s * d_t) + Z_{st}\gamma + \varepsilon_{ist}$

These equations are estimated using individual data from the CPS files. t is the time period indicator, i indexs individuals and s indexs states. We have four dependent variables, each denoted by Y in the regression equation: (1) an indicator variable denoting whether has employer-sponsored health insurance, (2) hourly wages earned[7], (3) weekly hours of work, and

[6] Survey years 2003-2006 and 2007-2013, respectively.
[7] Data represent earnings before taxes.

(4) an indicator for working less than 35 hours per week. Equations for the indicator variables are estimated as linear probability models. Linear probability models are not rare in difference-in-differences with discrete dependent variables (for instance, Royalty (2000), Yamano and Jayne (2005), Lindley, Dale, and Dex (2006), and Lundin, Mörk, and Öckert (2008)). The most widely cited reasons for choosing linear probability models despite the binary nature of dependent variables are computational simplicity and the complexity introduced by the nonlinearities of alternative probit or logit specifications. In addition to the linear probability models for the first and last dependent variables, we present estimates of marginal effects from logit specifications for comparison purposes. Individual level covariates controls (X) include age, age squared, gender, interaction of gender and age, interaction of gender and age squared, whether married or not, interaction between marital status and gender, four categories of race variable, five categories of education variable, fourteen categories of industry variable, and ten categories of occupation variable. State-level covariates (Z) include annual measures of the state minimum wage and the log change in the state Gross Domestic Product (GDP) compared to previous year. ε_{ist} is an *i.i.d.* disturbance. The difference-in-differences term, $MA_s * d_t$ is our focal independent variable, defined as the interaction between the pre-post mandate difference d_t, and the treatment-control difference, MA_s. The pre-mandate years are coded as zero (survey years 2003-2007) and post-mandate years are 1 (survey years 2008-2013). The treatment-control difference indicates whether individual is in the treatment group (i.e., whether individual resides in Massachusetts) or in the control group. Thus, the coefficient δ captures the population average treatment effects. Statistical inference relies on the asymptotic approximations associated with the assumption that the number of groups grow large while the size of groups is fixed (Wooldridge 2003). As noted by Donald and Lang (2007), this assumption does not apply to

studies where the focus in on a single state. As Wooldridge (2003) posed the question of whether an observed conditional difference in observed outcomes is entirely due to the policy change in interest, we also question how often we would obtain results of similar magnitude if we had chosen a state at random for the study instead of Massachusetts.

To address these concerns, we follow Buchmueller, DiNardo, and Valletta (2011) and Abadie, Diamond, and Hainmueller (2010) by implementing a variant of Fisher's permutation or randomization test[8]. In particular, the permutation test treats each state as a hypothetical experimental unit by replacing MA with an indicator for one of the other 49 states including the District of Columbia but excluding Hawaii, in each case, running regressions for each period and estimating δ. Thus, instead of comparing δ to its asymptotic standard error obtained using conventional means, we compare our estimate to the 49 placebo estimates. In other words, we treat the 49 placebo estimates as the sampling distribution for δ. The hypothesis that change in Massachusetts is no different from the change in other states is then tested by computing the percentile that δ represents in the distribution of placebo estimates. A *p*-value is calculated directly indicating whether the treatment effect of the Massachusetts Health Care Reform is different from zero. Abadie, Diamond, and Hainmueller (2010) claim that the resulting hypothesis tests are based on much more conservative and appropriate confidence intervals than those produced using the usual method of estimating standard errors.

Results

[8]Imbens and Wooldridge (2008) provide a more detailed discussion of this approach. Abadie, Diamond, and Hainmueller (2010) and Buchmueller, DiNardo, and Valletta (2011) apply this approach in setting similar to ours (policy effects in a single state).

Table 3-3 presents the regression adjusted difference in having employer-sponsored health insurance coverage between Massachusetts and other states. The difference-in-differences estimate is positive and significant at 1% based on conventional asymptotic inference. In the context of permutation test, the 0.5^{th} and 99.5^{th} percentiles of the distribution of placebo estimates are critical values for rejecting the null hypothesis that the Massachusetts effect is zero, with significance level of 1%. These values are also listed in Table 3-3. Figure 3-3 illustrates the same results by showing Massachusetts' position in the full distribution of placebo effects. Similar to Table 3-3, we report results for estimated difference-in-differences, Massachusetts' value and the 0.5^{th} and 99.5^{th} percentiles critical values are separately identified with solid line and dashed lines.

Recall from Figure 3-1 that in the early years of our sample the employer-sponsored health insurance coverage rate for private-sector workers was about 3 percentage points higher in Massachusetts compared with other states. When we adjust for covariates, the difference decreases substantially to about one percentage point. The difference-in-differences estimate is 4.5 percentage points. This increase is significant at 1% using our placebo criterion. In particular, Massachusetts is ranked the first among the distribution of placebo estimates. Overall these results are consistent with the theoretical prediction that the Massachusetts Health Care Reform should raise relative employer-sponsored health insurance rate in Massachusetts relative to other states.

Figure 3-2 shows that Massachusetts employers' cost of providing health insurance rose significantly and consistently outstripped the national average between 2002 and 2012. Taken together, these sets of results indicate that employer mandate in Massachusetts could raise hiring costs by increasing the cost of non-pecuniary benefits. The demand-supply framework predicts

two likely labor market effects. First, wage could be adjusted downward as a means for employers to pass the cost of the mandate onto workers. However, wage offset may not be feasible when employing minimum wage workers or perhaps due to competition in labor market. When complete wage offset is not possible, one potential response to that mandate could be to employ more part-time workers who are exempt from the mandate. In our next set of regressions, we examine whether the employment effects of the Massachusetts Health Care Reform are as predicted.

