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How Does Health Insurance Affect Firm Employment and Performance? Evidence from Obamacare

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Abstract. This article discusses how mandating employers to provide health insurance of a minimum quality and the associated increases in health insurance premia affect firm employment and performance. Using firm-level employee health insurance data around the passage of the Patient Protection and Affordable Care Act (PPACA), we show that the PPACA is associated with a significant increase in health insurance premia for employees in company-sponsored health insurance plans. In response, employers with greater exposure to the PPACA reduce employee enrollments in their health insurance plans to a larger extent after the law's enactment. Our analysis suggests that employers achieve this reduction in enrollment by shifting employment composition from full-time employees to part-time, temporary, or seasonal workers, who are not covered in employer-sponsored health insurance plans. Furthermore, we find no evidence of deterioration in performance at companies more exposed to the increase in health insurance premia. Overall, our findings illustrate how firms adapt to and mitigate cost increases associated with regulatory changes through strategic labor practices.

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1. Introduction

Health insurance plays an important factor in shaping labor demand and supply decisions. This strong connection is justified by the fact that most Americans obtain their health insurance through employment relationships. However, there is limited evidence on how employers respond to changes in health insurance regulation that affects the quality and cost of employer-sponsored health insurance plans. Most existing studies have analyzed the labor market outcomes of health insurance provision using individual and household-level survey data, focusing in particular on labor supply decisions, wage determination, job turnover, and other labor market outcomes. In light of the recent healthcare reforms in the United States and the contentious debate surrounding them, it is important to also consider the employer side.

That is our goal in this paper. We use firm-level employee health insurance data around the passage of the Patient Protection and Affordable Care Act (PPACA), often shortened to the Affordable Care Act (ACA), and nicknamed Obamacare, to examine how health insurance shapes firm employment decisions and performance. The PPACA, signed into law on March 23, 2010, aims to improve the accessibility, affordability, and quality of healthcare in the United States through consumer protections, mandates, subsidies, taxes, and insurance exchanges (Obama 2016). A key component of the PPACA is the employer mandate, which requires that employers with 50 or more full-time equivalent (FTE) employees provide health insurance to at least 95% of their full-time employees and their dependents up to 26 years of age. The coverage offered must be considered "affordable" (i.e., the coverage must cost no more than 9.5% of an employee's household income after the employer's contribution) and must provide "minimum value" (i.e., the plan must cover at least 60% of the covered healthcare expenses for a standard population). As a result of the employer mandate and other related regulations, the PPACA is expected to significantly increase health insurance premia in employer-provided plans. At the same time, affected firms cannot easily reduce health insurance coverage to contain costs because of the employer mandate.

We use the passage of the PPACA as a regulatory shock on the cost of employer-sponsored health insurance and study employment composition and performance changes for publicly traded companies during periods surrounding the PPACA. To do so, we construct a novel data set by assembling health insurance information collected from Form 5500 Annual Return/Report of Employee Benefit Plan filings and matching it to the establishment-level firm employment measures constructed from the National Establishment Time Series (NETS) database and Compustat database. Our unique data set allows us to identify health insurance premium and coverage information (the numbers of total employees, active employees, and retired/separated employees covered) and to construct proxies for foreign and domestic (both full-time and part-time) employment for a large sample of U.S. firms during the periods before and after the enactment of the PPACA.

We start the analysis by showing that the PPACA is in fact associated with significant increases in healthcare premia. Since the passage of the PPACA, Compustat firms with Form 5500 filings on average have spent 32% more on total health insurance premia compared with the periods before Obamacare. To assess whether such an increase is attributable to premium hikes or enrollment increases, we also examine the per-person cost of employer-sponsored health insurance premiums. We find that on average, an employer spends 13% more on health insurance premiums for each employee. This finding provides support to the hypothesis that the PPACA increases employers' health insurance provision costs.

Do employers adjust their labor policies to contain the increase in health insurance costs? In order to answer this question empirically, it is necessary to come up with proxies for firms' exposure to the PPACA. We use two alternative strategies in our empirical work.

The first strategy is to measure a firm's exposure to Obamacare using pre-PPACA health insurance coverage, which is the firm's proportion of covered employees in its employer-sponsored health insurance plan in 2007 (prior to the PPACA). Intuitively, higher pre-PPACA health insurance coverage exposes the employer to the cost impact of the PPACA to a larger extent. Besides the increase in cost, the employer mandate can also help determine a firm's exposure to the PPACA. First, the employer mandate applies only to firms with more than 50 full-time employees. However, because of the nature of our data, all firms in our sample are above this cutoff. Second, the employer mandate requires firms to provide health insurance to 95% or more of their full-time employees. This aspect of the mandate is also unlikely to be relevant for our analysis because most U.S. firms with more than 50 full-time employees had already provided some type of health insurance to all full-time employees prior to the passage of the PPACA.[1] Thus the employer mandate matters mostly through its requirement that firms provide "affordable" and "minimum value" coverage, which should correspond to an increase in the quality (and thus cost) of employer-provided health insurance. The increase in cost should matter more for firms that provide insurance to a greater proportion of their employees.

This proxy, however, is not without issues. Given that large U.S. firms were already providing health insurance to almost all full-time employees prior to the PPACA, this proxy is likely to capture the fraction of employees who were not full-time, that is, part-time, temporary, seasonal, or overseas workers. Because labor composition is a choice variable, one may worry that the pre-PPACA labor composition is correlated with post-PPACA changes in employment decisions through channels that are independent of the passage of the PPACA (and the associated increase in insurance premia). Although our analysis tries to deal with this possibility explicitly through the introduction of appropriate controls and placebo tests, it is desirable to show that our results do not rely only on this imperfect proxy.

These limitations motivate our second empirical strategy. As an alternative proxy for a firm's exposure to the PPACA, we use the labor dependency of the firm's operations, which is constructed based on the count of labor-related sentences using a set of keywords in the employer's 10-K filing in 2007. A firm more dependent on labor in its operations is naturally more exposed to regulatory shocks affecting the cost and quality of health insurance. Using both proxies raises the bar for alternative explanations. Any competing stories would need to explain why labor policies change more for both firms with high pre-PPACA coverage and labor-dependent firms through channels that are not associated with increases in health insurance regulation.[2]

Using both measures, we find that employers with higher exposure to health insurance shocks imposed by the PPACA actively reduced their plan enrollments after the law enactment. This enrollment reduction was achieved through the decrease in the number of active employee participants in employers' health insurance plans, not through drops in retired or separated employee enrollment. In particular, we find that a one-standard-deviation increase in health insurance coverage before the PPACA reduced the fraction of covered total and active employees in employer-sponsored health insurance plans by 38% and 32% after the PPACA, respectively. Similarly, a one-standard-deviation increase in the text-based labor dependency ratio decreases the fraction of covered total employees

by 8%. These results hold up to a battery of robustness tests.

The baseline results above can be explained by the increase in health insurance premia associated with the PPACA. In finer tests, we exploit the idea that the employer mandate should be more binding for companies that provided lower-quality health insurance plans to their employees prior to the PPACA. These companies face the requirement to provide higher-quality insurance after the PPACA and thus experience potentially higher increases in health insurance costs. In contrast, firms that already provided PPACA-compliant health insurance before the passage of the law should be less affected. Consistent with this notion, we find that the reduction in enrollment in employer-sponsored health insurance is more pronounced for exposed employers that offered lower-quality health insurance plans before the PPACA.

How do employers achieve this reduction in health insurance coverage? The restrictions associated with the employer mandate also help shape this response. Recall that the mandate requires companies to provide insurance to at least 95% of full-time employees. Thus, it is unlikely that companies achieved cost containment by reducing coverage to full-time employees. There are two alternative ways in which companies could have responded to the increase in health insurance costs while still satisfying the employer mandate. First, they could have contained costs by substituting labor for capital (automating jobs, for example). In that case, we should observe a reduction in total employment. Second, they could respond by shifting their employee composition toward employees for whom companies are not required to provide health insurance. In this case, we should observe a shift in labor composition from full-time to part-time, and/or from domestic to overseas, because part-time employment and foreign employment are not subject to the PPACA requirements.[3]

We find evidence consistent with the second channel (labor composition). Total employment does not seem to respond to the PPACA (i.e., more exposed firms change employment at rates that are similar to those at less exposed firms). However, firms with higher exposure to the PPACA do increase the number of domestic noncovered employees in the period after the law's enactment relative to otherwise similar firms that have lower exposure. Because firms are required to provide insurance to full-time employees, this result suggests that there is a shift in labor composition from full-time to part-time employment. Finally, we do not find any significant relationship between exposure to Obamacare and changes in foreign employment following the PPACA, suggesting that overseas employment shifting is not the main channel through which employers reduce enrollments into their health insurance plans.

Additionally, we examine whether the increase in health insurance costs associated with the PPACA negatively affects firms' operating performance. We do not find any evidence for differential performance deterioration after the PPACA for companies that are more exposed to the law change. Thus, changes in labor composition may have allowed exposed firms to absorb the increase in health insurance costs and avoid a hit to performance.[4]

Our paper contributes to the literature that examines the relationship between health insurance and labor market outcomes. Existing empirical evidence shows that health insurance is a central determinant of individual labor supply decisions because individual and household health insurance are closely tied to one's employment status.[5] Our unique data afford us access to health insurance premium and coverage information as well as employment statistics at the firm level, allowing us to study the relation between health insurance cost and firm labor policies.

Our paper also adds to a growing number of empirical studies and reports that seek to understand the relationship between health insurance policies and employment. Because of data limitations, these existing studies have relied chiefly on survey data. For example, focusing on individual outcomes, Frean et al. (2017) studied the American Community Survey data and found that the PPACA has increased health coverage. Using data from the Medical Expenditure Panel Survey, Abraham et al. (2016) found no evidence that PPACA provisions influenced employers' decisions to offer or not offer health insurance. Studies using the Current Population Survey (CPS) data have yielded mixed findings regarding the impact of Obamacare on part-time employment. For example, Dillender et al. (2020) focus on three industries and showed that the PPACA increased part-time employment in the retail, accommodation, and food service sectors; similarly, Even and Macpherson (2019) found an increase in involuntary part-time employment after the passage of the PPACA that was higher than predicted based on economic and labor market conditions. However, other studies using the CPS data turn up mixed or little evidence supporting a shift from full-time to part-time employment.[6] Overall, the lack of firm-level data in these studies makes it difficult to link data patterns to employer decisions in response to regulatory changes. Because the identities of the employers are anonymous in the survey data, these studies can rely only on variations at the industry level or in demographic characteristics to do cross-sectional cuts. The detailed firm-level data in our paper allow us to explore firms' differential exposure to the PPACA based on ex ante firm characteristics. We believe that our data on health insurance premiums collected from firms' regulatory filings offer a relatively clean and reliable estimate of employer

health benefit costs. To our best knowledge, this paper is the first to study and quantify the impact of the PPACA on firm-level health insurance costs and to use microdata on publicly traded companies to shed light on the impact of the PPACA on employment decisions from firms' perspective.[7] Additionally, our findings show that firms did not experience a negative productivity shock despite a significant shift in labor composition. This challenges the traditional view that workforce restructuring toward part-time labor necessarily harms firm productivity. Instead, it highlights firms' ability to adapt their labor strategies to regulatory changes while maintaining operational efficiency. Overall, our results suggest that firms were able to adjust their workforce without compromising operating performance in response to the PPACA and underscore the nuanced nature of labor allocation decisions and their impact on firm operating performance.

