# New Employer Payroll Taxes and Entrepreneurship

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April 2025

**Abstract**

How costly are taxes for young firms? In this paper, we demonstrate that even small payroll taxes significantly distort hiring decisions and employment growth. First, leveraging cross-sectional variation in the taxes faced by new employers, we find that higher taxes discourage new firms from hiring their first workers, with an elasticity of the number of new employers to taxes of –0.1. Second, studying changes in taxes after entry, we find that higher taxes lead more firms to exit, while also reducing employment for those who survive and leading some firms to avoid taxes by using non-taxable contract labor.

**JEL Classification Codes:** H25, H71, L26, M13

**Key Words:** firm entry, young firms, labor costs, unemployment insurance

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# 1 Introduction

Over the past several decades, there has been a striking decline in business dynamism in the United States, characterized by declining firm entry and a shift of employment toward older and larger firms (Decker et al. (2014)). Since the 1970s, firm entry rates have fallen from 13 percent to a low of 7.2 percent in 2010, before stabilizing around 8 percent after 2016 (Figure A.1). Given that young businesses are important contributors to both aggregate employment growth (Haltiwanger et al. (2013)) and innovation (Klenow and Li (2021)), it is important to understand factors that may contribute to this declining business dynamism.

While there are millions of business registrations each year, far fewer firms become employers; for example, in 2019 there were 3.5 million new business applications in the US but only 450,000 new employers. A crucial potential barrier for new firm entry and growth is the cost of running a business: starting and growing a new firm is expensive. Robb and Robinson (2014) estimate that more than 50 percent of new firms report losses, with nearly 60 percent of new firms having more than $10,000 in expenses.When firms start to employ workers, they face additional costs beyond wages: with workers come employee benefits and—as we study in this paper—payroll taxes. Piled atop all the other costs firms face, these employment costs may be too much for an entrepreneur to afford.

In this paper, we study how sensitive cash-constrained young firms are to relatively small employment costs. We do this by studying new employer payroll taxes, which help finance state unemployment insurance (UI) benefits. When firms start employing workers, they face an annual per-worker payroll tax that depends on their state and sector; this tax ranges widely, but most firms face a tax between $200 and $400 per worker per year, equivalent to approximately 1 percent of payroll on average. These taxes are effectively a surcharge on employment, and—unlike income taxes—firms face these tax burdens even if they are not profitable. This means that cash-constrained young firms may see these taxes as significant barriers to hiring workers and growing their businesses.

Using administrative microdata from the U.S. Census Bureau, we estimate how payroll taxes for new employers affect entry decisions and outcomes conditional on entry, where we consider entry to be when a firm starts to employ workers. We leverage both cross-sectional and time variation in new employer taxes to analyze whether higher tax rates discourage firm entry and growth. While tax policy is not randomly determined, we exploit exogenous variation in the tax regimes established by historic state policies and control for concurrent economic conditions. We estimate several complementary research designs: a case study of tax increases occurring after the Great Recession, a broader event study leveraging large increases in taxes during our sample, a pooled Two-Way Fixed Effects (TWFE) model, and a border county analysis. Across all specifications, we find evidence consistent with higher tax costs having a causal impact on firm entry. On average, a doubling of the per-worker tax burden for new employers predicts 10 percent fewer new entrants in a given state and sector. In sectors like construction, where seasonality and high worker turnover imply higher tax payments, this number nearly doubles.

Even after entry, these taxes prove costly for firms: we find that young firms operating in higher tax regimes are less likely to survive and tend to stay small conditional on survival. For example, a one standard deviation increase in the maximum per-worker payroll tax faced by a five-year-old firm predicts a 6 percent higher likelihood of exit by the end of the year, relative to the mean. Among firms that survive for five or more years, a one standard deviation in the new employer tax predicts 1–1.5 percent lower employment in the first few years the firms operate. Throughout these results, we consistently see a greater role for payroll taxes compared to corporate or personal income taxes. This is intuitive, as many of the new and young firms we study are still working toward profitability; while they are not liable for income taxes if they are making losses, they *are* still liable for payroll taxes.

Finally, some firms adapt to higher taxes by changing their production inputs. While many sectors in this paper are sufficiently labor-intensive such that new firms cannot simply substitute to capital, some firms can switch to a type of labor that is *not* subject to these

payroll taxes: contract labor. Since contract laborers are not technically on a firm's payroll, firms employing these workers do not directly owe payroll taxes on them. We find evidence of this tax "avoidance" in the construction sector, where young construction firms in higher tax regimes are significantly more likely to hire temporary contract labor: a one standard deviation increase in taxes predicts a 23 percent increase in the likelihood of using this non-taxed labor, relative to the mean. Taken together, these results provide evidence that taxes on new employers can significantly influence how firms enter and grow.