The estimated policy effects for wages are displayed in Table 3-4 and Figure 3-4. The wage regressions are estimated with the log hourly wage as dependent variable, and the difference-in-differences estimates are translated into percent effects on hourly wages using the standard transformation of the coefficient on an indicator variable in a semi-log equation. The results show that wage on average fell slightly (about 0.5 percent) in Massachusetts relative to other states over our sample frame. This is not statistically significant. We get a consistent result using the placebo approach, which attests to the robustness of our result. Using the placebo method we find that Massachusetts' estimate lies in the middle of the distribution of placebo estimates, and thus, we fail to reject the hypothesis that wage changes in Massachusetts were the same as in other states using the placebo criterion.

As discussed before, reducing wages may not always be feasible. Thus, even if we conclude that the wage difference in Massachusetts before and after the mandate is not statistically significant, there could still be contraction in the labor market as a direct result of the employer mandate. We test this in two ways. First, we examine the pre- and post-mandate work hours (continuous variable), and second, we examine the change in the likelihood of working full-time versus part-time pre- and post-mandate (binary variable).

As we mentioned earlier, Massachusetts' employer mandate applies to employers with 11 or more FTE employees. This FTE measure is calculated quarterly by adding up payroll hours of each employee and dividing total payroll hours by 500. Table 3-2 shows that the fraction of workers in firms with less than 25 employees increased after the mandate went into effect. Thus it is a plausible choice for Massachusetts employers who are close to the 11 FTE employees thresholds to avoid being subject to the mandate by lowering working hours. Figure 3-5 and Table 3-5 display results from regressions that test whether there has been a decrease in working hours in Massachusetts relative to other states.

The specification of these regressions is similar to the model used for wages. The estimate of difference-in-differences is negative and lies towards the middle of the distribution. This result is similar to the wage regressions, indicating although conditional hours declined in Massachusetts over time, the changes do not achieve statistical significance at 10 percent level based on our placebo test. It is important to note that the *t*-statistics for difference-in-differences term is -2.09, indicating significance at 5 percent level for the estimated hour decline in Massachusetts. However, if each of the other states is considered as a hypothetical experimental unit and is applied the same statistical test to its effect, we obtain 36 significant mandate effects[9] of the 49 cases examined. Usually, type I error is thought to be more serious than a type II error, thus the more conservative placebo approach could be preferable. On the other hands, from a policy perspective one might argue that negative impacts of the mandate on the labor market may not be ignored, no matter even if they are small. The employer mandate in Massachusetts led to a 0.6 percent decrease in weekly hours of work, which could be translated to $6.93 decrease in weekly earnings on average based on the assumption that hourly wage remains at the average level in Massachusetts in post-mandate years.

[9] Significant at 1%, 5% and 10% levels.

Finally Table 3-6 and Figure 3-6 display results from regressions that use an indicator for working less than 35 per week. Although total payroll hours (including both full-time and part-time employees) are used to determine if an employer is subject to the mandate, only full-time employees are required to be provided health insurance. Thus, employers subject to the mandate may substitute part-time for full-time workers in order to reduce expenditures on contributing towards employers' health insurance premiums. The specification of these regressions is similar to the model used for insurance coverage. The difference-in-differences estimate for Massachusetts is positive but insignificant based on conventional *t*-test. It is not significant based on placebo test either since it fails to pass the 95th percentile critical value implied by the distribution of placebo estimates. Thus, over the sample period the percentage of adults with part-time jobs grew faster in Massachusetts, but no more than in other states. This insignificant increase in part-time dependence is consistent with limited quantitative evidence provided in Long (2010).

Given the binary nature of our dependent variable (indicator for employer-sponsored health insurance and part-time), we estimate difference-in-differences terms for Massachusetts using logistic regressions. And the coefficient δ is converted into "Population Average Treatment Effects on the Treated" (PATT) (Imbens and Wooldridge 2008). The coefficient, now, represents the percentage point change in the probability of observed outcome arising from the employer mandate in Massachusetts, conditional on other covariates. We follow Puhani (2012) in the calculation of PATT. For a specific estimate of the difference-in-differences δ is $PATT_{\delta} = \sum_{i\in(MA=1)} \frac{1}{N_{MA}} \left(\widehat{P}_i(DID=1) - \widehat{P}_i(DID=0)\right)$ [10] where $\hat{P}$s refer to the fitted logit probabilities

[10] Puhani (2012) derives treatment effect in nonlinear like probit and logit Difference-in-Differences models as $\tau(T=1, G=1, X) = \Phi(\alpha+\beta+\gamma+X\theta) - \Phi(\alpha+\beta+X\theta)$, where $\Phi(\cdot)$ is the link function. The model is $E(Y|T,G,X) = \Phi(\alpha T + \beta G + \gamma TG + X\theta)$, where G is treatment group, T is post-treatment period.

based on equation (1) for individual i, with the coefficient on the interaction term included ($MA * t = 1$) or excluded ($MA * t = 0$). The PATT is the difference between these fitted probabilities averaged across the complete set of Massachusetts observations used in the regression, with observations for other states excluded from the calculation, N_{MA} is the number of Massachusetts observations. Table 7 presents the estimated treatment effects for employer-sponsored health insurance (Column 2) and part-time indicator (Column 3) from the logit models. These estimates are essentially the same as those estimated under LPM. Our results are thus robust to different estimation methods

Using the placebo approach, neither measure of employment hours indicated overall negative impacts due to the employer mandate in Massachusetts. However, as predicted by the demand and supply theory, the effect of an employer mandate should be greatest for workers who place a low value on health insurance, and therefore, have low rates of insurance coverage in the absence of a mandate, such as low-skill, nonwhite, young workers. To account for heterogeneous policy effects, we implement a similar stratifying scheme as in Card (1996) where individuals are stratified based on their probabilities of receiving employer-sponsored health insurance in a voluntary market. To do this we fit the following regression on the complete sample of observations, excluding those in Massachusetts and Hawaii, using a logit model estimated separately for each year.