This paper is structured as follows. Section 2 sketches the institutional background of the PPACA, Section 3 describes the data used in our study, Section 4 discusses the empirical strategy, Section 5 presents the empirical results, and Section 6 concludes the paper.

2. Institutional Framework

Before we discuss our data, empirical strategy, and findings, it is important to understand the institutional framework associated with Obamacare. Health insurance provision in the United States is characterized by heavy involvement of employers, especially for the working-age population.[8] According to the U.S. Census Bureau, 55.1% of the U.S. population, or 68.2% of the employed population aged 18–64, had employment-based health insurance coverage in 2011 (DeNavas-Walt et al. 2011, Janicki 2013). From firms' perspective, health insurance represents an important item in the cost structure of many American corporations. For example, in 2010, the median employer contribution to health insurance premiums amounted to 12.8% of payroll costs (Henry J. Kaiser Family Foundation 2012).

The central goal of the PPACA has been to achieve near-universal coverage through shared responsibilities among individuals, employers, insurers, and the government.[9] The main component of the Act that affects employers is the employer mandate, also referred to as the employer shared responsibility provisions or the "play or pay" provisions. The employer mandate requires that employers with 50 or more full-time equivalent (FTE) employees provide health insurance to at least 95% of their full-time employees and their dependents up to 26 years of age. The coverage offered must be considered "affordable" (i.e., the coverage must cost no more than 9.5% of an employee's household income after the employer's contribution) and must provide "minimum value" (i.e., the plan must cover at least 60% of the covered healthcare expenses for a standard population). An applicable employer who either does not offer coverage or offers coverage that does not meet the affordability and minimum value standards faces penalties, officially called "an employer shared responsibility payment," owed to the Internal Revenue Service.[10]

In addition, the PPACA considerably expands the federal insurance standards for group health coverage, including employer-sponsored health benefit plans. These additional requirements include coverage of children up to age 26 under their parents' plans, coverage for clinical preventative care, a ban against exclusions of children with pre-existing conditions, restrictions on annual or lifetime limits, compliance with new claims procedures and reporting (to the government) and disclosure (to plan participants) obligations, etc.

Since its inception, Obamacare has sparked mixed public reactions and ongoing national debates over a wide range of issues. The discussions pertaining to employers center largely on a set of closely related questions: whether the PPACA leads to significant cost increases for employers, whether the law affects how employers provide healthcare for their employees, and how the health reform influences employers' hiring and staffing decisions and ultimately impacts employment.

Regarding the cost impact of Obamacare on employers, proponents of the law argue that by driving waste and inefficiencies out of the healthcare system, the PPACA's reforms can reduce healthcare cost and slow down healthcare spending system-wide and that the slowdown in healthcare cost growth would benefit employers by reducing the growth of employer health insurance premia (Executive Office of the President of the United States 2013). These potential benefits, however, may take time to materialize. In the meantime, a wealth of survey evidence suggests that employers in general anticipate that the PPACA will lead to significant increases in the cost of employer-sponsored healthcare plans. For example, data from the Kaiser Family Foundation Survey on Employer Health Benefits, which focuses on employer-sponsored health coverage information, including premiums, indicate that during our sample period of 2004 to 2018, the average annual increase in employer health benefit costs is approximately 4.7% per year. There is a significant increase of 8.6% in the employer's share of health insurance premiums from 2010 to 2011. The Kaiser survey provides support that there is indeed an abnormal increase in healthcare premium around 2010.[11] The increases are attributed largely to the mandated requirements and additionally to taxes, fees, and administrative burdens (e.g., new costs for general implementation, administration, and reporting, disclosure, and notification requirements) associated with the PPACA.

Despite the concerns about cost, the vast majority of employers to date have remained committed to providing health benefits to full-time employees. This is consistent across multiple employer surveys and in contrast with the speculation at the onset of the reform that the PPACA's incentives would encourage employers to drop coverage and induce a wholesale shift away from the employer-sponsored health insurance system. The main reasons to continue coverage, according to surveyed employers, are to attract future talent, to retain current employees, and to maintain employee satisfaction and loyalty (see, e.g., International Foundation of Employee Benefits Plans 2013–2015). From the employees' perspective, tax-subsidized employer-sponsored coverage is on average as good as or better than the PPACA exchange coverage for the majority of employees, that is, those whose income is above 250% of the federal poverty level (Garrett and Buettgens 2011). Therefore, employment-based health insurance remains the predominant means of healthcare coverage for employees.

3. Data

3.1. Form 5500 Data

The Employee Retirement Income Security Act of 1974 (ERISA) and the Internal Revenue Code require welfare and pension benefit plans with more than 100 participants to file Form 5500 annually to report their detailed plan information, including coverage, financial condition, investments, and operations. Form 5500 consists of a main form and a variety of schedules. The main file of Form 5500 contains basic plan information regarding the filing entity and indicates which schedules are included. It also reports participant compositions of the employer welfare and benefit plans, including the numbers of total, active, and retired or separated employees covered.[12] This detailed information regarding plan enrollment allows us to construct measures of plan coverage. Additionally, an employer that contracts its health insurance with standalone insurance companies must also attach a Schedule A to Form 5500.[13] Schedule A of Form 5500 reports insurance plan information, including insurance carrier information, insurance type (e.g., health, dental, or vision), number of persons covered under each insurance plan, and uniquely, the plan premium. We extract data on the number of persons covered and plan premia from these Schedule A filings.[14]

The main form and Schedule A are the most relevant to our study. The rest of the schedules report additional welfare and pension plan-related aspects of the filing entity, which are not pertinent to our analysis.[15] Form 5500 data are maintained by the IRS, Department of Labor, and Pension Benefit Guaranty Corporation and are made available to the public under a Freedom of Information Act request. The government releases Form 5500 data by filing year and by schedule starting in the year 1999.

Our Form 5500 data construction process starts with downloading the annual main form. To be included in our study, we require the firms to specify that they have a health insurance plan, HMO plan, PPO plan, or indemnity plan on the main form because those types of insurance contracts are affected by the PPACA. We then download the Schedule A data to supplement the main form. We take advantage of a unique identifier provided by the Department of Labor that links each Schedule A to its main form. Each Schedule A can report only one type of insurance plan. For example, a firm that allows employees to choose between an HMO plan and a PPO plan needs to file two Schedule A's. We aggregate insurance premia across all the Schedule A's within each year to the associated main Form 5500 level.

Another potential issue arises when matching the Form 5500 company to the Compustat company. Specifically, Form 5500s are filed for each "welfare and benefit plan" defined by employers. Whereas many employers refer to their various health-related plan coverages (medical, dental, etc.) as one plan and file one form, others file multiple forms, each corresponding to a particular plan applying to a subsidiary, employees of certain ranks, etc. Even though each form is associated with an Employer Identification Number (EIN), Compustat reports only one EIN per firm, which is at the consolidated company level. The EINs reported on Form 5500s may not be at the same level; that is, some firms report under multiple EINs. The problem at hand is to accurately match as many Form 5500s to Compustat as possible. We address this problem in three ways. First, we hand-match the filing entity name to the Compustat firm name. Second, we hand-match the address reported on Form 5500s to the address provided by Compustat. When the Form 5500 firm and Compustat firm share the same address, we take on additional web search efforts to check whether they are indeed the same entity. Third, we conduct web and Edgar searches to identify the subsidiaries of each Compustat company. We then match those subsidiaries to Form 5500s. After the matching procedure, we aggregate the total coverage and cost information in all the Form 5500s to the Compustat company level, yielding us a firm-year panel with complete firm financial information.

In summary, we are able to obtain firm-level insurance coverage information and corresponding insurance premiums for each year. We demonstrate how we construct the variables for our analysis using this information in Section 3.5.

3.2. NETS Data

Developed by Walls & Associates and Dun and Bradstreet (D&B), the National Establishment Time Series

(NETS) database provides comprehensive coverage of all domestic establishments at an annual frequency. D&B is a leading credit rating provider that maintains a detailed data set regarding each establishment through annual surveys and self-reporting. D&B spends a multimillion dollar amount each year to ensure the accuracy and integrity of the data provided.

The NETS data set provides information on business name, address, and number of employees among more than 350 data fields. We purchased the Publicly Listed Companies database from NETS, which tracks all the publicly listed firms and their establishments in the United States. The data also track the inclusion and exclusion of establishments at each firm and identifies such events accordingly, providing us with information on the composition of each firm across time. Most relevant to our study, this database allows us to track firms' domestic employment levels. The database provides an identifier that links each establishment to its ultimate parent. This allows us to focus on the ultimate parent when we perform the matching procedure to Compustat. We match the NETS data to Compustat by name and address. We make sure that the names are exact matches and take on additional effort to check for alternative names and addresses used by the firms to ensure matching accuracy.

The main piece of information we extract from the NETS database is the employment count. Because our unit of analysis throughout the paper is at the firm level, we aggregate all the employment numbers across all establishments within each firm by year. The NETS database covers U.S. firms and establishments only. Hence, the employment count reported covers domestic employees only, including both full-time and part-time employees.[16] We provide more details on constructing our variables for the analysis using this data set in Section 3.5.

3.3. Kaiser Foundation Employer Health Benefit Survey Data

To measure employer-provided health insurance plan quality, we need firm-year panel data on employer-provided health insurance contract terms. Obtaining such data is not an easy task because firms are not required to publicly file their employee health insurance plan contracts. For example, a thorough search of firms' SEC filings yields very few such plans.

We overcome this data availability issue by assembling a unique data set containing details on health insurance contracts using the Kaiser Foundation Employer Health Benefit Survey data.[17] The Kaiser Foundation conducts a detailed survey among a representative sample of employers regarding their employer-provided health insurance plans every year. In the survey, the Kaiser Foundation asks the employers to provide information regarding insurance contract terms such as the maximum out-of-pocket costs and the copay for regular doctor's office visits. The identities of survey responders are anonymous. However, Kaiser Foundation uses a unique identification number to track each employer in the survey. There is a substantial overlap in the firms surveyed by Kaiser every year. Therefore, we are able to construct a firm-year panel from the survey data. This Kaiser sample allows us to compare the insurance contract terms before and after the PPACA. We focus on three measures reported in the surveys to gauge insurance contract quality. Specifically, we study the maximum out-of-pocket costs, the copay for regular doctor's office visits, and the copay for a specialist's office visits.[18] The surveys also report firm total employment and covered total employees in employer-provided health insurance.

3.4. A Text-Based Measure of Labor Dependency

We use the labor dependency of a firm's operations as an alternative proxy for the firm's exposure to the PPACA. Quantifying labor dependency is difficult using traditional data sets such as Compustat. Therefore, we use a text-based measure. We search through firms' 10-K filings for the fiscal year ending in 2007 for a set of keywords related to labor. Specifically, we count the number of sentences including "employee," "worker," "personnel," "colleague," "team member," "individual," "people," "staff," and "workforce," We count the number of sentences containing one or more of these keywords and scale the number of sentences by total employment counts. Firms that more frequently mention labor-related words are likely to be more dependent on labor in their operations. Thus, they are more susceptible to regulatory shocks to health insurance policies.