This paper contributes to three main strands of literature. First, our work relates to the literature on how government policy affects entrepreneurship. Numerous papers document that entrepreneurship can be a costly endeavor, and many new firms are not profitable (see, e.g., Adelino et al. (2015) and Robb and Robinson (2014)). For example, Brown and Earle (2017) and Hackney (2022) argue that the Small Business Administration loan program helps alleviate small firms' constraints to growing their firms, and in France a reform that allowed entrepreneurs to claim UI benefits in the case of business failure resulted in more firm creation (Hombert et al. (2020)). Taxes can also distort firm entry and incorporation through income shifting: several papers have studied how tax regimes may influence individuals to start firms or incorporate businesses in order to shift income toward lower tax sources (see, e.g., DeBacker et al. (2019) and Tazhitdinova (2020)).[1] Additionally, Benzarti et al. (2020) find that when mandated social insurance contributions are relaxed, entrepreneurs reduce their contributions in order to channel more cash into their firms. We contribute to this literature by studying a policy that has been relatively overlooked in the entreprenuership literature, relatively small payroll taxes, which we find to still have a role in deterring entry and growth of new firms.

Second, a complementary literature studies how corporate and personal income taxa-

[1]More broadly, tax policies—including tax subsidies, deduction allowances, and structures that allow for pass-through of business income taxes to individual income taxes—have been argued to potentially increase or decrease firm entry (or have no effect). Furthermore, the relative taxation of labor and business income may matter; for example, Cullen and Gordon (2007) and Gersbach et al. (2019) argue that higher taxes on labor earnings and lower taxes on firm profits combine to generate more entrepreneurship. See Bruce et al. (2020) for a survey of the literature on taxes and entrepreneurship.

tion affects entreprenurship. Globally, Djankov et al. (2010) find that countries with larger effective corporate tax rates have lower aggregate investment and entrepreneurial activity. Within the United States, Curtis and Decker (2018) studies differences across state borders, and estimates an age 1 employment elasticity to the state corporate income tax rate of 3.7. They find no significant effect for personal income rates or sales taxes, although Moretti and Wilson (2017) find that both corporate and personal income taxation affects the location decisions of star scientists (with elasticity estimates of 1.8 and 1.9 respectively).[2] While our estimated elasticities are an order of magnitude smaller (we estimate an elasticity of 0.1), the new employer taxes that firms face are also much smaller in nature. Thus our contribution to this literature is in showing how taxes that affect firms regardless of profitability may create a particularly strong distortion for newly established (i.e. less profitable) businesses.

Finally, our work adds directly to the literature studying the impacts of payroll taxes that finance unemployment insurance. Work by Anderson (1993), Anderson and Meyer (1997), Johnston (2021), and Guo (2024), among others, provides evidence for significant labor demand responses when UI tax rates rise for mature firms. We contribute to this literature by analyzing the entry and growth behavior of young firms, which are both understudied in this context and potentially subject to different effects, as the taxes paid by new employers differ from those faced by mature employers who face greater experience rating. Guo (2023) shows that manufacturing firms are more likely to exit from high-tax states, with a one standard deviation increase in relative UI tax costs raising the likelihood of exit by 5%. We estimate that a one standard deviation increase in new employer UI costs lowered the number of new firms by a comparable 5.7%.

The remainder of this paper is organized as follows. Section 2 describes how UI taxes are administered and presents a conceptual framework on how these payroll taxes may affect young firm behavior. Section 3 discusses our data on UI tax schedules and firm outcomes, and Section 4 presents four complementary empirical strategies. Sections 5 and 6 present

[2]Additional studies related to firm location include: Bartik (1985), Carlton (1983), Papke (1991), Suárez Serrato and Zidar (2016), Giroud and Rauh (2019), van der List (2024).

our empirical results, and Section 7 concludes.

## 2 Background and Conceptual Framework

Payroll taxes on employers are widely used to fund social insurance programs. In the United States, these taxes include Social Security, Medicare, and UI taxes.[3] While other payroll tax rates are uniform across employers, UI tax rates are employer-specific and experience-rated: if firms lay off workers who then claim UI benefits, they are charged a higher future tax rate—up to a maximum. However, when firms first start employing workers, they have no experience upon which tax rates can be based; consequently, they are assigned a statutory "new employer" rate specific to their state and sector.

States determine their own new employer rules in line with federal regulations. These require a minimum of one year and a maximum of three years of new employer rates before experience rating begins, and that new employer rates cannot be lower than 1 percent. Because UI is administered at the state rather than federal level, there is considerable variation in new employer tax costs across states for otherwise similar firms. There are a variety of reasons why new employer taxes may vary across states and change over time. We describe these reasons and our identification strategy in Section 3.

How should new and young firms respond to these new employer payroll taxes? Like all taxes, UI taxes represent a cost for firms and so may deter entry or encourage exit, especially if they cannot pass costs through to the consumer or input suppliers (e.g., workers).[4] Yet,

[3] While Social Security and Medicare taxes also have an *employee* component that appears on workers' pay stubs and are deducted from workers' pay, UI taxes are employer-only taxes and are not deducted from workers' pay. In this way, firms do not immediately pass through the cost of taxes to workers. Nevertheless, employer payroll taxes, including UI taxes, are a business expense that firms can deduct on their corporate or personal income taxes. While there are both federal and state UI taxes, we focus on state UI taxes in this paper. All employers receive a credit for the federal tax upon payment of state taxes, so net federal UI taxes only amount to $42 per worker (0.06 percent of $7,000).