(2) $C_{ist} = X_{ist}\Pi + Z_{st}\Gamma + \varepsilon_{ist}$

The dependent variable is an indicator variable for employer-sponsored health insurance coverage, X and Z are the same controls as in (1). The fitted probabilities of employer-sponsored health insurance coverage for each individual are sorted, and individuals are placed into quintiles

of this distribution, separately for each year. The difference-in-differences estimates based on stratified subsamples yield some interesting results that are important from a policy perspective. At an aggregate level for all non-elderly private sector workers, the effect on weekly hours is small and insignificant (see Table 3-5). The breakdown by quintiles (Table 3-8; Figure 3-7)[11] indicates that the treatment effect is significant for the 1st quintile, representing workers with low coverage probability in the absence of the mandate. This group in Massachusetts saw weekly hours of work decrease by 2.8 percent as a result of the employer mandate (Table 3-8, Row 2; Figure 3-7, Panel A). This treatment effect converts to a positive of 1.2 percent for those who are in the 5th quintile, and is not statistically significant based on our placebo test (Table 3-8, Row 3; Figure 3-7, Panel B).

The part-time results by quintile are also notable (Table 3-9; Figure 3-8). While there are no significant effects in subsample with the highest probability of receiving employer-sponsored health insurance (Table 3-9, Row 3; Figure 3-8, Panel B), the difference-in-differences estimate for those in the lowest quintile is particularly large. The treatment effect is 3.0 percentage points, and it passes the significance test based on our placebo distribution (Table 3-9, Row 2; Figure 3-8, Panel A). Our results provide support evidence that policy effects are not homogeneous and are the greatest for workers who have lower rates of employer-sponsored health insurance coverage in the absence of a mandate, such as less skilled workers. The examination of policy effects on these groups of people is important since the mandate is specifically targeted at increasing the insurance rates in this sub-population.

[11] Regressions for the other quintiles are conducted. Results for the two extreme tails (1st and 5th quintiles) are presented.

Discussion and Conclusion

The Massachusetts Health Care Reform had the desired effect of increasing insurance rates for the state population. We find that employer-sponsored health insurance coverage rose in Massachusetts post-mandate compared to the rest of the country. Its statistical significance passes the stringent standard imposed by our placebo framework suggesting that it is the result of the state's employer mandate rather than random factors at the state level. Regarding labor market outcomes, our sample does not suggest any significant wage effects of the mandate; the changes in Massachusetts's wage rate are not statistically distinguishable from the ones in other states based on our permutation test. Although relative hourly wage fell in Massachusetts over time but no more than in other states during the same time period.

It is likely that for some groups, such as low-wage workers whose wages are close to minimum wages, any wage reduction will not be large enough to fully offset the mandate costs to employers. Under these circumstances, demand and supply framework points to adjustment along other margins. We uncover evidence of such adjustments in the group of individuals with lower probability of receiving employer-sponsored health insurance in the absence of the mandate, particularly low-skill, nonwhite, and young individuals. These adjustments are in the form of an increase in the percentage of part-time workers (<35 hours per week) and a decrease in weekly hours of work. The estimated shift towards low-hour schedules is concentrated among the worker groups that are predicted to be most affected by the mandate, and is not detectable in aggregate level based on our placebo framework.

Taken together, our results suggest Massachusetts's health insurance mandate succeeded in raising employer-sponsored health insurance coverage. Our results regarding labor market

outcomes suggest that while the employer mandate may not cause labor market distortions in aggregate, certain groups– particularly workers who are unlikely to receive insurance benefit in a voluntary market– may experience shifts towards lower-hour schedules.

Appendix

Complete Regression Results (selected equations, 2003-2013 sample)

	(1)	(2)	(3)	(4)
Variables	Coverage (LPM)	ln(wage)	ln(hours)	Part-time (LPM)
DID	0.045***	-0.005	-0.006**	0.003
	(15.72)	(-0.81)	(-2.09)	(0.003)
MA dummy	0.009**	0.008	-0.023**	0.028***
	(2.08)	(0.64)	(-9.66)	(5.89)
Post-mandate dummy	-0.026***	-0.056***	0.010***	0.013***
	(-5.66)	(6.53)	(4.58)	(3.34)
Age	0.016***	0.056***	0.027***	-0.031***
	(13.51)	(55.44)	(29.49)	(38.42)
Age2/10	-0.001***	-0.006***	-0.003***	0.004***
	(-11.39)	(-47.92)	(-28.00)	(36.24)
HS Degree	0.136***	0.191***	0.041***	-0.041***
	(23.84)	(25.50)	(8.46)	(-7.04)

Some college	0.184***	0.302***	0.022***	-0.005
	(24.11)	(41.22)	(3.70)	(-0.77)
College	0.216***	0.519***	0.055***	-0.043***
	(32.12)	(57.01)	(12.13)	(-7.22)
Post-college	0.218**	0.729***	0.088***	-0.041***
	(27.43)	(63.03)	(16.87)	(-6.81)
Female	-0.001	0.035	-0.138***	0.175***
	(-0.09)	(1.10)	(-10.70)	(8.12)
Female*Age	0.001	-0.006***	0.004***	-0.006***
	(0.11)	(-3.61)	(5.39)	(-4.70)
Female*Age2/10	0.000	0.001**	-0.000***	0.006***
	(0.32)	(2.63)	(-4.10)	(4.14)
Married	0.104***	0.176***	0.040***	-0.042***
	(36.12)	(55.05)	(26.27)	(20.99)
Married*Female	0.005	-0.140***	-0.092**	0.100***
	(1.02)	(-41.92)	(-27.26)	(21.66)
Black	-0.056***	-0.097***	0.010***	0.034***
	(-12.57)	(-11.74)	(3.75)	(8.46)