3.5. Other Data and Variable Construction

Throughout our analysis, we supplement the data sets with firm characteristics and financials from Compustat. We eliminate utilities from our sample (but financial firms are included).

Our main outcome variables used in the analysis are constructed as follows. The first variable is total health insurance premium. We aggregate all the health insurance premia reported in the Schedule A's for each firm at any given year. For the analysis, we take the natural logarithm of the total health insurance premium. We then calculate the variables total premium/persons covered and total premium/total employees. The former is the dollar value of total health insurance premium scaled by the total number of persons covered by company-provided insurance, and the latter is the dollar value of total health insurance premium scaled by the total number of employees. We obtain our total number of employees from Compustat ("total

employees"). The number of persons covered by company-provided insurance comes from Form 5500 Schedule A.

To obtain participant composition information, we aggregate the numbers of total, active, and retired or separated employees covered in each plan as reported in the main forms and name the variables covered total, covered active, and covered retired or separated employees, respectively, reported on the main Form 5500. We also construct covered total employees/total employees, covered active employee/total employees, and covered retired or separated employees/total employees as the ratios of the number of covered total, active, and retired or separated employees to the total number of employees, respectively.

Focusing on the main Form 5500 allows us to assemble a comprehensive sample that includes both self-insured plans (where the employer assumes the financial risk of providing health insurance benefits to its employees) and fully insured plans (where the employer contracts commercial insurance providers, such as Blue Cross Blue Shield, to offer group health insurance to its employees). One potential concern with constructing coverage variables from the main form is that an employer may refer to its various welfare plan offerings (medical, dental, life, etc.) as one plan and file one Form 5500 for the plan. In that case, the total participation counts reported in the main Form 5500 can include employees who are enrolled only in, for example, the life insurance plan but not in the medical insurance plan. We do not think that this possibility materially affects our results. First, enrolling in employer-provided life or dental plans but not medical insurance plan is likely to be rare. Second, in unreported robustness tests, we redo our entire analysis by restricting our sample to firms that file both the main form and Schedule A. This subsample includes only fully insured plans. The required Schedule A filings for this subsample of employers clearly specify plan types, which allow us to focus on health insurance plans only.[19] We find robust results in this subsample, consistent with the findings from our main sample tests.

To construct measures for foreign employment and domestic employment, we make use of the NETS database. Compustat reports the number of all employees, including both domestic and foreign (total employees).[20] Because NETS covers all full-time and part-time employees in the United States (which we label as domestic employees), we are able to back out the number of foreign employees by taking the difference between the number of total employees and the number of domestic employees. We scale foreign employees by total employees to obtain foreign employees/total employees.

Similarly, we are able to construct a proxy for domestic noncovered employees by subtracting the number of covered active employees (from Form 5500) from the total number of domestic employees (from NETS) and scale the difference by total employees to construct domestic noncovered employees/total employees. This variable uses domestic employee counts not covered by the employer-provided health insurance as a proxy for domestic part-time and seasonal employees. In our opinion, such an approximation is valid because the majority of full-time U.S. workers obtain their health insurance through their employers. The PPACA's mandate applies to employees working for 30 or more hours per week. Even if firms also enroll some part-time employees in their health insurance programs, the inclusion will only bias against our results, making our finding a lower bound estimate. Given the paucity of panel data on part-time employment, especially at the individual firm level, we believe that our measure is a reasonable approximation.

For our operating outcome analysis, we consider two variables. ROA is defined as operating income before depreciation over total assets. EBIT is earnings before interest expenses and taxes over total assets.

We include previous year's employment, size, *Q*, leverage, asset tangibility, cash holding, cash flow, and foreign pretax income as control variables. Employment is the total number of employees in each firm. We take the natural logarithm of total number of employees to control for the difference in workforce size at each firm. Total asset is the total book value of assets. We take the natural logarithm of total asset to proxy for firm size. *Q* is the book value of assets plus the market value of equity minus total debt and deferred taxes all over assets. Leverage is the sum of short-term debt and long-term debt scaled by total assets. Tangibility is property, plant, and equipment scaled by assets. Cash holding is cash and short-term investments over assets. Cash flow is the sum of income before extraordinary items and depreciation and amortization scaled by assets. Foreign income is pretax income from foreign operations scaled by total assets. All the variables are deflated using the GDP deflator provided by the Federal Reserve Bank of St. Louis, with 1992 as the base year. We winsorize all of the continuous variables at the 1% level to reduce the effect of outliers. In addition, for the post-PPACA years, the values of our firm-level controls are fixed at their respective levels at the end of 2007 to mitigate endogeneity concerns.

3.6. Summary Statistics

Our main sample covers around 2,000 firms from year 2004 to year 2018, for which we have comprehensive data coverage from Form 5500 filings and Compustat. We present the sample summary statistics in Table 1. In panel A, we report summary information regarding the firms in our analysis. The average firm spends around $8.4 million per year on employee health insurance premium payments. The average premium for each person

Table 1. Summary Statistics

Panel A: Summary statistics for sample firms

Variable	*N* (1)	Mean (2)	SD (3)	Median (4)
Total health insurance premium (million $)	14,764	8.361	50.143	1.709
Total premium/persons covered ($)	14,764	2,876	2,568	2,472
Total premium/total employees ($)	14,764	1,801	2,749	471
Total employees	14,764	19,438	48,996	3,500
Size	14,764	6.696	1.954	6.578
Q	14,764	2.481	2.059	1.924
Leverage	14,764	0.233	0.256	0.178
Tangibility	14,764	0.264	0.238	0.183
Cash holdings	14,764	0.224	0.259	0.127
Cash flow	14,764	0.079	0.145	0.099
Foreign income	14,764	0.017	0.033	0
Precoverage ratio	14,764	0.877	0.830	0.73
Prelabor dependency	14,764	0.036	0.064	0.009
Log (covered)	14,764	7.572	1.791	7.448
Log (total)	14,764	8.187	1.914	8.161
Covered/total	14,764	0.779	0.681	0.672
Log (active)	14,764	7.428	1.878	7.372
Active/total	14,764	0.704	0.594	0.619
Log (retired)	14,764	0.547	1.611	0
Retired/total	14,764	0.003	0.014	0
Noncovered/total	14,764	0.394	1.024	0.216
Log (domestic)	14,764	7.855	1.912	7.886
Domestic/total	14,764	1.097	1.013	0.834
ROA	14,764	0.113	0.224	0.125
EBIT	14,764	0.068	0.225	0.082

Panel B: Firms with and without matches to Form 5500 and NETS data

	With matches			Without matches		
Variable	*N* (1)	Mean (2)	SD (3)	*N* (4)	Mean (5)	SD (6)
Total employees	14,764	19,438	48,996	15,446	9,333	23,707
Size	14,764	6.696	1.954	15,446	6.113	2.324
Q	14,764	2.481	2.059	15,446	2.842	3.981
Leverage	14,764	0.233	0.256	15,446	0.242	0.284
Tangibility	14,764	0.264	0.238	15,446	0.234	0.256
Cash holdings	14,764	0.224	0.259	15,446	0.300	0.388
Cash flow	14,764	0.079	0.145	15,446	0.002	0.280
Foreign income	14,764	0.017	0.033	15,446	0.008	0.091

Notes. This table presents summary statistics for our sample. Panel A presents the summary statistics for firms in our analysis, and panel B provides a comparison between the firms that could be matched to Form 5500 and NETS data and the ones that could not. All the variables are defined in the appendix.

covered is around $2,900. The average firm provides health insurance coverage to approximately 78% of the total number of employees at each firm.

In Table 1, panel B, we compare our sample firms, that is, the ones that could be matched to Form 5500 and NETS data, to the firms in Compustat that could not be matched. In comparison, our sample firms are considerably more mature and larger in size, with a higher number of employees and higher cash flow. For example, our sample firms on average have 19,400 employees as opposed to 9,300 employees for Compustat firms that we could not match.[21] Along the other dimensions, including *Q*, leverage, tangibility, and cash holdings, the two groups look qualitatively similar.

4. Empirical Strategy

4.1. Insurance Premium Regressions

To gauge the impact of the PPACA on health insurance premium, we estimate the following OLS regression over a firm-year panel spanning six years before and nine years after the passage of the PPACA:

$$Outcome_{i,t} = \alpha + \beta_1 \cdot After + \beta_2 \cdot trend_t + \beta_3 \cdot trend_t^2 + \beta_4 \cdot X_{i,t-1} + \theta_i + \epsilon_{i,t}, \quad (1)$$

where i and t represent firm and year, respectively. Our dependent variable, $Outcome_{it}$, denotes the natural logarithm of the total health insurance premium, total premium over persons covered, and total premium

scaled by total employees. *After* is a dummy variable that equals one if the majority of a firm's fiscal year falls after the passage date of Obamacare, that is, March 23, 2010, and equals zero otherwise. We include time trend and time trend squared terms to control for any seasonality and growth in insurance premiums because of reasons unrelated to Obamacare. $X_{i,t-1}$ represents a battery of firm-level controls to account for other factors that could potentially confound the changes in insurance premiums. For the post-PPACA years, the values of our firm-level controls are fixed at their respective levels at the end of 2007. θ_i captures firm fixed effects that account for firm-level heterogeneities. β_1 is our key coefficient of interest. If health insurance premia go up in the period after the passage of Obamacare, we would expect β_1 to be positive and significant.

We use the initial passage, rather than the effective dates of various mandates, as the start of posttreatment for two reasons. First, as we will show in our analysis in Section 5.1, the employer's share of health insurance costs increases abnormally around 2010, which coincides with the passage of the PPACA. This premium increase may reflect the impact of the mandates in the PPACA that take effect shortly after its passage, such as the longer coverage for children and minimum plan quality requirements. Correspondingly, employers are likely to adjust labor policies in response to the abnormal increase in health insurance costs. Second, when the government announced the plan to phase in the PPACA in 2010, firms knew that the employer mandate would become effective in 2015 (in fact, the employer mandate was set to take effect in January 2014 when the law was passed in 2010 but was delayed to 2015). It is likely that firms anticipated the ongoing cost impact of the new regulations, such as the employer mandate, and adjusted their labor compositions before the mandate became applicable. This anticipation of the cost increase is consistent with evidence from employer surveys, as discussed in Section 2. Because labor adjustments (e.g., layoffs) take some time, it may not be optimal for firms to wait until 2015 to adjust the composition of the labor force to the new regulatory environment.