[4] With the new employer tax being a firm-specific rather than market-level tax, we assume no pass-through of these tax costs to worker wages. The previous literature on UI tax incidence has found no evidence of firm-specific UI taxes impacting wages (Anderson and Meyer (2000), Johnston (2021), Guo (2024)). Alternatively, if firms were able to pass through UI tax costs to workers, the firm would demand a set level of labor (not influenced by UI taxes) but pay workers less than they would in the absence of UI taxes.

there are several key characteristics of new employer taxes that are unlike other tax costs. First, these taxes are owed regardless of profitability or sales. While firms only pay income taxes if they are profitable, firms are liable for UI taxes on each worker they employ.[5] With the majority of new firms reporting losses (Robb and Robinson (2014)), these new employer taxes could be particularly burdensome for new firms that are still working to generate positive cash flows.

Second, while other payroll taxes typically scale proportionally with worker earnings, UI taxes are charged on abnormally low taxable wage bases (i.e., the amount of each workers' pay on which tax is paid)—the median tax base during our study period was only $10,500 annually. Taxable wages are set at the state level, and new firms are charged the fixed new employer rate only up to the tax base, such that new employer taxes are closer to an annual per-capita tax than a true payroll tax. Thus, a firm $j$ operating in state $s$ and sector $n$ employing $N_{j,t}$ workers in year $t$ will pay the following new employer tax:

$$\text{UI Tax}_{j,t} = \sum_{i=1}^{N_{j,t}} \min(w_{i,j,t}, \text{base}_{t,s}) \tau^{u}_{j,t,s,n}, \tag{1}$$

where worker $i$ earns $w_{i,j,t}$, the tax base is $\text{base}_{t,s}$, and the firm faces new employer tax rate $\tau^{u}_{j,t,s,n}$.

These abnormally low tax bases effectively make low-earning workers disproportionately expensive. Consequently, UI taxes may be particularly costly when a firm employs many low-earning workers, whether due to low hourly wages, high part-time rates, or high worker turnover.

Third, since firms' UI tax rates evolve to become based on their layoff experience after the first few years, UI taxes generate dynamic considerations: firms expanding their workforce face the risk of higher future taxes if they subsequently lay off workers who are likely to claim UI benefits. This means that these taxes inherently amplify the risk of uncertain

[5] Federal regulations make employers liable for UI tax if they either pay at least $1,500 in wages in any quarter or have at least one employee in each of at least 20 weeks of a year. In this paper, we assume that any firm employing at least one worker satisfies these requirements.

investments that involve expanding employment. Although we are unable to disentangle the effect of experience rating from the financial effect of a larger tax burden, we posit that the financial burden plays a much larger role for new employers and we will treat this as the main mechanism explaining our observed firm behavior.[6]

Additionally, all three of the characteristics described above amplify firms' incentives to substitute away from labor toward non-taxed inputs: if firms can produce the same output with alternative inputs, they save on UI taxes. While switching to capital is likely infeasible for many of the labor-intensive industries studied in this paper, the structure of U.S. payroll taxes contains a nuance that may allow some firms to avoid taxes by substituting toward non-taxed labor. Payroll taxes, including UI, are only assessed on payroll employees—that is, workers receiving W-2 income. Effectively, firms are only taxed on workers who could potentially claim UI benefits after losing their job at the firm. Notably, contract labor is not part of this group, so firms may be able to hire contract workers in lieu of regular employees in order to avoid UI taxes.[7]

Given these characteristics, we have several predictions for how new employer UI taxes may affect firms, which we test in this paper. First, higher taxes should deter entry, reduce optimal labor demand, and encourage exit. Second, these patterns should be stronger if a firm's optimal labor demand is large (e.g., high labor shares), if they hire relatively more part-time or low-wage workers (who generate higher costs due to the per-capita nature of the taxes), and if they have higher turnover of workers (e.g., due to seasonality of product demand). Firms with these higher expected costs should react more strongly to higher new employer taxes. Lastly, higher taxes give firms an incentive to substitute toward temporary or contract workers who are not W-2 employees, as these classifications of workers are not charged new employer taxes (because they are not on payroll), and as a result are also not

[6] In section 5.3 we show that even industries with relatively little exposure to experience rating (because of low UI risk) are responsive to new employer taxes on the entry margin.

[7] The extent of this substitution toward contract labor is limited by federal regulation that dictates which workers can be classified as contract workers. For example, contract workers must have some independence from the firm.

eligible for UI benefits.

# 3 Data

We combine state-level UI tax data with administrative data on firms and their workers. Appendix Section A.I provides additional details.

## 3.1 UI Tax Data

We collect industry-specific new employer tax information from all U.S. states and Washington, D.C., using a combination of annual reports from the Department of Labor, state UI websites, and correspondence with program administrators. Further details of the data's construction are described in Appendix Section A.I.1. Additional UI tax variables include taxable wage bases and maximum UI tax rates.