Hispanic	-0.152***	-0.122***	0.016***	0.039***
	(-14.58)	(-11.74)	(4.08)	(10.71)
All others	-0.069***	-0.050***	-0.004	0.024***
	(-7.46)	(-6.52)	(-0.82)	(5.52)
State min.wage	-0.004	0.045***	-0.009***	0.011***
	(-1.60)	(6.46)	(-7.11)	(6.36)
Δ in ln(state GDP)	-0.219***	-0.030	0.249	-0.267***
	(-3.11)	(-0.28)	(7.05)	(-7.22)
	(1)	(2)	(3)	(4)
Variables	Coverage (LPM)	ln(wage)	ln(hours)	Part-time (LPM)
Industries: Mining	0.247***	0.440***	0.100***	-0.068***
	(19.73)	(15.60)	(7.58)	(-7.70)
Construction	0.080***	0.240***	-0.033***	-0.008
	(6.03)	(9.93)	(-3.13)	(0.94)
Manufacturing	0.200***	0.293***	0.002	-0.065***
	(17.34)	(13.17)	(0.20)	(-6.63)

Wholesale trade	0.185***	0.293***	0.014	-0.068***
	(15.71)	(11.52)	(1.46)	(6.13)
Retail trade	0.115***	0.071***	-0.061***	0.054***
	(10.66)	(3.35)	(-5.93)	(6.13)
Trans/utilities	0.165***	0.331***	0.004	-0.019*
	(14.05)	(14.76)	(0.35)	(-1.88)
Information	0.177***	0.281***	-0.023**	-0.027***
	(15.60)	(11.58)	(-2.09)	(-2.83)
Financial activities	0.162***	0.304***	-0.006	-0.054***
	(13.90)	(12.23)	(-0.52)	(-5.05)
Prof./Bus. services	0.106***	0.262***	-0.013	-0.029***
	(8.21)	(9.91)	(-1.29)	(-3.09)
Edu./health services	0.144(**	0.157***	-0.041***	0.012
	(12.94)	(7.22)	(-3.73)	(1.06)
Leisure/hospitality	0.012	0.030	-0.070**	0.109***
	(0.84)	(1.45)	(-6.67)	(9.85)
Personal household	-0.166***	-0.052**	-0.192***	0.195***
	(-11.40)	(-2.24)	(-12.68)	(9.84)

Other services	0.018	0.028	-0.064***	0.059***
	(1.31)	(1.22)	(-5.58)	(5.49)
	(1)	(2)	(3)	(4)
Variables	Coverage (LPM)	ln(wage)	ln(hours)	Part-time (LPM)
Job: Managerial	0.176***	0.525***	0.057***	-0.060***
	(14.57)	(28.73)	(6.99)	(-6.13)
Professional	0.181***	0.429***	-0.023***	-0.009
	(14.64)	(22.27)	(-2.93)	(-0.96)
Service	0.023*	0.038**	-0.097***	0.113***
	(1.78)	(2.21)	(-10.49)	(11.85)
Sales	0.098***	0.234***	-0.028***	0.035***
	(8.11)	(12.66)	(-3.79)	(3.54)
Admin	0.158***	0.173***	-0.045***	0.010
	(12.74)	(9.85)	(-5.76)	(1.00)
Operators	0.041**	0.219***	-0.024***	-0.011

	(2.58)	(10.47)	(-2.96)	(-1.02)
Prod/craft/repair	0.159***	0.298***	-0.012	-0.051***
	(12.92)	(15.82)	(-1.44)	(-5.01)
Handler/cleaner	0.130***	0.117***	-0.032***	-0.006
	(8.67)	(6.12)	(-4.38)	(-0.61)
Trans./moving	0.080***	0.066***	-0.036***	0.040***
	(5.79)	(4.03)	(-5.06)	(4.47)

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Notes: Omitted categories are education<high school degree, white race, agricultural industry, and farming occupations. Asymptotic *t*–statistics are shown in parentheses. Robust standard errors (clustered by state) are estimated. Intercept terms are included in each specification but not reported. Individual weights used.

References

Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. 2010. "Synthetic control methods for comparative case studies: Estimating the effect of California's tobacco control program." *Journal of the American Statistical Association* no. 105 (490).

Baicker, Katherine, and Helen Levy. 2008. "Employer health insurance mandates and the risk of unemployment." *Risk Management and Insurance Review* no. 11 (1):109-132.

Buchmueller, Thomas C, John DiNardo, and Robert G Valletta. 2011. "The effect of an employer health insurance mandate on health insurance coverage and the demand for labor: Evidence from hawaii." *American Economic Journal: Economic Policy* no. 3 (4):25-51.

Dick, Andrew W. 1994. "State report. Will employer mandates really work? Another look at Hawaii." *Health Affairs* no. 13 (1):343-349.

Donald, Stephen G, and Kevin Lang. 2007. "Inference with difference-in-differences and other panel data." *The Review of Economics and Statistics* no. 89 (2):221-233.

Fisher, Ronald Aylmer. 1935. "The design of experiments."

Gruber, Jonathan. 1994. "The incidence of mandated maternity benefits." *The American Economic Review* no. 84 (3):622-641.

Gruber, Jonathan. 2011a. 2011 Hewitt Health Care Lecture: The Budgetary Impact of Federal Health Care Reform." vimeo. com. March 2011.

Gruber, Jonathan. 2011b. The Impacts of the Affordable Care Act: How Reasonable Are the Projections? : National Bureau of Economic Research.

Gruber, Jonathan, and Alan B Krueger. 1991. "The Incidence of Mandated Employer-Provided Insurance: Lessons from Workers' Compensation Insurance." *Tax Policy and the Economy* no. 5:111-143.

Imbens, Guido W., and Jeffrey M. Wooldridge. "Recent Developments in the Econometrics of Program Evaluation." *Journal of Economic Literature* 47, no. 1 (2009): 5-86.

Kolstad, Jonathan T, and Amanda E Kowalski. 2012. Mandate-based health reform and the labor market: Evidence from the Massachusetts reform. National Bureau of Economic Research.

Lindley, Joanne K, Angela Dale, and Shirley Dex. 2006. "Ethnic differences in women's employment: the changing role of qualifications." *Oxford Economic Papers* no. 58 (2):351-378.

Long, Sharon K. 2008. "On the road to universal coverage: impacts of reform in Massachusetts at one year." *Health Affairs* no. 27 (4):w270-w284.

Long, Sharon K. 2010. "Health reform in Massachusetts: an update as of fall 2009."