4.2. Employment Regressions

The focus of our paper is to examine the impact of health insurance cost on firm employment decisions, using the PPACA as a regulatory shock on the employer-sponsored health insurance costs. Correspondingly, we use the following regression specification over a firm-year panel over the six-year periods before and after the passage of the PPACA.

$$\begin{aligned} Outcome_{i,j,t} = {} & \alpha + \beta_1 \cdot After + \beta_2 \cdot treatment_{2007} \cdot After \\ & + \beta_3 \cdot X_{i,j,t-1} + \beta_4 \cdot X_{i,j,t-1} \cdot After + \beta_5 \\ & \cdot \text{trend}_{i,j,t-2,t-1} + \theta_i + \eta_{j,t} + \epsilon_{i,j,t}, \end{aligned} \tag{2}$$

where i, j, and t, represent firm, industry, and year, respectively. *Treatment* represents a firm's exposure to the health insurance cost shocks induced by the PPACA. We use two measures for this exposure. The first is the number of covered total employees in health insurance plans sponsored by the employer as a proportion of the employer's total employment at the end of 2007.[22] The other one is the text-based labor dependency measure using labor-related keywords in the firm's 10K filings, as described in detail in Section 3.4. Both treatment variables are in place to measure the firms' exposure to the PPACA ex ante, one from a cost perspective and the other from a labor perspective. *After* is a dummy variable that equals one if the majority of a firm's fiscal year falls after the passage date of Obamacare, that is, March 23, 2010, and equals zero otherwise.[23] Our key coefficient of interest is β_2, which captures the differential change in the outcome variable across firms with different exposures to the PPACA around the enactment of the law.

We include the following control variables in the vector $X_{i,j,t-1}$. First, we control for firm size measures, *log (employment)* and *size*, which are standard in the literature. Moreover, we control for investment opportunities, Tobin's Q, to account for employment composition changes that are due to the needs of new projects. We also control for a firm's financial and liquidity conditions, that is, *leverage*, *tangibility*, *cash holdings*, *cash flow*, to tease out the possibility of forced layoff because of financial distress. Lastly, to gauge the firm's dependency on domestic operations, which are subject to the provisions of the PPACA, we control for the employer's *foreign income*. We fix our firm-level controls at the end of 2007, for the post-PPACA years, to be consistent with our treatment variable. To allow for potential nonlinear changes in the control variables that might affect the dependent variables during periods before and after the PPACA, we also include interaction terms between the control variables and the *After* dummy. $Trend_{i,j,t-2,t-1}$ is the change in the dependent variables in the prior two years, capturing any time trend in the dependent variables leading up to the passage of the PPACA. To control for macroeconomic and industry-level business cycles as well as unobservable time-invariant firm characteristics, we include firm fixed effects and industry times year fixed effects. We denote them θ_i and $\eta_{j,t}$, respectively.[24]

The interpretation of these regressions is subject to the usual concerns with identification. In particular, to interpret the results as causal, we need to assume that in the absence of the PPACA, our treatment variable would not affect the outcomes in the post-PPACA period through other channels. Although we cannot completely rule out this possibility, we implement a battery of standard tests, including placebo tests,

controlling for pretrends in outcomes, and matching estimators, to minimize such concerns.

5. Empirical Results

In this section, we present our empirical results. We first examine the effect of the PPACA on firms' insurance premium costs. We then document the effects of the PPACA on firms' employment compositions. We also study operating performance outcomes. We conclude this section with placebo tests and matching estimator analysis.

5.1. Health Insurance Premium

Does Obamacare increase health insurance costs to employers? In this subsection, we investigate the changes in health insurance premium in employer-sponsored plans before and after the passage of the PPACA.

For our first set of analyses, we utilize all firms in the Form 5500 data set whether they are matched to Compustat or not. This way, we include both public and private firms to better gauge the impact of PPACA on health insurance premiums for a broader spectrum of employers. We report the results in Table 2.

In Table 2, columns (1)–(3), we use the natural logarithm of the total healthcare premium as the dependent variable. Focusing on the full sample in column 1, the regression coefficient on the *After* dummy is 0.51, indicating that after the passage of the PPACA, firms' health insurance premia on average increase 51% compared with the period before Obamacare. We then break down our sample into firms with different sizes to see whether Obamacare has a different impact on large versus small firms. Specifically, we study the smallest 25% of the sample firms and report the results in column (2), whereas column (3) presents the results using the largest 25% of the firms in our sample. We find that the smaller firms on average experience a 55% increase in insurance premiums, whereas the larger firms experience a 41% increase in insurance premiums.

In Table 2, columns (4)–(6), we repeat the same analysis by replacing our dependent variable with the natural logarithm of health insurance premiums over persons covered. On a per person basis, we find a 31% increase in premiums on average. Using the subsamples, we find that the increases in smaller firms and larger firms are approximately 23% and 33%, respectively.

Although using the entire Form 5500 sample covers the largest number of firms, data on firm-level characteristics that may influence firm-level health insurance costs and employment policies are not available for all firms. Additionally, Form 5500 does not require firms to report their total number of employees, which is a key focus of our paper. Therefore, in our main empirical analysis, we focus on the merged Compustat and Form 5500 sample. We examine the insurance premium changes around the enactment of the PPACA for this merged sample in Table 3.

In column (1) of Table 3, we use the natural logarithm of the total healthcare premium as the dependent variable. The regression coefficient on the *After* dummy is 0.32, indicating that after the passage of the PPACA, firms' health insurance premia on average increase 32% compared with the period before Obamacare. Given the unconditional mean of total health insurance premiums at $8.4 million, this translates to a $2.7 million increase in health insurance expenditure per firm, representing the estimated net impact of the PPACA on health insurance costs after accounting for firms' cost-saving actions. In Table 3, columns (2) and (3), we use two different measures to gauge the changes in health insurance cost on a per person basis, scaling total health insurance premium by the number of persons covered and the number of total employees, respectively. We observe 12% and 13% increases in health insurance premiums per both covered employee and total employee,

Table 2. Insurance Premiums: All Firms Filing Form 5500

	Log (total premium)			*Log (total premium/persons covered)*		
Variables	All firms (1)	Smallest 25% (2)	Largest 25% (3)	All firms (4)	Smallest 25% (5)	Largest 25% (6)
After	0.510***	0.553***	0.406***	0.313***	0.229***	0.330***
	(0.017)	(0.031)	(0.032)	(0.011)	(0.021)	(0.020)
Time trend	Y	Y	Y	Y	Y	Y
Time trend squared	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Observations	442,415	107,074	118,490	442,415	107,074	118,490
Adjusted R^2	0.590	0.577	0.580	0.597	0.565	0.586

Notes. This table reports OLS regression results for firms' insurance premiums around the passage of the PPACA using data on all firms filing Form 5500. The dependent variable in columns (1)–(3) is the natural logarithm of total insurance premium, and the dependent variable in columns (4)–(6) is the natural logarithm of the healthcare premium scaled by the total number of persons covered. *After* is a dummy variable that equals one for the period after the passage of the PPACA and zero otherwise. Robust standard errors clustered by firm are in parentheses.

***Statistical significance at the 1% level; **statistical significance at the 5% level; *statistical significance at the 10% level.

Table 3. Insurance Premiums: Main Sample

Variables	*Log (total premium)* (1)	*Log (total premium/persons covered)* (2)	*Log (total premium/total employees)* (3)
After	0.316***	0.120***	0.131***
	(0.068)	(0.047)	(0.041)
Log (employment)	0.404*	−0.031	−0.075
	(0.211)	(0.121)	(0.128)
Size	0.374*	0.165	0.092
	(0.211)	(0.121)	(0.121)
Q	−0.012	−0.016	−0.031
	(0.039)	(0.024)	(0.024)
Leverage	0.088	0.118	−0.033
	(0.321)	(0.160)	(0.209)
Tangibility	−0.100	−0.390	−0.217
	(0.844)	(0.446)	(0.467)
Cash holdings	0.184	0.128	0.003
	(0.333)	(0.185)	(0.220)
Cash flow	0.044	−0.001	−0.101
	(0.461)	(0.256)	(0.268)
Foreign income	−0.374	0.576	−1.351
	(2.068)	(1.294)	(1.109)
Time trend	Y	Y	Y
Time trend squared	Y	Y	Y
Firm FE	Y	Y	Y
Observations	14,764	14,764	14,764
Adjusted R^2	0.587	0.573	0.728

Notes. This table reports OLS regression results for firms' insurance premium around the passage of the PPACA using the Form 5500 and Compustat matched sample. The dependent variables in Columns 1 to 3 are the natural logarithm of total insurance premium, the natural logarithm of health insurance premium scaled by the total number of persons covered, and the natural logarithm of insurance premium scaled by the total number of employees, respectively. After is a dummy variable that equals one for the period after the passage of the PPACA and zero otherwise. All the other variables are defined in the appendix. Robust standard errors clustered by firm are in parentheses.

***Statistical significance at the 1% level; **statistical significance at the 5% level; *statistical significance at the 10% level.

respectively. These results are consistent with those obtained using the entire Form 5500 sample.

Overall, the results in Tables 2 and 3 indicate that in the period after the PPACA, firms face significantly higher healthcare insurance premia. Given these increased costs associated with Obamacare, we next explore how firms adjust their employment compositions in response so as to potentially reduce health insurance costs and whether there is any implication on firm performance.

5.2. The Effect of the PPACA on Insured Employment

In this subsection, we examine the impact of health insurance costs on firms' employment policies regarding both total employment and covered employment in their health insurance plans. We use the PPACA as a regulatory shock on the cost of providing employer-sponsored health insurance and examine its effect on employment policies across employers with different levels of exposure to the law.

We first investigate the impact of the PPACA on total employment and the covered total employees. Then we break down the covered total employees into covered active employees and covered retired or separated employees in employer-provided health insurance plans. For each of the three measures of covered employee counts (covered total, covered active, and covered retired or separated), we use both the logarithm of the respective measure and ratio of the measure to total employment as our dependent variables. This allows us to document the impact of the PPACA on both the trend and the composition of the covered employment population. We run firm-year level panel regressions per Equation (2).