As stated in Equation (1), a new employer $j$ operating in state $s$ and sector $n$ employing $N_j, t$ workers in year $t$ will pay the following new employer tax:

$$\text{UI Tax}_{j,t} = \sum_{i=1}^{N_{j,t}} \min(w_{i,j,t}, \text{base}_{t,s}) \tau^u_{j,t,s,n}, \tag{2}$$

where worker $i$ earns $w_{i,j,t}$, the tax base is $\text{base}_{t,s}$, and the firm faces new employer tax rate $\tau^u_{j,t,s,n}$. We proxy this tax payment by assuming that all workers earn above the tax base, such that the tax is a per-capita cost. This is a reasonable assumption as the UI tax bases tend to be low, with the median tax base in our study being only $10,500 annually; we test this assumption in robustness analyses below.[8] Specifically, we assume that new employer $j$ will pay the new employer tax:

[8]Note that we need to make this assumption because (a) we do not know the hypothetical wages a potential new employer may hire, and (b) we do not directly observe worker-specific wages for firms with workers.

$$\text{UI Tax}_{j,t} \approx \sum_{i=1}^{N_{j,t}} \text{base}_{t,s} \tau^{u}_{j,t,s,n}. \tag{3}$$

In our analyses, we focus on the parsimonious tax measure of the product of rate and base, log(new rate*base). In other words, this is the tax cost that we expect a new employer to pay for each worker they hire. These per-capita tax costs range from $77 to $2,726 per worker per year, and may constitute a significant share of payroll for low-earning and/or part-time workers. Figure A.2 plots the distribution of average per-capita new employer tax costs by state, where tax costs are defined as the new employer rate multiplied by the state's tax base. Hawaii, Oregon, Alaska, and New Jersey have the highest average new employer taxes because they have large taxable wage bases. Meanwhile, South Dakota, Louisiana, Vermont, and Arizona charge the lowest new employer taxes. Figure 1 plots the distribution of state new employer taxes over time.

In the case of uniform rates, UI taxes can end up significantly lower or higher than the industry average, depending on the industry's layoff risk; for example, construction firms—which are likely to lay off many workers—may implicitly receive a tax discount under uniform new employer rates compared to retail trade firms who are less likely to lay off many workers. It is precisely because of this disparity that many states designate higher construction-specific new employer rates to reflect the greater propensity for UI claims in the construction sector. To illustrate this, Figure A.3 plots new employer rates over time for construction versus retail trade for nine states with the largest annual variance. Construction rates are generally more cyclical than other industries, although there are some states where the two move in lockstep. Figure A.4 shows that there is significantly more variation in construction rates than other industries.

For additional controls and comparison, we also collect information about relevant taxes and policies that vary at the state level. These include corporate and personal income tax rates (provided by Suárez Serrato and Zidar (2016)), maximum weekly UI benefits, minimum wages, and state unemployment rates. All values are nominal. Table 1 reports summary

statistics for these state policy variables.[9] The median firm faces a new employer tax cost of $243 per worker.

Below, we isolate the effect of taxes net of economic conditions by flexibly controlling for the local unemployment rate and maximum unemployment benefits available in our empirical analyses, and by presenting several robustness checks related to economic conditions. This is important, as there is a positive correlation between state UI tax costs and benefit generosity. However, the impact of benefit generosity on firm entry is theoretically ambiguous. On the one hand, higher benefits could deter firm entry because unemployed would-be entrepreneurs choose to claim benefits instead of starting a firm (Xu (2022)). On the other hand, the presence of more generous unemployment insurance could make it easier for new start-up firms to attract workers who may feel more protected in the case of the start-up failing.

## 3.2 Census Bureau Data

We combine state UI tax schedules with several administrative datasets from the U.S. Census Bureau on firms and their workers. We study firm entry, size, and survival using the Longitudinal Business Database (LBD) and its public-use version, the Business Dynamics Statistics (BDS). We additionally study use of temporary contract labor using the Census of Construction Industries (CCN). See Appendix subsection A.I.2 for details.

The LBD covers the universe of U.S. establishments that employ workers, and includes annual measures of employment and NAICS industry. By design there is only coverage of employer businesses, and self-employed individuals are excluded; thus our definitions of firm entry will also exclude non-employer businesses. Because the LBD contains longitudinal identifiers for firms and establishments, we are able to identify when new firms enter (i.e., start employing workers) based on the entry year of their earliest entering establishment; we date a firm's age as the difference between the current year and the firm's entry year.

[9] We present both unweighted and weighted-by-total firm count summary statistics, estimated at the NAICS sector-state-year level. The former describes the variables for the average sector-state-year cell, while the latter captures variables for the average firm in the economy.

For firm entry and survival analyses, we use the public-use BDS data, which aggregates outcomes at the state, year, 2-digit NAICS sector, and firm age level. Since new employer tax rates only vary at the level of state and NAICS sector, this level of aggregation in the BDS is sufficient for studying entry and exit.

We measure new entrants using the count of age 0 firms in each state, NAICS sector, and year cell. Our two outcome variables of interest are the log number of new entrants and the entry rate (dividing the count by the total number of firms in the state-sector pair in the previous year).[10] As shown in Table 1, the median state-sector-year cell sees 252 new entrants, reflecting an 8.3 percent entry rate. We also construct exit rates for firm ages 1 through 5, by dividing the number of age $a$ firm deaths by the total number of age $a$ firms in each state-sector-year cell, where a firm "dies" if it stops employing workers.

The LBD's establishment-level microdata captures employment as of the payroll period that includes March 12 each year. Thus we focus on firms' employment starting from age 1 rather than age 0, as some age 0 firms are missing employment information due to this annual snapshot. When studying employment, we bundle all establishments of a firm in the same sector (2-digit NAICS) and state—we call this bundle a firm.[11] Bundling in this way mimics the firm unit at which UI taxes are collected, known as the State Employer Identification Number, which generally consists of all establishments belonging to the same firm within a given sector in the given state. For both the BDS and LBD, we use data from 2003 through 2014 for all 50 states plus Washington, D.C.