Long, Sharon K, and Paul B Masi. 2009. "Access and affordability: an update on health reform in Massachusetts, fall 2008." *Health Affairs* no. 28 (4):w578-w587.

Long, Sharon K, Karen Stockley, and Alshadye Yemane. 2009. "Another look at the impacts of health reform in Massachusetts: evidence using new data and a stronger model." *The American Economic Review* no. 99 (2):508-511.

Lundin, Daniela, Eva Mörk, and Björn Öckert. 2008. "How far can reduced childcare prices push female labour supply?" *Labour Economics* no. 15 (4):647-659.

Minarik, Joe. 2014. "Healthcare Costs, Wage Growth, and Inequality." *Committee for Economis Development*.

Olson, Craig A. 2002. "Do workers accept lower wages in exchange for health benefits?" *Journal of Labor Economics* no. 20 (S2):S91-S114.

Puhani, Patrick A. 2012. "The treatment effect, the cross difference, and the interaction term in nonlinear “difference-in-differences” models." *Economics Letters* no. 115 (1):85-87.

Romer, Christina, and Mark Duggan. 2010. "Exploring the Link between Rising Health Insurance Premiums and Stagnant Wages." *Council of Economic Advisers*.

Royalty, Anne Beeson. 2000. "Tax preferences for fringe benefits and workers' eligibility for employer health insurance." *Journal of Public Economics* no. 75 (2):209-227.

Summers, Lawrence H. 1989. "Some simple economics of mandated benefits." *The American Economic Review* no. 79 (2):177-183.

Thurston, Norman K. 1997. "Labor market effects of Hawaii's mandatory employer-provided health insurance." *Industrial and Labor Relations Review* no. 51 (1):117-135.

Wooldridge, Jeffrey M. 2003. "Cluster-sample methods in applied econometrics." *American Economic Review* no. 93 (2):133-138.

Yamano, Takashi, and Thomas S Jayne. 2005. "Working-Age Adult Mortality and Primary School Attendance in Rural Kenya." *Economic Development and Cultural Change* no. 53 (3):619-653.

Table 1: Insurance status of private workers in Massachusetts

Health insurance status	2007-2012	2002-2006
Employer health insurance:	0.850	0.815
Own employer	0.637	0.609
Other employer	0.213	0.206
Other health insurance	0.103	0.082
Uninsured:	0.047	0.103
Within $1.7 of minimum wage	0.009	0.025
Total	1.000	1.000

Note: Authors' tabulation (weighted) from March CPS. Average of two periods: 2008-2013, reference years 2007-2012 and 2003-2007, reference year 2002-2006.

Table 2: Establishment size and insurance status, column percentage (row percentage in parenthesis)

	2007-2012			2002-2006		
Establishment size	All	Insured	Uninsured	All	Insured	Uninsured
1-9	0.13	0.10	0.26	0.12	0.10	0.27
	(1.00)	(0.66)	(0.34)	(1.00)	(0.66)	(0.37)
10-24	0.14	0.12	0.22	0.11	0.10	0.18
	(1.00)	(0.76)	(0.24)	(1.00)	(0.73)	(0.27)
25-99	0.12	0.12	0.14	0.15	0.16	0.17
	(1.00)	(0.83)	(0.17)	(1.00)	(0.83)	(0.17)
100-499	0.15	0.16	0.12	0.18	0.17	0.12
	(1.00)	(0.88)	(0.12)	(1.00)	(0.88)	(0.12)
500-999	0.06	0.07	0.04	0.06	0.07	0.04
	(1.00)	(0.90)	(0.10)	(1.00)	(0.90)	(0.10)
1000+	0.40	0.43	0.23	0.38	0.41	0.21
	(1.00)	(0.91)	(0.09)	(1.00)	(0.91)	(0.09)
Total	1	1	1	1	1	1

Notes: Authors' tabulation (weighted) from March CPS. Average of two periods: 2008-2013, reference years 2007-2012 and 2003-2007, reference year 2002-2006. Fraction of full-time private sector workers in each column falling into category.

Table 3: Employer-sponsored insurance coverage

(Placebo tests, Massachusetts versus rest of the US)

	Massachusetts effect	Placebo effects (rest of the US)	
		99.5^{th} percentile	0.5^{th} percentile
Difference-in-differences	$0.045^{***\dagger\dagger}$	0.034	-0.029
	(0.003)		

*** p<0.01 ** p<0.05 * p<0.10 based on asymptotic *t*-tests

††† significant at 1% level †† significant at 5% level † significant at 10% level based on placebo criterion

Notes: Estimated using March CPS data, private sector workers age 18-64, controlling for demographic, state, and job characteristics. The demographic characteristics are age, age squared, gender, married, gender by age interaction, gender by age squared interaction, married by gender interaction, race (4 categories), education (5 categories). State characteristics include real minimum wage and real GDP growth. The job characteristics are industry and occupation (See Appendix). Two-tailed tests based on the distribution of placebo effects. Heteroskedasticity consistent errors are shown in parentheses.

Table 4: Hourly wages

(Placebo tests, Massachusetts versus rest of the US)

	Massachusetts effect	Placebo effects (rest of the US)	
		95th percentile	5th percentile
Difference-in-differences	-0.005	0.060	-0.033
	(0.006)		

*** p<0.01 ** p<0.05 * p<0.10 based on asymptotic *t*-tests

††† significant at 1% level †† significant at 5% level † significant at 10% level based on placebo criterion

Notes: Estimated using March CPS data, private sector workers age 18-64, controlling for demographic, state, and job characteristics. The demographic characteristics are age, age squared, gender, married, gender by age interaction, gender by age squared interaction, married by gender interaction, race (4 categories), education (5 categories). State characteristics include real minimum wage and real GDP growth. The job characteristics are industry and occupation (See Appendix). Regressions are log-linear (coefficients converted to percent effects). Two-tailed tests based on the distribution of placebo effects. Robust standard errors are in parenthesis.