We report the results in Tables 4–6. Table 4 focuses on the impact of the PPACA on total employment and covered total employees. The treatment variable in columns (1) to (3) is a firm's pre-PPACA coverage ratio (i.e., a firm's covered total employee in its health insurance plan scaled by its total employment). In column (1), we use *log (covered)* as the dependent variable. We see a negative and significant coefficient on the interaction term between the pre-PPACA coverage ratio and *After*, indicating that firms with higher fractions of insured employees before the passage of the PPACA reduce the number of insured employees by a greater extent afterward. An employer with a one-standard-deviation higher coverage ratio reduces the total employee enrollment in its health insurance plan by 24% after the passage of the PPACA. The number of total employees, however, does not seem to be affected

Table 4. The Effect of the PPACA on Health Insurance Coverage: Covered Total Employees

Variables	*Log (covered)* (1)	*Log (total)* (2)	*Covered/total* (3)	*Log (covered)* (4)	*Log (total)* (5)	*Covered/total* (6)
After	0.543***	0.238**	0.290***	0.247	0.294**	−0.161
	(0.162)	(0.108)	(0.089)	(0.183)	(0.121)	(0.099)
Pre-coverage ratio × After	−0.287***	0.011	−0.354***			
	(0.038)	(0.025)	(0.036)			
Pre-labor dependency × After				−1.219**	−0.229	−0.959**
				(0.518)	(0.453)	(0.420)
Log (employment)	0.316***	0.369***	−0.082*	0.335***	0.367***	−0.055
	(0.066)	(0.049)	(0.043)	(0.067)	(0.049)	(0.044)
Size	0.184***	0.249***	−0.032	0.200***	0.248***	−0.013
	(0.058)	(0.037)	(0.040)	(0.058)	(0.037)	(0.042)
Q	0.001	0.014**	−0.019**	0.002	0.014**	−0.018**
	(0.009)	(0.007)	(0.009)	(0.009)	(0.007)	(0.009)
Leverage	0.083	0.007	−0.009	0.071	0.008	−0.026
	(0.070)	(0.049)	(0.057)	(0.070)	(0.049)	(0.061)
Tangibility	0.092	0.078	−0.084	0.117	0.078	−0.054
	(0.178)	(0.103)	(0.132)	(0.176)	(0.104)	(0.138)
Cash holdings	0.199***	0.094*	0.083	0.181**	0.092*	0.067
	(0.075)	(0.052)	(0.068)	(0.075)	(0.051)	(0.070)
Cash flow	0.139	0.055	−0.144	0.120	0.058	−0.173*
	(0.103)	(0.069)	(0.100)	(0.102)	(0.068)	(0.098)
Foreign income	−0.478	0.854***	−0.400	−0.220	0.849***	−0.094
	(0.533)	(0.324)	(0.396)	(0.548)	(0.325)	(0.422)
Firm FE	Y	Y	Y	Y	Y	Y
Industry × year FE	Y	Y	Y	Y	Y	Y
Controls × after	Y	Y	Y	Y	Y	Y
Prior trends control	Y	Y	Y	Y	Y	Y
Observations	14,764	14,764	14,764	14,764	14,764	14,764
Adjusted R^2	0.894	0.978	0.705	0.892	0.978	0.685

Notes. This table reports OLS regression results for firms' employee health insurance coverage around the passage of the PPACA. The dependent variable in columns (1) and (4), log (covered), is the natural logarithm of the number of total employees covered. The dependent variable in columns (2) and (5), log (total), is the natural logarithm of the total number of employees. The dependent variable in columns (3) and (6), covered/total, is covered total employees divided by total employees. All the other variables are defined in the appendix. Robust standard errors clustered by firm are in parentheses.

***Statistical significance at the 1% level; **statistical significance at the 5% level; *statistical significance at the 10% level.

disproportionately; in column (2), in which the dependent variable is *log (total)*, the estimate on the interaction term is small in magnitude and is not statistically different from zero. In column (3), we use the ratio of covered total employees to total employees as the dependent variable. We observe a point estimate of −0.35 on the interaction term, which is statistically significant at the 1% level. This result is also economically meaningful. An employer with a one-standard-deviation higher coverage ratio reduces health insurance coverage by 29% of its total employee counts after the PPACA. This reduction accounts for 38% of the average total employee coverage measured as a proportion of the employer's total employee counts.

Columns (4)–(6) in Table 4 carry out the regressions using the text-based labor dependency measure to proxy for firms' exposures to the health insurance cost shocks induced by the PPACA and find similar results. Taking column (6) as an example, a one-standard-deviation increase in labor dependency leads to an 8% reduction in the proportion of employees covered by the employer's health insurance plan after PPACA. Again, firms more exposed to the PPACA appear to reduce enrollments in health insurance plans without changing total employment relative to control firms.

Because both active employees and retired or separated employees are eligible to enroll in the employer-provided health insurance plans, in the next two tables we examine whether the enrollment reduction after the law's passage for the firms with higher exposures to the PPACA is achieved through enrollment cuts of active employees or retired or separated employees or both.

In Table 5, we examine the impact of the PPACA on the number of covered active employees in the employer-provided health insurance plans. The coefficients on the interaction terms are all negative and statistically significant, consistent across the two measures of active employees and the two measures of firm exposure to the PPACA. The estimates in columns (1) and (2) show that a one-standard-deviation higher coverage ratio leads to a 24% reduction in the log number of covered active employees and a 20% decrease in the number of covered active employees as a fraction of total employment after the passage of the PPACA. This

Table 5. The Effect of the PPACA on Health Insurance Coverage: Covered Active Employees

Variables	Log (active) (1)	Active/total (2)	Log (active) (3)	Active/total (4)
After	0.501**	0.161**	0.301	−0.169**
	(0.204)	(0.077)	(0.224)	(0.086)
Pre-coverage ratio × After	−0.290***	−0.274***		
	(0.053)	(0.033)		
Pre-labor dependency × *After*			−1.854***	−0.861**
			(0.658)	(0.392)
Log (employment)	0.289***	−0.064*	0.306***	−0.044
	(0.073)	(0.036)	(0.074)	(0.037)
Size	0.188***	−0.017	0.202***	−0.002
	(0.069)	(0.035)	(0.069)	(0.036)
Q	−0.001	−0.014*	0.001	−0.013
	(0.011)	(0.008)	(0.011)	(0.008)
Leverage	0.032	−0.030	0.021	−0.043
	(0.092)	(0.051)	(0.092)	(0.054)
Tangibility	0.115	−0.109	0.142	−0.086
	(0.242)	(0.113)	(0.240)	(0.117)
Cash holdings	0.225**	0.071	0.199**	0.057
	(0.091)	(0.063)	(0.091)	(0.065)
Cash flow	0.209	−0.118	0.195	−0.139*
	(0.135)	(0.082)	(0.135)	(0.080)
Foreign income	−0.751	−0.350	−0.478	−0.110
	(0.683)	(0.372)	(0.696)	(0.392)
Firm FE	Y	Y	Y	Y
Industry × year FE	Y	Y	Y	Y
Controls × after	Y	Y	Y	Y
Prior trends control	Y	Y	Y	Y
Observations	14,764	14,764	14,764	14,764
Adjusted R^2	0.771	0.692	0.770	0.676

Notes. This table reports OLS regression results for firms' employee health insurance coverage for active employees around the passage of the PPACA. The dependent variable in columns (1) and (3), log (active), is the natural logarithm of the number of active employees covered. The dependent variable in columns (2) and (4), active/total, is covered active employees divided by total employees. All the other variables are defined in the appendix. Robust standard errors clustered by firm are in parentheses.

***Statistical significance at the 1% level; **statistical significance at the 5% level; *statistical significance at the 10% level.

decrease is economically significant, accounting for 32% of average active employee coverage measured as a proportion of the total employee counts. In columns (3) and (4), we observe similar results using labor dependency as the measure of a firm's exposure to the PPACA. Taking column (4) as an example, a one-standard-deviation increase in labor dependency ratio before the PPACA results in an 8% reduction in the proportion of covered active employees in the firm's health insurance plan. Overall, the evidence in Table 5 indicates that the passage of the PPACA leads to a meaningful drop in the number of active employees covered by their employers' health insurance plans.

If an employer intends to reduce its exposure to the health insurance cost increase without slashing too much of its workforce, an alternative way is to reduce the health insurance coverage for its retired or separated employees. In Table 6, we examine the impact of the PPACA on employer-provided health insurance enrollment numbers for covered retired or separated employees. Estimates in columns (1)–(4) indicate that the passage of the PPACA does not disproportionately affect employers with higher exposure to the law in terms of covered retired or separated employee in their health insurance plans. The coefficients on the interaction terms are not statistically significant, using either measure of firm exposure to the regulatory shocks to health insurance costs.

Overall, we see that firms with higher exposure prior to the PPACA reduce health insurance coverage more after the law's enactment in terms of both the total number of enrollments and its proportion to total employee counts. Moreover, this reduction is achieved chiefly through the reduced coverage of active employees.

5.3. Does the Effect of the PPACA on Coverage Depend on Ex Ante Health Plan Quality?

One goal of the PPACA is to regulate firms that provide inadequate employee health insurance coverage before the law. Enrollments should therefore respond more to the PPACA for employers that offered lower-quality health insurance plans to their employees before the law went into effect because these companies face the requirement to provide higher-quality insurance after

Table 6. The Effect of the PPACA on Health Insurance Coverage: Covered Retired or Separated Employees

Variables	Log (retired) (1)	Retired/total (2)	Log (retired) (3)	Retired/total (4)
After	−0.020	0.000	0.106	0.001
	(0.360)	(0.003)	(0.376)	(0.004)
Pre-coverage ratio × After	−0.012	0.000		
	(0.081)	(0.001)		
Pre-labor dependency × After			−0.917	−0.000
			(0.812)	(0.012)
Log (employment)	−0.079	−0.001	−0.082	−0.001
	(0.075)	(0.001)	(0.076)	(0.001)
Size	−0.057	−0.001	−0.058	−0.001
	(0.080)	(0.001)	(0.080)	(0.001)
Q	−0.015	−0.000	−0.015	−0.000
	(0.015)	(0.000)	(0.015)	(0.000)
Leverage	0.096	0.000	0.097	0.000
	(0.145)	(0.001)	(0.146)	(0.001)
Tangibility	−0.345	−0.003	−0.341	−0.003
	(0.276)	(0.003)	(0.278)	(0.003)
Cash holdings	0.097	0.000	0.086	0.000
	(0.120)	(0.002)	(0.119)	(0.002)
Cash flow	0.221	0.001	0.228	0.001
	(0.151)	(0.003)	(0.152)	(0.002)
Foreign income	1.024	0.005	1.051	0.005
	(0.938)	(0.008)	(0.946)	(0.008)
Firm FE	Y	Y	Y	Y
Industry × year FE	Y	Y	Y	Y
Controls × after	Y	Y	Y	Y
Prior trends control	Y	Y	Y	Y
Observations	14,764	14,764	14,764	14,764
Adjusted R^2	0.534	0.411	0.534	0.411

Notes. This table reports OLS regression results for firms' employee health insurance coverage for retired or separated employees around the passage of the PPACA. The dependent variable in columns (1) and (3), log (retired), is the natural logarithm of the number of retired or separated employees covered. The dependent variable in columns (2) and (4), retired/total, is covered retired or separated employees divided by total employees. All the other variables are defined in the appendix. Robust standard errors clustered by firm are in parentheses.

***Statistical significance at the 1% level; **statistical significance at the 5% level; *statistical significance at the 10% level.

the PPACA and thus a potentially higher increase in health insurance costs. In this subsection, we use the plan quality measures from the Kaiser survey data to investigate how the ex ante health insurance quality impacts the effect of the PPACA on covered employment. The Kaiser data also report the total number of employees and covered total employees in employer-provided health insurance. Following our approach earlier, we construct the coverage ratio as the number of covered total employees divided by the total number of employees to proxy for firms' exposure to the PPACA.

In Table 7, we split our sample in halves according to two quality measures of health insurance plans before the PPACA, namely, the maximum out-of-pocket costs and the copay for regular doctor's office visits. For both of these two measures, we find that the effect of the PPACA on insured employment (as measured by the number of covered total employees divided by the total number of employees) concentrates in the subsample of employers that offered lower-quality health plans prior to the law; the coefficients on the interaction term between the pre-PPACA coverage ratio and *After* are negative and significant across both measures in the subsamples of lower-quality plans but are close to zero and insignificant in the subsamples of higher-quality plans.[25] In summary, these results suggest that employers that offered lower-quality health insurance plans prior to the PPACA reduce health insurance coverage more than employers with ex ante higher-quality plans.