We use the CCN to study the use of temporary contract labor in response to higher

[10]Strictly speaking, the first measure is log of the number of new entrants plus 1; we do this to maintain the same sample between the different entry measures (i.e., there are 105 observations with zero entrants, out of 9,162). If we do not add 1, and consequently drop the 105 observations, the estimates negligibly change.

[11]Note that in our LBD analyses, our sector measure is based on the first 2 digits of the 6-digit NAICS variable. Meanwhile, in our BDS analyses, our sector measure captures the 2-digit NAICS "sector" measure, which bundles a handful of sectors as we define in the LBD: namely, in the BDS, the manufacturing sector pools 2-digit NAICS 31, 32, and 33; the retail trade sector pools 44 and 45; and the transportation and warehousing sector pools 48 and 49 (this is the level at which the data is available). In our LBD analyses, we choose to separate these groups in order to control for sector (marginally) more flexibly. We do not expect this difference to generate meaningful bias in our results.

taxes. The CCN is a partial census of construction establishments that is collected as part of the quinquennial Economic Census. The CCN consists of a survey with many questions on production and other firm behavior.[12] We use the 2007 and 2012 waves of the CCN, which collect information on expenditures on temporary staff and leased employees. In Section 6.3 we use this information to study how UI taxes predict the use of these types of workers, for whom a firm *does not* pay UI taxes.

# 4 Empirical Strategy

We leverage two broad sources of UI tax variation for identification: state taxable wage bases and new employer tax rates. Although state UI tax laws are not randomly determined, we believe UI tax regimes (characterized in Table A.1) are plausibly exogenous to current economic conditions. This is because annual new employer rates and tax bases are automatically determined in accordance with tax policies that were established in the 1980s or earlier.[13]

The first-order variation in state tax bases comes from whether states have adopted flexible tax bases indexed to wage growth. While the majority of states do not index their tax bases, a total of 17 states calculate their annual tax base as a percentage of average wages in their state; as a result, these states have significantly higher tax bases on average, and the base automatically increases every year with no need for additional legislation.[14] Among states without automatic indexing, some periodically update their schedules to keep up with inflation, but the majority rarely legislate tax increases. A decomposition of the variance in new employer tax costs shows that over our sample period from 2003 to 2014,

[12] See Calabria (2000) for details on the CCN and its sampling.

[13] Although legislated policy changes are rare, the largest number of state policy changes occurred right after the Great Recession in response to financing needs. We also confirm robustness to excluding these changes.

[14] This automatic indexing was first adopted in the 1970's around the same time that Social Security became indexed to wage growth. With the exception of Rhode Island, which abandoned indexing in 1999 and then re-adopted it in 2012, all states have been indexed since the 1980s, with Oklahoma being the last state to adopt indexing in 1987. Vermont and Colorado also recently adopted indexing but were not indexed during our period of analysis.

two-thirds of the variance occurs between states, primarily driven by state tax bases.[15]

However, there also exists variation in new employer rates within states, over time. The primary variation in new employer tax rates arises from whether states elect to assign rates based on the average rates of existing employers. The large majority of states charge a uniform new employer rate to all new businesses (the modal new employer rate is 2.7 percent), but 8 states assign sector-specific rates equal to the average tax rate within the state's sector (paid by mature firms); the exception is the construction sector, where roughly half of states assign a higher sector-specific new employer rate. The secondary variation in new employer rates stems from whether rates are held constant over time or are a function of the state's UI trust fund. In either scenario, no active legislation is needed—updated rates are simply calculated using existing formulas. As a consequence, new employer taxes may increase more in one state than another, even if they are facing similar economic conditions.

In our empirical analyses below, we study how higher UI taxes affect firm entry, survival, and employment growth. To do this, we employ a series of empirical strategies, described in this section. Broadly speaking, we begin by considering the impact of large and persistent tax increases. We do this in two parts. First, we analyze a specific event study based on large tax changes following the Great Recession. Second, we broaden our event study to explore all large tax increases during our time period.

After studying large and persistent tax increases, we next exploit all variation in taxes over our time period to estimate a pooled two-way fixed effect (TWFE) model. We leverage state-by-sector-by-year variation in taxes, controlling for state-by-sector and sector-by-year fixed effects (or, in firm-level analyses, firm fixed effects). We bolster the TWFE approach with a border counties analysis in which we control for local economic factors by comparing neighboring counties at state borders.

[15] We decompose the variation in UI taxes (i.e., variance of log(average new tax rate*tax base)) into within-state variation (variance of log(average new tax rate*tax base) demeaned at the state level) and between-state variation (variance of state-level mean log(tax rate*tax base)). For 2003–2014, we find a variance of UI taxes of 0.355; 30 percent of this (i.e., 0.108) is within-state variation and 70 percent (i.e., 0.247) is between-state variation. (Note: this decomposition is commonly used in labor economics to study between- vs. within-firm pay inequality; see, for example, Equation (2) of Sorkin and Wallskog (2023).)