Table 5: Weekly Hours

(Placebo tests, Massachusetts versus rest of the US)

	Massachusetts effect	Placebo effects (rest of the US)	
		95th percentile	5th percentile
Difference-in-difference	-0.006**	0.016	-0.012
	0.003		

*** p<0.01 ** p<0.05 * p<0.10 based on asymptotic *t*-tests

††† significant at 1% level †† significant at 5% level † significant at 10% level based on placebo criterion

Notes: Estimated using March CPS data, private sector workers age 18-64, controlling for demographic, state, and job characteristics. The demographic characteristics are age, age squared, gender, married, gender by age interaction, gender by age squared interaction, married by gender interaction, race (4 categories), education (5 categories). State characteristics include real minimum wage and real GDP growth. The job characteristics are industry and occupation (See Appendix). Regressions are log-linear (coefficients converted to percent effects). Two-tailed tests based on the distribution of placebo effect.

Table 6: Part-time

(Placebo tests, Massachusetts versus rest of the US)

	Massachusetts effect	Placebo effects (rest of the US)	
		95th percentile	5th percentile
Difference-in-differences	0.003	0.024	-0.020
	(0.003)		

*** p<0.01 ** p<0.05 * p<0.10 based on asymptotic *t*-tests

††† significant at 1% level †† significant at 5% level † significant at 10% level based on placebo criterion

Notes: Estimated using March CPS data, private sector workers age 18-64, controlling for demographic, state, and job characteristics. The demographic characteristics are age, age squared, gender, married, gender by age interaction, gender by age squared interaction, married by gender interaction, race (4 categories), education (5 categories). State characteristics include real minimum wage and real GDP growth. The job characteristics are industry and occupation (See Appendix). Two-tailed tests based on the distribution of placebo effects. Heteroskedasticity consistent errors are shown in parentheses.

Table 7: Employer-sponsored health insurance and Part-time

(Logit models, Massachusetts)

	Insurance coverage	Part-time
Difference-in-differences	0.035***	0.003
	(0.000)	(0.030)
Treatment Effect	0.042	0.003

*** p<0.01 ** p<0.05 * p<0.10 based on asymptotic *t*-tests

Notes: Estimated using March CPS data, private sector workers age 18-64, controlling for demographic, state, and job characteristics. The demographic characteristics are age, age squared, gender, married, gender by age interaction, gender by age squared interaction, married by gender interaction, race (4 categories), education (5 categories). State characteristics include real minimum wage and real GDP growth. The job characteristics are industry and occupation (See Appendix). Robust errors are shown in parentheses.

Table 8: Weekly hours by quintile

(Placebo tests, Massachusetts versus rest of the US)

Difference-in-difference	Massachusetts effect	Placebo effects (rest of the US)	
		95th percentile	5th percentile
1st quintile	-0.028***†	0.043	-0.027
	(0.003)		
5th quintile	0.012***	0.015	-0.021
	(0.002)		

*** p<0.01 ** p<0.05 * p<0.10 based on asymptotic *t*-tests

††† significant at 1% level †† significant at 5% level † significant at 10% level based on placebo criterion

Notes: estimated using March CPS data, private sector workers age 18-64, controlling for demographic, state, and job characteristics. The demographic characteristics are age, age squared, gender, married, gender by age interaction, gender by age squared interaction, married by gender interaction, race (4 categories). State characteristics include real minimum wage and real GDP growth. The job characteristics are industry and occupation. Regressions are log-linear (coefficients converted to percent effects). Quintiles are formed using fitted Pr(Coverage) (see text). Two-tailed tests based on the distribution of placebo effect.

Table 9: Part-time by quintile

(Placebo tests, Massachusetts versus rest of the US)

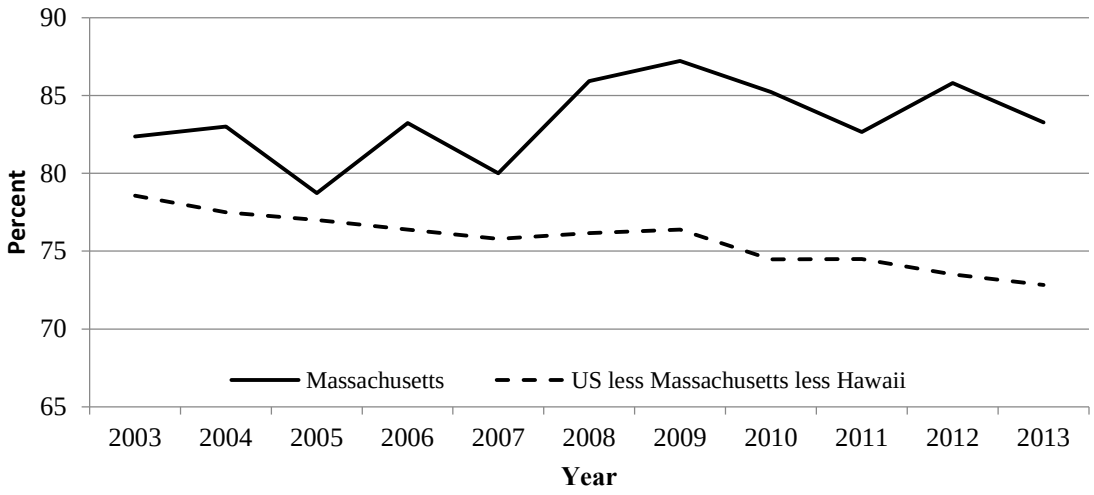
Difference-in-difference	Massachusetts effect	Placebo effects (rest of the US)	
		95th percentile	5th percentile
1st quintile	0.030***†	0.029	-0.032
	(0.007)		
5th quintile	-0.010***	0.014	-0.012
	(0.003)		

*** p<0.01 ** p<0.05 * p<0.10 based on asymptotic *t*-tests

††† significant at 1% level †† significant at 5% level † significant at 10% level based on placebo criterion