So far, we have shown that firms with high exposure to the PPACA reduce health insurance coverage of their active workforce after the law's enactment. Firms may achieve this reduction in two ways that can circumvent the requirements of the PPACA. One is that firms can employ foreign workers instead of domestic workers, that is, to outsource positions overseas. The other is that firms can replace full-time employees with part-time employees that are out of the jurisdiction of the PPACA. We explore these two possibilities in turn in the next two subsections.[26]

5.4. Foreign Employment

One potential way for firms to avoid the PPACA's jurisdiction is to shift employment overseas because the law affects only employees in the United States. We

Table 7. The Effect of the PPACA on Health Insurance Coverage: High vs. Low Ex Ante Plan Quality

	Covered employees/total employees			
	Maximum out-of-pocket cost		Office visit copay	
Variables	Low-quality (1)	High-quality (2)	Low-quality (3)	High-quality (4)
Pre-coverage ratio × After	−0.097***	−0.004	−0.127**	−0.008
	(0.028)	(0.006)	(0.050)	(0.009)
Controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Industry × year FE	Y	Y	Y	Y
Controls × after	Y	Y	Y	Y
Prior trends control	Y	Y	Y	Y
Observations	1,965	2,083	1,052	2,992
Adjusted R^2	0.907	0.887	0.876	0.906

Notes. This table reports OLS regression results for employee health insurance coverage around the passage of the PPACA for employers with high- vs. low-quality health insurance plans before the PPACA. For each quality measure, we split the sample into halves and define a health insurance plan's quality as high (low) if the plan's quality measure falls into the bottom (top) half. The dependent variable is the ratio of covered total employees to total employees. Firm control includes the natural logarithm of total employment. Robust standard errors clustered by firm are in parentheses.

***Statistical significance at the 1% level; **statistical significance at the 5% level; *statistical significance at the 10% level.

empirically test this possibility using proxies for foreign employment as constructed in Section 3.5.

We implement the same empirical strategy depicted in Equation (2), using foreign employees scaled by total number of employees as the dependent variable. We report the results in Table I.A.1 in the Online Appendix. Using both measures of firms' exposure to the law, we find that firms with higher exposure prior to the PPACA are not actively shifting their workforce overseas relative to otherwise similar firms that have lower exposures. In other words, firms do not seem to engage in shifting employment overseas in response to the PPACA. One potential explanation is that it might be costly for firms to acquire new sites overseas or to move operations to existing foreign subsidiaries, at least in the short run.

5.5. Domestic Employment

The other potential method for firms to save on health insurance costs is to replace some jobs that require full-time workers with part-time workers, thereby reducing coverage obligations, because the PPACA does not require health insurance coverage for part-time employees. The Bureau of Labor Statistics (BLS) publication "Employment Benefits in the United States – March 2010" reports that 86% of full-time private industry workers have access to medical care benefits, whereas only 24% of part-time workers have access to medical care.[27] In addition, the participation rates for full-time and part-time employees in employer-provided health insurance plans are 64% and 14%, respectively. The big gap in both access to and participation between full-time and part-time employees with respect to employer-sponsored health insurance plans gives employers incentives to shift their employment composition from full-time to part-time as a way to reduce potential costs associated with the PPACA.

Because we cannot directly measure part-time employees, we instead examine the number of domestic noncovered employees as an alternative (as described in Section 3.5). We take the difference between the number of domestic employees reported by NETS and the number of covered active employees reported in Form 5500 to back out the number of domestic noncovered employees. To the extent that the majority of a firm's domestic full-time employees are covered in the firm-sponsored health insurance plan, which is a reasonable assumption, this measure serves as a first-order approximation for the number of part-time employees.[28]

Following the regression specification in Equation (2), we present the results in Table 8. We examine domestic noncovered employees divided by total employees as the dependent variable in columns (1) and (4). We observe positive and significant coefficients on the interaction term with either the coverage ratio or the labor dependency measure before the passage of the PPACA, indicating that firms with higher exposures to the PPACA indeed increase the number of domestic noncovered employees in the period after the law's enactment relative to otherwise similar firms that have lower exposures. Using the estimates from column (1), for example, an employer with a one-standard-deviation higher coverage ratio increases the number of domestic employees without employer-provided health insurance coverage as a fraction of total employment by 22% after the PPACA. This increase accounts for 55% of average employment without coverage measured as a proportion of an employer's total employee counts. We interpret these results as

Table 8. The Effect of the PPACA on Domestic Employment

Variables	*Noncovered/total* (1)	*Log (domestic)* (2)	*Domestic/total* (3)	*Noncovered/total* (4)	*Log (domestic)* (5)	*Domestic/total* (6)
After	−0.040	0.201	0.200	0.142	0.211	0.148
	(0.170)	(0.154)	(0.169)	(0.208)	(0.161)	(0.202)
Pre-coverage ratio × After	0.262***	−0.058	0.013			
	(0.049)	(0.043)	(0.041)			
Pre-labor dependency × After				1.666**	−0.676	0.475
				(0.768)	(0.482)	(0.728)
Log (employment)	−0.047	0.399***	−0.057	−0.062	0.401***	−0.056
	(0.071)	(0.069)	(0.074)	(0.070)	(0.070)	(0.074)
Size	−0.065	0.160***	−0.116**	−0.078	0.162***	−0.116**
	(0.060)	(0.060)	(0.056)	(0.060)	(0.060)	(0.055)
Q	−0.008	−0.001	−0.018*	−0.009	−0.000	−0.018*
	(0.013)	(0.009)	(0.010)	(0.013)	(0.009)	(0.010)
Leverage	−0.005	−0.015	0.004	0.005	−0.017	0.004
	(0.080)	(0.107)	(0.075)	(0.079)	(0.107)	(0.075)
Tangibility	0.315	0.150	0.238	0.289	0.156	0.235
	(0.199)	(0.176)	(0.174)	(0.200)	(0.177)	(0.174)
Cash holdings	−0.094	0.011	−0.016	−0.071	0.002	−0.010
	(0.105)	(0.070)	(0.096)	(0.105)	(0.069)	(0.096)
Cash flow	−0.095	−0.024	−0.209*	−0.083	−0.024	−0.212*
	(0.150)	(0.153)	(0.125)	(0.145)	(0.154)	(0.124)
Foreign income	0.582	0.927	0.238	0.336	0.988	0.218
	(0.574)	(0.716)	(0.527)	(0.593)	(0.714)	(0.527)
Firm FE	Y	Y	Y	Y	Y	Y
Industry × year FE	Y	Y	Y	Y	Y	Y
Controls × after	Y	Y	Y	Y	Y	Y
Prior trends control	Y	Y	Y	Y	Y	Y
Observations	14,764	14,764	14,764	14,764	14,764	14,764
Adjusted R^2	0.701	0.945	0.747	0.697	0.945	0.747

Notes. This table reports OLS regression results for firms' domestic employment around the passage of the PPACA. The dependent variable in columns (1) and (4), noncovered/total, is the ratio of domestic noncovered employees to total employees. The dependent variable in columns (2) and (5), log (domestic), is the natural logarithm of the number of domestic employees. The dependent variable in columns (3) and (6), domestic/total, is the ratio of domestic employees/total employees. All the other variables are defined in the appendix. Robust standard errors clustered by firm are in parentheses.

***Statistical significance at the 1% level; **statistical significance at the 5% level; *statistical significance at the 10% level.

evidence that firms are shifting full-time jobs to part-time ones in response to the PPACA.

In Table 8, columns (2) and (5), we examine the effect of the PPACA on domestic employment using *Log (domestic)* as the dependent variable. Similarly, in columns (3) and (6), we use the number of domestic employees as a fraction of the total number of employees as the dependent variable. We do not find statistically significant results on the interaction terms in these regressions. These results are not surprising because the domestic employment measure is simply the difference between the total number of employees and the number of foreign employees, both of which are not affected by the PPACA, as we have shown in earlier results.

Together, results from our employment analysis suggest that the adjustment in employment composition in response to the PPACA seems to take place at the domestic level, that is, firms substituted noninsured employees for employees on their health insurance plans, and not across borders. This is consistent with the drop in the number of covered employee counts as well as the coverage ratio and no change in the total number of employees or the number of foreign employees that we observe in the data.

It is important to note that, unfortunately, to the best of our knowledge, there is no available data set at the firm level, including our own, that contains information for directly measuring firm-level part-time employee counts. We proxy for the number of domestic part-time employees using the number of domestic employees not covered by the employer-provided health insurance, which is calculated by subtracting the number of covered active employees (from Form 5500) from the total number of domestic employees (from NETS). In our opinion, such an approximation is plausibly valid because the majority of full-time U.S. workers obtain their health insurance through their employers. Given the paucity of firm-level data on part-time employment, this approximation is the best available proxy. Although our result is consistent with an increase in part-time employment, we cannot completely rule out the alternative explanation that full-time employees may voluntarily leave company-sponsored health

insurance plans to move to insurance exchanges. This alternative, however, is rather unlikely given that, from the employees' perspective, tax-subsidized employer-sponsored coverage is on average as good as or better than the PPACA exchange coverage for the majority of employees, that is, those whose income is above 250% of the federal poverty level (Garret and Buettgens 2011). Furthermore, our finding that firms substitute part-time employees for full-time employees is consistent with an abundance of anecdotal evidence on the PPACA's impact on overall employment and employee composition, especially the shift toward part-time workers.[29] Together, these lend us some confidence in our interpretation that the PPACA induced firms to substitute part-time positions for full-time ones.

5.6. Operating Performance

In this subsection, we examine changes in firm operating performance around the enactment of the PPACA. We focus on two of the most commonly used operating performance measures, *ROA* and *EBIT*. We estimate the same regression specification, as shown in Equation (2); we run OLS regressions of the dependent variables, respectively, on the interaction term, firm-level controls, firm fixed effects, industry times year fixed effects, and interaction terms between the *After* dummy and firm-level controls.

We present the results in Table 9. The coefficients on the interaction term are insignificant both statistically and economically. There are no significant differences in operating outcome changes around the passage of the PPACA across firms with different levels of exposure to the law.[30] Viewed together with our previous findings, these results suggest that the employment composition shifts that firms implemented may have helped firms mitigate the effect of higher healthcare premia on operating performance.

Our findings on operating performance raise two important observations. First, our results suggest that the substitution of full-time with part-time employees does not necessarily have a negative effect on operating performance. This is consistent with the findings of Kunn-Nelen et al. (2013), who examined part-time labor in the Dutch pharmacy sector. Their study showed that firms with a larger share of part-time employees can be more productive than those relying predominantly on full-time labor. These authors attribute this productivity to the flexibility offered by part-time labor, which allows firms to adjust staffing more efficiently in response to fluctuations in demand. Although Kunn-Nelen et al. (2013) focused on a specific industry and may not have been generalizable across all sectors, it highlighted the complexity of the tradeoff between full-time and part-time labor and challenged the assumption that an increase in part-time employment necessarily leads to a decline in productivity. This complexity is also reflected in our results, where firms' increased reliance on part-time labor under the PPACA does not appear to compromise their operating performance.