In this section, we present the setup of each empirical strategy. Sections 5 and 6 present results.

## 4.1 Great Recession Case Study

In our first empirical strategy, we present a case study of a period in which some states saw persistent differences in taxes: the aftermath of the Great Recession. We start with this case study because it allows us to most cleanly leverage variation in historically determined tax schedules.

When UI benefit claims peaked in 2009 due to the recession, some states' historically determined tax schedules automatically adjusted tax rates without any intentional legislation. These "treatment" states had variable rate mechanisms that meant that, starting in 2010, new firms could face *mechanically* higher tax rates than entrants in other states, despite facing similar economic conditions. We analyze this predictable tax gap in an event study framework in which we compare states with mechanical tax rate increases to states with stable tax rates during the 2010—2013 period.

Because most variable rate states also index their tax bases to wage growth, we first restrict our analysis to the 17 states that index their tax bases. This ensures that our treatment and control states are more comparable in terms of tax base (the other component of the new employer tax cost) and benefit generosity. Among these 17 states, 11 are defined as treatment states (i.e., states with variable rate mechanisms) with the remaining 6 assigned as control states.[16]

Figure A.5 shows that starting in 2010, treatment states experienced an average $200-300 increase in new employer tax costs per worker due to the mechanical rate increases, while control states faced mostly flat taxes. Meanwhile, there was no differential change to UI benefit generosity (as measured by maximum weekly benefit levels) or in unemployment

[16]Treatment states include Alaska, Hawaii, Idaho, Iowa, Minnesota, Montana, Oregon, Rhode Island, Utah, Washington, and Wyoming. Control states include Nevada, New Jersey, New Mexico, North Carolina, North Dakota, and Oklahoma.

rates, suggesting that both treatment and control states faced similar economic conditions during the recession. The fact that treatment states had slightly lower unemployment after the Great Recession also reassures us that the treatment states did not raise taxes because they were hit harder by the recession.

We estimate the following regression for observations at the state $s$, 2-digit NAICS sector $n$, and year $t$ level:

$$\text{Firm entry}_{snt} = \sum_{k=2005, k\neq 2008}^{2013} \beta_k \text{Treat}_s(t=k) + X'_{st}\delta + \alpha_{sn} + \gamma_{nt} + \epsilon_{snt}, \tag{4}$$

We control for state-by-sector ($\alpha_{sn}$) and sector-by-year fixed effects ($\gamma_{nt}$); the latter accounts for the fact that in states where new employer taxes are based on industry averages, tax rates will mechanically be higher in years following economic downturns. Consequently, we identify the role of deviations from expected tax rates in deterring firm entry. We also control for a vector $X'_{st}$ of time-varying state characteristics that likely also affect or correlate with firms' decisions to enter, including corporate and personal income tax rates, the log of maximum weekly UI benefits, the minimum wage, and the state unemployment rate, as well as fixed effects for ventiles of the unemployment rate distribution and deciles of the unemployment benefit distribution.[17] Because our aim is to measure how the average firm's entry decision may depend on taxes, we estimate model (6) with weights on observations corresponding to the total number of firms of all ages in the state-sector-year cell; doing this avoids implicitly overweighting very small state-sector pairs.[18] Standard errors are clustered at the state-sector level.

The $\beta_k$ coefficients capture the relative gap in firm entry between treated and control states, relative to 2008. We posit that, because treated states exhibited a mechanical increase

[17] We discretize the unemployment rate and benefits in this way in order to more flexibly control for the state of the unemployment system and local economic conditions. These fixed effects capture much of the variation in the unemployment rates and benefits: the median unemployment rate ventile spans 0.3 percentage points, while the median unemployment benefit decile spans $28.

[18] In robustness analyses, we demonstrate that these weights do not drive our results.

in new employer tax costs in 2010, we should see a relative reduction in firm entry in treated states, relative to control states, following the recession, as would-be entrepreneurs respond to the higher taxes by not entering.

## 4.2 Broader Event Study

In our second empirical strategy, we take a broader event study approach and consider the effect of relatively large tax increases that occurred during our analysis window. We identify the top 10% of year-on-year tax changes at the sector-state level; these amount to cases in which per-capita UI taxes increased by at least 20%. For each state-sector pair, we define a single "large tax increase" event time as the first year with a tax increase larger than 20%. Almost half of the large increases identified occur in 2010 or 2011 (consistent with our prior case study of the Great Recession), and over a quarter occurred at the beginning of our sample (in 2004 or 2005). Roughly one third of state-sector pairs never experience such an increase, and they form our control group.

We estimate an event study in which we study how firm entry (and later firm survival and size) vary around large tax increases. We estimate this as a staggered event study following Sun and Abraham (2021). Specifically, we estimate

$$\text{Firm entry}_{snt} = \sum_{k=-4, k\neq -1}^{4} \beta_k \text{Treat}_s(t=k) + X'_{st}\delta + \alpha_{sn} + \gamma_{nt} + \epsilon_{snt}, \tag{5}$$

where control variables are the same as in model (4) and we similarly weight observations.

Figure A.6 decribes the variation in taxes underlying this empirical strategy by plotting our event study estimates with per worker new employer taxes as the outcome. The average tax increase amounts to $100 per worker in the first year, and grows slightly to $150 in the years after. Notably, these large tax increases are persistent; this is because the majority of these events included a tax base increase, and base increases are rarely reversed.