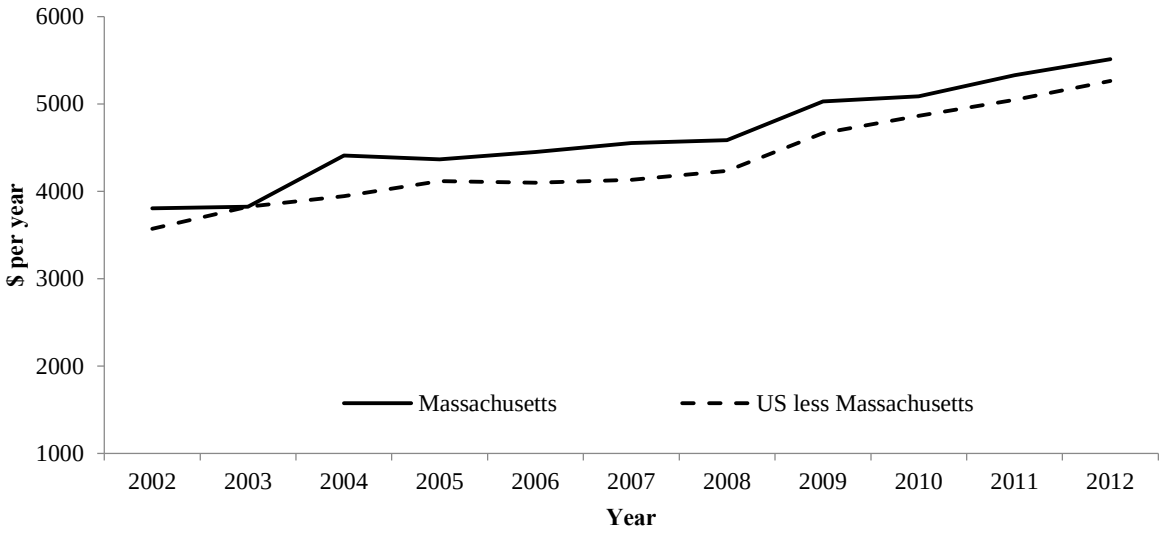
Notes: Estimated using March CPS data, private sector workers age 18-64, controlling for demographic, state, and job characteristics. The demographic characteristics are age, age squared, gender, married, gender by age interaction, gender by age squared interaction, married by gender interaction, race (4 categories). State characteristics include real minimum wage and real GDP growth. The job characteristics are industry and occupation. Linear probability model. Quintiles are formed using fitted Pr(Coverage) (see text). Two-tailed tests based on the distribution of placebo effect.

Figure 1: Employer-provided health insurance, 2002-2012 (private sector employees, age 18-64)



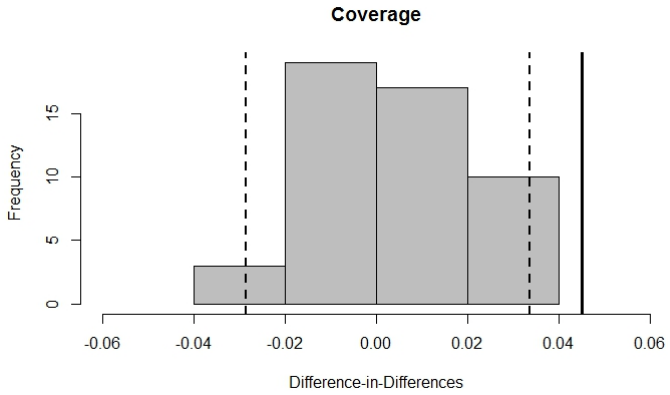
Note: Authors' tabulations (weighted) from March CPS files, 2003-2013.

Figure 2: Employer-sponsored health insurance premiums in Massachusetts ($2006)



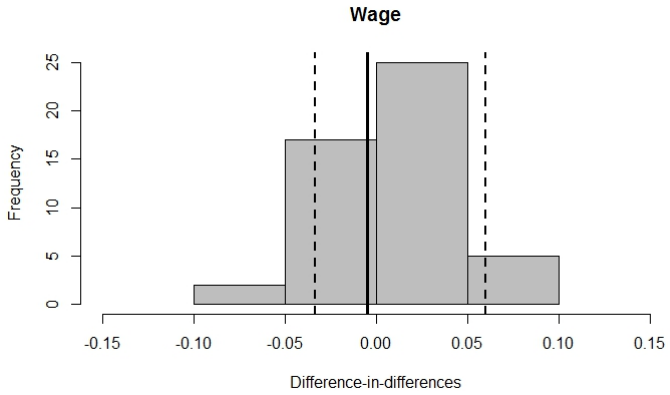
Note: MEPS average total single coverage premium at private sector.

Figure 3: Employer-sponsored insurance coverage. Estimated difference-in-differences



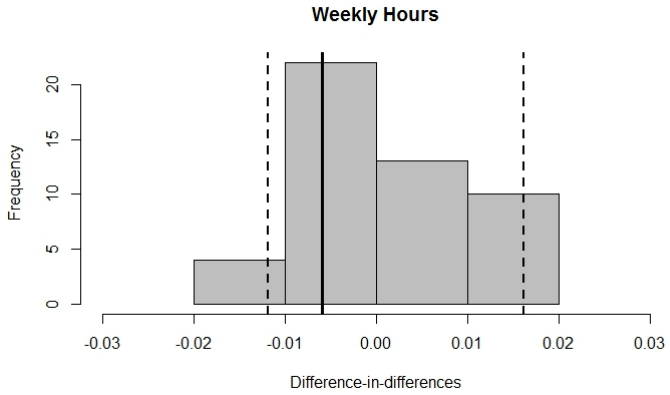
Notes: Estimated using March CPS data, private sector workers age 18-64. The dashed lines are the 0.5th and 99.5th percentile values, the solid line is the Massachusetts value. Linear probability model; covariates include the complete set of demographic, state, and job controls (See Table 3).