Table 9. The Effect of the PPACA on Operating Performance

Variables	*ROA* (1)	*EBIT* (2)	*ROA* (3)	*EBIT* (4)
After	0.006	0.007	−0.000	−0.005
	(0.029)	(0.028)	(0.032)	(0.032)
Pre-coverage ratio × *After*	0.004	0.004		
	(0.004)	(0.004)		
Pre-labor dependency × *After*			0.085	0.122
			(0.135)	(0.135)
Log (employment)	0.006	0.006	0.006	0.007
	(0.017)	(0.017)	(0.017)	(0.017)
Size	−0.028*	−0.019	−0.028*	−0.019
	(0.017)	(0.017)	(0.017)	(0.017)
Q	0.008**	0.011**	0.008**	0.011**
	(0.004)	(0.005)	(0.004)	(0.005)
Leverage	−0.230	−0.213	−0.230	−0.213
	(0.195)	(0.200)	(0.195)	(0.200)
Tangibility	0.141	0.117	0.140	0.116
	(0.189)	(0.195)	(0.189)	(0.195)
Cash holdings	0.065	0.077	0.066	0.078
	(0.085)	(0.080)	(0.085)	(0.081)
Cash flow	−0.077	−0.076	−0.078	−0.077
	(0.113)	(0.119)	(0.113)	(0.119)
Foreign income	0.193	0.152	0.188	0.147
	(0.131)	(0.130)	(0.132)	(0.131)
Firm FE	Y	Y	Y	Y
Industry × year FE	Y	Y	Y	Y
Controls × after	Y	Y	Y	Y
Prior trends control	Y	Y	Y	Y
Observations	14,764	14,764	14,764	14,764
Adjusted R-squared	0.573	0.571	0.573	0.571

Notes. This table reports OLS regression results for firms' operating performance around the passage of the PPACA. The dependent variable in Columns 1 and 3 is ROA. The dependent variable in Columns 2 and 4 is EBIT. All the other variables are defined in the appendix. Robust standard errors clustered by firm are in parentheses.

***Statistical significance at the 1% level; **statistical significance at the 5% level; *statistical significance at the 10% level.

Second, a natural question arises: Why did firms not utilize more part-time workers in the pre-PPACA equilibrium? We posit that the answer lies in the shift in cost structures introduced by the PPACA. The policy imposes significant additional costs on employing full-time workers because of mandated health insurance provisions, thereby altering firms' cost-benefit analyses and making part-time employment relatively more attractive as a cost-saving strategy to mitigate potential negative effects on operating performance. Although the PPACA creates an incentive to increase part-time labor, it does not necessarily imply that firms could achieve the same level of productivity at lower costs before the policy. In the pre-PPACA equilibrium, firms likely optimized their labor composition based on the then-prevailing operating environment and cost-benefit considerations. The introduction of new costs

under the PPACA may force firms to reevaluate and adjust their labor strategies to control costs while maintaining productivity, possibly by reallocating internal resources or adopting technology to support part-time employees. The absence of observed negative consequences for operating performance in our findings suggest that firms are able to effectively manage this transition.

5.7. Validation and Robustness

In this subsection, we carry out a set of validation and robustness tests. First, we test the validity of the parallel trend assumption underlying our empirical tests. Second, we conduct placebo tests assuming that the PPACA took place in a different year. Third, we implement a matching estimator approach. Fourth, we implement our specification with alternative control variables. And lastly, we use a different measure for firms' exposure to Obamacare.

5.7.1. Parallel Trends. One concern with studies using the difference-in-differences methodology is whether the treated and control groups follow parallel trends prior to the event. To address this concern, in this subsection we verify the parallel trends assumption by examining our outcome variables going further back in time. More specifically, we compare whether the changes in the outcome variables in years leading up to the passage of Obamacare are different. Because we utilize two treatment variables, that is, the pre-coverage ratio and the pre-labor dependency ratio, in our paper, we run OLS regressions of changes in the outcome variables on each treatment variable.

We present the results in Table I.A.2 in the Online Appendix, in which we report the regression coefficients of the changes in the outcome variables on the treatment variables. Columns 1–3 focus on our first treatment variable, *pre-coverage ratio*, and columns 4–6 focus on our second treatment variable, *pre-labor dependency*. We compare the changes in the outcome variables year by year in rows 1–5. For example, in the first row of the table, we compare changes in the outcome variables from 2008 to 2009; in the second row, we compare changes in the outcome variables from 2007 to 2008, and so on. We also compare the changes in the outcome variables for more than one year, using the year before the event as the base year, and report the results in rows 6–9. Specifically, in rows 6–9, we compare the changes in the outcome variables from 2007 through 2009, from 2006 through 2009, from 2005 through 2009, and from 2004 through 2009, respectively. The results in Table I.A.2 show that changes in the outcome variables are indistinguishable for both treatment variables in the years leading up to the event. It is thus difficult to argue that our results are driven by outcome variables following different trends prior to the passage of Obamacare.

5.7.2. Placebo Tests. Another concern with our empirical strategy is that our battery of control variables and fixed effects cannot fully rule out the possibility that there is a latent variable driving our results. Hence, it might invalidate our assumption that the changes in outcome variables we observe are through no other channels than the exposure to the PPACA before the passage of the law.

To address this problem, we conduct the same experiment for the March 2010 passage of the PPACA using a placebo event year. Specifically, we perform the same tests around March 2004 using a sample from 2001 to 2007.[31] We present the placebo test results in Table I.A.3 in the Online Appendix. Following our empirical strategy, we define the treatment variable in columns (1)–(3) as the pre-coverage ratio in year 2003, which is the year prior to the placebo event year. In columns (4)–(6), we use the pre-labor dependency ratio in year 2003 as the treatment variable.

Like before, we run firm-level regressions as shown in Equation (2). We focus on *log (covered)*, *covered/total*, and *noncovered/total* as the dependent variables. The interaction terms show no statistically significant results. The magnitudes of the regression coefficients are also much smaller than the ones from the actual event.

Another potential concern with our empirical methodology is that the pre-coverage ratio as a measure for firms' exposure to Obamacare could exhibit some degree of mean reversion. However, if mean reversion alone drives our results, then we should find qualitatively similar results in these placebo tests, in which a nonevent month (March 2004) is set as the start of treatment. We do not find any significant results in the placebo tests, which suggests that mean reversion alone is unlikely to drive our results.

5.7.3. Matching Estimator. Our results could be due to other subtle firm-level heterogeneities that we cannot fully control for in the analysis. Ideally, the assignment of the treatment, in our case, for example, the proportion of covered employment, should be randomly distributed across firms in our sample prior to the event. Equation (2) with controls does not fully address the concern that firms being compared may have very different characteristics. To overcome this issue, we utilize the Abadie and Imbens (2006) matching estimator approach. The matching estimator analysis ensures that the assignment of treatment is orthogonal to the outcome variable and also addresses the concern that the firms being compared may have different observable characteristics, which might in turn affect the outcome variable.

Our main results are based on two continuous treatment variables, the *pre-coverage ratio* and the pre-PPACA text-based labor dependency ratio. The difference-in-difference matching estimator cannot be applied to continuous treatment variables. Therefore, instead, for each of our treatment variables, we sort it from the largest to the smallest and create a dummy variable *Treatment dummy* that equals one if the continuous treatment variable is in the top 50% and equals zero if it falls into the bottom 50%. Firms with *Treatment dummy* equal to one become our treated firms, and firms with *Treatment dummy* equal to zero are our control firms. For each treated firm, we first match it with a firm ("control firm") from the nontreated group that is in the same industry as the treated firm and has the minimal distance (i.e., the Mahalanobis distance) to the treated firm along the vector of observed covariates, namely, *log (employment)*, *size*, *Q*, *leverage*, *tangibility*, *cash holding*, *cash flow*, and *foreign income*. This first step ensures that the treated and control observations have identical distributions along each one of the covariates chosen. In the second step, we estimate the average treatment effect on the treated (ATT) using our matched sample. The set of counterfactuals is restricted to the matched controls. The crucial assumption here is that in the absence of the treatment, the treated group would have behaved similarly to the control group.

We report the results in Tables I.A.4 (using *pre-coverage ratio* as the treatment variable) and I.A.5 (using *pre-labor dependency* as the treatment variable) in the Online Appendix. For both tables, in panel A, we report the summary statistics of the matched treated sample, nontreated sample, and the matched control sample. We also report the *t*-test *p* values between the treated and control groups. None of the *t*-test *p* values are statistically significant, indicating that the matched treated and control groups are very similar along multiple dimensions. This comparison provides us with assurance to proceed with the matching estimator approach. Panel B shows the ATT estimator coefficients. They are qualitatively similar to the main results reported in earlier tables, providing further support for our interpretation.

5.7.4. Alternative Control Variables. In the paper, we fix firm-level controls at the end of 2007 for the post-PPACA years to be consistent with our treatment variable and to mitigate endogeneity concerns. In Table I.A.6 in the Online Appendix, we instead use control variables lagged by one year and interact these $t-1$ controls with the *After* dummy. We find qualitatively similar results.

5.7.5. An Additional Measure for Exposure to the PPACA—Industry Wage. Throughout the paper, we use two different measures to proxy for firms' exposure to Obamacare: one based on firm characteristics and the other derived from textual analysis. In this subsection, we show that our results remain robust when using a wage-based measure. The idea is that, because high-wage employees are likely to have already received health benefits before Obamacare, it is exposure to low-wage workers that matters most in determining firms' overall exposure to increased healthcare costs under the PPACA.

Given that wage information is missing for most firms in Compustat, we use an industry-level wage measure. Specifically, we obtain the average wage in each firm's four-digit NAICS industry from the Current Population Survey (CPS), provided through the Integrated Public Use Microdata Series (IPUMS). We then construct a dummy variable to identify low-wage industries, based on the sample median industry wage, as an industry-level proxy for exposure. The regression results using this new proxy are presented in Table I.A.7 in the Online Appendix. These results confirm that our findings on the effect of the PPACA on health insurance coverage are robust when employing the low-wage industry as an alternative measure of firms' exposure to the PPACA.

6. Conclusion

In this paper, we assemble new data that allow us to examine how health insurance regulation affects firm employment decisions, using the passage of the PPACA as an experiment. We show that the PPACA is associated with a significant increase in health insurance premiums for employees in company-sponsored health insurance plans. In the post-PPACA period, employers that covered a large fraction of employees under their health insurance plans and depended more on their labor force prior to the PPACA actively reduce enrollment in their plans. This reduction is achieved chiefly through the reduced coverage of its active employees. One possible explanation for this finding is that affected companies shift their employment composition from full-time employees to part-time, temporary, or seasonal workers, who are not subject to the PPACA mandates.

Our findings indicate that employers adjust their labor policies to counteract the negative financial effects of the PPACA, reflecting opportunistic firm behaviors aimed at avoiding potential penalties and mitigating declines in financial performance. However, the impact of the PPACA on employers and employees is asymmetrical. Whereas employers can strategically adapt their policies, employees generally lack effective mechanisms to mitigate the law's effects on key aspects of their welfare, such as job security, employee benefits, and overall workforce morale. This disparity underscores important policy considerations. The unintended

consequences of the PPACA regulations emphasize the need for policymakers to anticipate and address strategic firm behaviors when designing and implementing future regulations.