## 4.3 TWFE Models

In our third empirical strategy, we summarize the impact of higher taxes using two-way fixed effects (TWFE) models. This approach is useful for two reasons. First, it allows us to summarize the impact of higher taxes on firm outcomes by estimating a continuous treatment effect. Second, it allows us to consider all tax changes, not just those following the Great Recession or ones that were large enough. In particular, many state-sector pairs exhibit numerous tax changes over our time window; we leverage this variation in these models.

To study whether current new employer taxes affect entry (and other outcomes later), we estimate the following regression for observations at the state $s$, 2-digit NAICS sector $n$, and year $t$ level:

$$\begin{aligned} \text{Firm entry}_{snt} = \beta \text{Log}(\text{new employer tax rate} \times \text{tax base})_{snt} \\ + X'_{st}\delta + \alpha_{sn} + \gamma_{nt} + \epsilon_{snt}. \end{aligned} \tag{6}$$

As in the previous models (4) and (5), we control for state-by-sector ($\alpha_{sn}$) and sector-by-year fixed effects ($\gamma_{nt}$), as well as the other control variables. Consequently, we identify the role of deviations from expected UI tax rates in deterring firm entry.[19]

The identifying assumption is that after controlling for these fixed effects and state characteristics, UI taxes are uncorrelated with any unobservables that could affect entry; we address potential violations of this assumption below after presenting our main sample results in Section 5. In our entry and survival analyses, we follow models (4) and (5) and estimate model (6) with weights on observations corresponding to the total number of firms of all ages in the state-sector-year cell; doing this avoids implicitly overweighting very small state-sector pairs. As a reminder, the goal of this weighting is to generate estimates to the

[19] We perform a basic check of this linear specification by also estimating a binscattered version of model (6), where we discretize the tax measure. Figure A.7 shows that the relationship between firm entry and UI taxes is approximately linear.

average firm. In our firm-level employment analyses, we equally weight all observations. Standard errors are clustered at the state-sector level.

## 4.4 Border Counties

We bolster the causal interpretation of the TWFE model for firm entry by using a border county analysis. This can help alleviate the concern that some tax changes may directly reflect economic conditions in a way for which our controls do not account.

We test this possibility by analyzing county-level entry data and comparing entry in neighboring counties located at state borders. We follow, for example, Dube et al. (2010) and argue that comparing neighboring counties allows us to control for local economic conditions: we assume that neighboring counties across state borders experience similar local conditions, such that any differences in entry may be attributed to differential taxation. To implement this analysis, we turn to a version of the BDS data that reports the number of firms by age within each county; we identify counties at state borders and their cross-border county neighbors using the Census Bureau's County Adjacency File and estimate county-level entry regressions with the inclusion of county pair fixed effects. We consequently estimate an average treatment effect of taxes on entry, within county pairs.[20] Due to power concerns, this analysis is estimated at the county level, pooling all sectors within a county. As new employer tax rates can vary substantially across sectors within a state, we focus on the tax base, which is uniform within a state, as our measure of UI taxes in this analysis. Specifically,

[20] A single county may share a border with several other counties. In these cases, we follow Dube et al. (2010) and duplicate county observations. Because this generates unequal numbers of observations for different counties, we weight observations by approximately the number of firms "in" a particular county pair. Specifically, if county $i$ and county $j$ are neighbors and have (all ages) firm counts $w_i$ and $w_j$ in a given year, respectively, there are two observations for this pair (one for county $i$ and one for county $j$). For both observations, we assign a weight equal to $(w_i \frac{w_j}{\sum_{j'} w_{j'}} + w_j \frac{w_i}{\sum_{i'} w_{i'}})$, where $j'$ denotes *all* counties that $i$ neighbors and $i'$ all counties that $j$ neighbors. Intuitively, if county $i$ has many cross-state neighbors, we include a smaller fraction of their total firm count into the weight for any given observation. Placing an equal weight on both counties in a pair ensures that our estimates reflect the average difference in outcomes within county pairs.

we estimate

$$\text{Firm entry}_{c_i t} = \beta \text{Log(tax base)}_{st} + X'_{st}\delta + \alpha_{c_i c_j} + \gamma_t + \epsilon_{c_i t}, \tag{7}$$

where county $c_i$ is in state $s$ and has cross-border neighbor county $c_j$. We include all time-varying state variables as in previous models. Instead of state-by-sector and state-by-year fixed effects, we now have neighoring county pair fixed effects $\alpha_{c_i c_j}$ and year fixed effects $\gamma_t$. Standard errors are clustered at the county level.

# 5 New Firm Entry

We begin by assessing to what degree higher UI taxes deter firm entry, which is measured as when firms employ their first worker. We first test whether fewer new firms enter when new employer taxes are higher in our baseline specifications, and then present several robustness tests. Since taxes represent a cost to firms (see Section 2), we expect higher tax burdens to deter firm entry and consequently a negative estimates of the coefficients on tax variables in our various specifications detailed in Section 4.