Figure 4: Labor market outcome: hourly wage. Estimated difference-in-differences



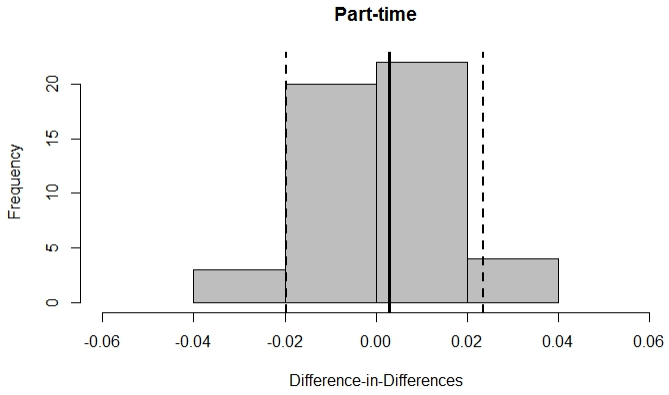
Notes: Estimated using March CPS data, private sector workers age 18-64. The dashed lines are the 5th and 95th percentile values, the solid line is the Massachusetts value. Regressions are log-linear (coefficient converted to percent effects). Full control used (See Table 3).

Figure 5: Labor market outcome: weekly hours. Estimated difference-in-differences.



Notes: Estimated using March CPS data, private sector workers age 18-64. The dashed lines are the 5th and 95th percentile values, the solid line is the Massachusetts value. Regressions are log-linear (coefficient converted to percent effects). Full control used (See Table 3).

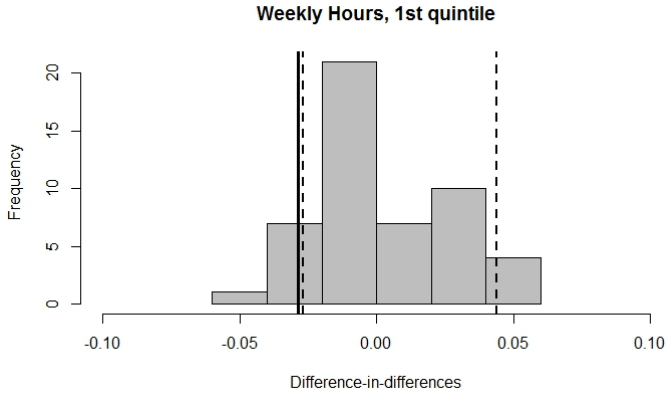
Figure 6: Labor market outcome: part-time indicator. Estimated difference-in-differences



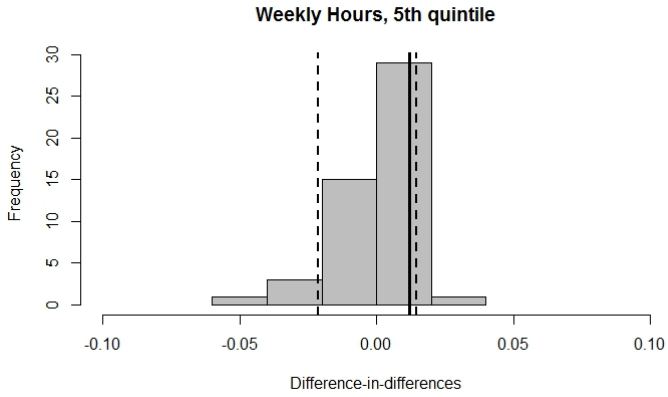
Notes: Estimated using March CPS data, private sector workers age 18-64. The dashed lines are the 5th and 95th percentile values, the solid line is the Massachusetts value. Linear probability model; covariates include the complete set of demographic, state, and job controls (See Table 3).

Figure 7: Labor market outcome by quintile: weekly hours. Estimated difference-in-differences

Panel A



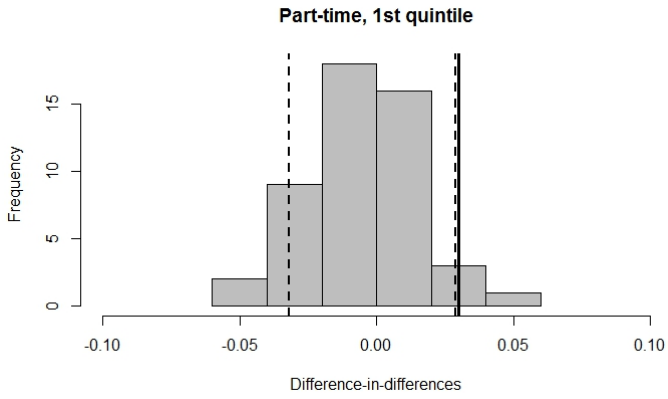
Panel B



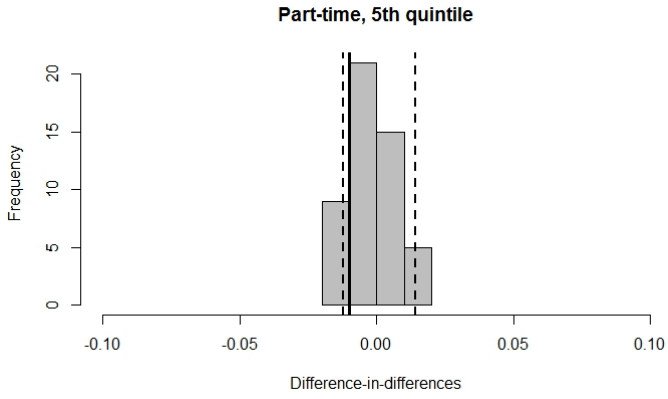
Notes: Estimated using March CPS data, private sector workers age 18-64. The dashed lines are the 5th and 95th percentile values, the solid line is the Massachusetts value. Regressions are log-linear (coefficient converted to percent effects). Control used (See Table 8). Quintiles are formed using fitted Pr(Coverage) (see text).

Figure 8: Labor market outcome by educational attainment: part-time. Estimated difference-in-differences

Panel A



Panel B



Notes: Estimated using March CPS data, private sector workers age 18-64. The dashed lines are the 5th and 95th percentile values, the solid line is the Massachusetts value. Linear probability model. Quintiles are formed using fitted Pr(Coverage) (see text). Control used (See Table 8).