It is important to point out the limitations of what we can conclude from our results. First, because we cannot directly and precisely measure part-time employment, we cannot completely rule out the possibility that our results are driven by channels other than the change in the composition of employment. Second, we cannot rule out the possibility that health insurance premia would have increased even more had the PPACA not been enacted. The period we are examining is characterized by sharp increases in health insurance costs, and we cannot measure the counterfactual increase in health insurance costs in the absence of the law change. Third, although this paper is the first to study the impact of the PPACA on firm-level health insurance costs and to use microdata on publicly traded companies, it is important to note that the findings may not be generalizable to smaller firms. Exploring the heterogeneous impact of the PPACA on firms of different sizes and characteristics represents an interesting topic for future research. Such an investigation could yield valuable insights into how small firms, which may face different operational constraints and incentives, respond to major healthcare reforms and their associated costs and benefits.

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Appendix. Variable Definitions

Variable	Definition
Total health insurance premium (million $)	Total dollar value of health insurance premium reported on Form 5500
Total premium/persons covered ($)	Total dollar value of insurance premium scaled by the total number of persons covered by firm-provided insurance plans
Total premium/total employees ($)	Total dollar value of insurance premium scaled by the total number of employees
Total employees	Total number of employees
Size	Natural logarithm of book value of asset
Q	Book value of assets plus the market value of equity minus total debt and deferred taxes all over assets
Leverage	Sum of long-term debt and debt in current liabilities all over assets
Tangibility	Property, plant, and equipment scaled by total assets
Cash holdings	Cash and short-term investments scaled by total assets
Cash flow	Depreciation and amortization plus income before extraordinary items scaled by total assets
Foreign income	Pretax income from foreign operations scaled by total assets
Pre-coverage ratio	The ratio of the covered total employees to the total number of employees in 2007
Pre-labor dependency	The ratio of the number of sentences containing labor-related keywords in the firm's 10-K filing to the total number of employees in 2007
Log (covered)	The natural logarithm of the number of total employees covered by the employer's health insurance
Log (total)	The natural logarithm of the total number of employees
Covered/total	Covered total employees scaled by total employees
Log (active)	The natural logarithm of the number of active employees covered by the employer's health insurance
Active/total	Covered active employees scaled by total employees
Log (retired)	The natural logarithm of the number of retired or separated employees covered by the employer's health insurance
Retired/total	Covered retired or separated employees scaled by total employees
Noncovered/total	The number of domestic employees minus covered active employees then scaled by total employees
Log (domestic)	The natural logarithm of the number of employees reported in the NETS data
Domestic/total	Domestic employees scaled by total employees
ROA	Operating income before depreciation over total assets
EBIT	Earnings before interest expenses and taxes over total assets

Endnotes

[1] According to the "Income, Poverty, and Health Insurance Coverage in the United States 2009," published by U.S. Census Bureau statistics, 87% of private health insurance is provided by employers. Only 0.2% of businesses had more than 50 full-time equivalent employees and did not already offer insurance to their full-time workers before the PPACA.

[2] The two proxies have a correlation of approximately 20%.

[3] In response to the passage of the PPACA, Regal Entertainment Group reportedly reduced employee hours to below 30 per week in 2013, citing increased costs associated with the PPACA (see https://www.forbes.com/sites/rickungar/2013/04/19/nations-largest-theater-chain-cuts-employee-hours-to-shirk-obamacare-responsibility, last retrieved November 10, 2024). Similarly, SeaWorld Entertainment implemented measures to cap part-time employees' schedules at fewer than 28 hours per week to manage costs related to the employer mandate (see https://www.huffpost.com/entry/seaworld-obamacare_n_3900026, last retrieved November 10, 2024).

[4] This is consistent with evidence that firms take into consideration the needs and management of their workforce when making financial and strategic decisions (e.g., see Faleye et al. 2006, Matsa 2018, and Agarwal et al. 2021).

[5] See Gruber and Madrian (2002) for a comprehensive review of this literature.

[6] For example, Mathur et al. (2016) found a substitution of employees 25–29 hours per week for employees working 31–35 hours per week after the passage of PPACA in March 2010; however, the shift is not more pronounced among low-wage workers or among workers in industries and occupations most likely to be affected by the mandate; Moriya et al. (2016) found no evidence for an overall increase in part-time employment in response to the PPACA, except among employees with low education working 25–29 hours per week and among workers aged 60–64.

[7] Using microdata from the U.S. Census Bureau that focuses on private and small firms, Gao et al. (2022) found that those firms reduce employment after increases in insurance premia. This study complements ours by documenting the impact of health insurance costs on small, private firms, whereas we focus on large, publicly traded firms.

[8] Currie and Madrian (1999) provided a detailed discussion of the U.S. health insurance system.

[9] Koijen et al. (2016) showed that market incompleteness and suboptimal household health insurance choice could lead to nonnegligible welfare losses.

[10] As of 2020, the employer shared responsibility payment is $2,570 per full-time employee per year (with the first 30 full-time employees being exempt) for employers who do not provide coverage.

[11] For additional survey evidence, see the annual strategic benefits–health care surveys conducted by the Society for Human Resource Management (2012–2015), the surveys conducted by the International Foundation of Employee Benefits Plans on the PPACA's impact on employer-sponsored health care (2013–2015), Mercer's survey on health care reform (2014), and the survey on the cost of the PPACA to large employers by the American Health Policy Institute (2014), among many others.

[12] The number of participants reported in the main Form 5500 does not include dependents of employees who are also enrolled in the plan.

[13] For example, as of 2017, Chevron Phillips Chemical Company contracted its health and welfare benefit plan with Dearborn National Life Insurance and thus included a Schedule A in its Form 5500 filing.

[14] We focus on the participant composition information reported on the main form when studying the labor market outcomes. When analyzing insurance premium, we use information reported on Schedule A because it is the only available source for firm-level insurance cost. Firms with self-insured plans are not required to file Schedule A. Premium information for such plans is thus not publicly available. In terms of generalizability of the results, we cannot speak to firms with self-insured plans.

[15] For more information regarding Form 5500 and its schedules, see https://www.irs.gov/retirement-plans/form-5500-corner and https://www.dol.gov/agencies/ebsa/employers-and-advisers/plan-administration-and-compliance/reporting-and-filing/form-5500. According to Form 5500 Instructions, firms file Schedule A of Form 5500 only if their health benefit plans are provided by an insurance company, insurance service, or other similar organization (e.g., Blue Cross Blue Shield or a health maintenance organization). Self-insured health benefit plans are thus exempted from Schedule A filings.

[16] We acknowledge that there could be potential measurement errors in the NETS data. As pointed out by Barnatchez et al. (2017), the main discrepancies between the NETS and the Census data are due to small establishments (whose NETS employment relies heavily on imputation), some of the largest government-owned educational establishments, and some false reports. Barnatchez et al. (2017) concluded that if one omits very small establishments, the NETS employment numbers agree reasonably well with those reported by County Business Patterns (CBP) and Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) both in terms of the trends over time and in terms of the cross-section. Given that our sample firms are publicly traded firms with Compustat data available, it is unlikely that they are affected by the main discrepancies described in Barnatchez et al. (2017).

[17] We thank the Kaiser Family Foundation for providing the annual survey microdata.

[18] Other measures reported are either ambiguous regarding its relationship with plan quality, such as whether the firm offers a high-deductible plan in addition to a regular plan, or involve too many missing values, for example, deductible amount and coinsurance percentage.

[19] A drawback of using Schedule A is that the enrollment counts reported in Schedule A may include dependents, whereas the main form is not subject to this concern. Main-form enrollment numbers thus provide cleaner measures for employers' employment decisions.

[20] The number of employees reported in Compustat is often used as a measure for total employment. For example, Falato and Liang (2016) use this measure of employment in their study on creditor rights and employment risk.

[21] In terms of selection bias, these differences suggest that firms in our sample are likely to have provided health insurance plans to their employees even prior to the PPACA. Thus, the impact of the PPACA on these firms should, if anything, be less pronounced compared to smaller publicly traded firms not included in our sample. Nevertheless, we still find significant effects of the PPACA on their employment decisions. Therefore, we do not believe that there is a selection bias working in our favor. Rather, the economic magnitudes documented in this paper may reflect a lower bound of the PPACA's true impact.

[22] We fix the treatment variables at a time point prior to the passage of Obamacare, in line with the approach of Acemoglu et al. (2004). Considering the potential contamination of firm outcomes because of the onset of the financial crisis at the end of 2007, we consistently use 2007 throughout the analysis. Using 2009, the year right before the PPACA, as the year to fix this treatment variable yields qualitatively similar results.

[23] Our results are also robust if we use shorter time windows of three, four, or five years surrounding the event date.

[24] Because $treatment_{2007}$ is time-invariant, it is absorbed by firm fixed effects in our model and therefore omitted from the specification for clarity.

[25] We cannot use the text-based labor dependency measure as the exposure proxy in this analysis because the Kaiser survey is anonymous, making it impossible to link to firm financials to calculate the ratio.

[26] A third potential dimension is that firms could adjust the quality of their health insurance plans. In an unreported analysis using the sample of firms for which two measures of plan quality (maximum out-of-pocket costs and doctor office visit copay) can be constructed from the Kaiser Foundation Survey, we find no evidence that firms on average change plan quality following the passage of the PPACA. This finding suggests that firms do not appear to respond to the PPACA by altering the quality of their health plans. However, we acknowledge that this analysis relies on a limited sample of firms reporting to the Kaiser Foundation Survey, which may not be representative of all firms.

[27] See table 2 on page 7 of https://www.bls.gov/news.release/archives/ebs2_07272010.pdf.

[28] In cases where firms also enroll some part-time employees in their health insurance programs, the inclusion will only bias against us finding results.

[29] See, for example, "Health-Care Law Spurs a Shift to Part-Time Workers" (*The Wall Street Journal*, November 4, 2012), "Restaurant Shift: Sorry, Just Part-Time" (*The Wall Street Journal*, July 14, 2013), "Who can deny it? Obamacare is accelerating U.S. toward a part-time nation" (*Forbes*, July 31, 2013), and "US employers slashing worker hours to avoid Obamacare insurance mandate" (*The Guardian*, September 30, 2013).

[30] In an unreported analysis, we examine the role of local competition in influencing how the PPACA affects firms' operating performance. Employers in areas with high local competition may be motivated to enhance plan quality to attract more productive workers while replacing part of the non-core full-time employees with part-time workers. Our split-sample analysis, based on two measures for local competition—the Herfindahl-Hirschman Index (HHI) at the industry-state-year level (using firm sales) and the state-year-level local labor market tightness (calculated as the ratio of unemployed workers to job openings using data from the Bureau of Labor Statistics)—shows no statistically significant differences in changes to firm operating performance around the passage of the PPACA when segmented by local competition. We also find no significant difference in operating performance changes in a split-sample analysis based on firm size.

[31] The following data restrictions leave us with data from 2001 to 2007 to perform the placebo test. Complete Form 5500 data coverage, that is, our sample, starts from the year 1999. We require two years to calculate the prior trend in the dependent variables, leaving us with a starting year of 2001 in our empirical estimation. Because the financial crisis started in late 2007, we stop the placebo sample in 2007 to avoid any confounding effects.

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