## 5.1 Case Study: The Great Recession

We begin with our case study of mechanical tax increases following the Great Recession. Figure 2 plots the coefficient estimates from model (4). In the years before the Great Recession, treatment and control states do not have statistically significantly different firm entry trends (relative to any differences in 2008); after the recession, when treatment states are exposed to a mechanical increase in taxes, a gap emerges. As predicted, we see relatively fewer entrants in treated states from 2010 to 2013. For example, treated states see 4% fewer new entrants in 2010, relative to control firms (and relative to 2008), and this gap widens over time to 9% fewer new entrants in 2013. We see a similar pattern in the second panel of

Figure 2 in which entry is defined as the entry rate (measured as the number of new firms relative to the total number of firms in the previous year).

We convert our regression estimates to elasticities by conducting a simple back-of-the-envelope calculation. Adapating model (4) to estimate the first stage increase in new employer taxes,[21] we find that relative to control states, treatment states on average experienced a 45% increase in new employer taxes from 2008 (our omitted year) to 2010. Estimates for increases in taxes from 2008 to 2011, 2012, and 2013 correspond to average increases of 55%, 49%, and 43%, respectively. Dividing the estimated coefficients for log(number of new firms) by these average tax increases, we can construct an elasticity of firm entry to new employer taxes. The -0.04 coefficient estimate in 2010 corresponds to an entry elasticity of -0.09, and the -0.09 coefficient in 2013 corresponds to an entry elasticity of -0.21.

To put these estimated elasticities in perspective, consider the restaurant industry. New restaurants in Washington (a treated state in our case study) faced a per worker new employer tax of only $370 in 2008; this tax increased by 76% to $650 in 2010. Meanwhile, new restaurants in New Mexico (a control state in our case study) faced a small increase in the per worker tax from $398 in 2008 to $416 in 2010 (a 6% increase). Our elasticities imply that this relative tax increase for new restaurants in Washington lead to a 6.3 percent decline in new entrants in 2010 in Washington relative to New Mexico.

## 5.2 Broader Event Study

We next expand to our broader event study of new employer tax increases that are greater than 20 percent. We estimate model (5), and Figure 3 presents estimates for our two measures of entry. Consistent with our results from the Great Recession case study, we find no evidence of differential trends in the years leading up to a large new employer tax increase. Meanwhile, in the five years following the increase, we observe statistically

[21] Specifically, we estimate model (4) with log(new employer tax rate $\times$ tax base) as the dependent variable. In this way, we are estimating relative increases in taxes for treatment states, residualizing against the same controls as in our case study.

significant declines in both the number of new firms and the entry rates.

When we convert these estimates to elasticies, they are broadly consistent with those from our case study. For example, taking our estimates from our model of log number of new firms and dividing them by the average increase in taxes, we estimate an average entry elasticity to new employer taxes that grows from -0.04 in year 0, to -0.08 in year 1, -0.12 in year 2, and -0.13 in year 3.[22,23] Increases in taxes appear to meaningfully predict lower firm entry.

## 5.3 TWFE Models

When we broaden our scope to *all* new employer tax variation in our TWFE model (6), we find results consistent with the case and event studies: higher taxes predict lower firm entry. Table 2 presents these results. In both a baseline specification with only state-by-sector and sector-by-year fixed effects (column (1)) and one in which we add time-varying state characteristics (column (2)), we estimate a statistically significant $\beta$ of –0.10, which is similar in magnitude to the average of the elasticities from both the case study and the broader event study design. This coefficient implies that a one standard deviation (0.57 log points) increase in the expected per-worker new employer tax cost—akin to comparing taxes faced by retail trade firms in 2004 in Colorado ($250 per capita) vs. New Mexico ($454 per capita)—is associated with a 5.7 percent decline in the number of new firms.

Importantly, the role of UI taxes is stark in comparison to the role of other taxes: neither corporate nor personal income taxes meaningfully predicts fewer entrants, conditional on UI taxes. This contrasts with the existing literature (Moretti and Wilson (2017), Giroud and Rauh (2019)) that has found evidence of mature businesses (that are likely more profitable than new firms) responding to state-level differences in corporate and personal income tax

[22]The average tax increases of $101 per worker in year 0, $151 in year 1, $147 in year 2, and $136 in year 3 translate to 28%, 38%, 37%, and 36% increases respectively.

[23]We confirm in Appendix Figure A.8 that these results are robust to dropping the tax increases that occurred after the Great Recession (from the case study above), which make up roughly half of the events identified using this method.

costs. The distinct role of UI taxes likely arises due to the nature of the taxes: unlike income taxes, firms are charged UI taxes *regardless* of whether they are profitable. For young firms only starting to generate cash flows, income taxes may not bite, but payroll taxes will.

Furthermore, both the tax rate and the tax base matter for firm entry. When we consider the two components separately in column (3), both of the UI tax terms have statistically significant negative estimated coefficients. In other words, regardless of whether higher new employer tax costs comes from a higher rate or a higher tax base, both lead to fewer entrants.

Columns (4)–(6) show very similar patterns for entry rates. In our preferred specification with full controls in column (5), we estimate that a one standard deviation increase in new employer tax costs implies a 43 basis point decline in the entry rate, or 4.6 percent of the mean entry rate.

In Section 2, we argued that new employer taxes should be *particularly* relevant and costly for firms with higher labor demand, more part-time or low-wage workers, and higher worker turnover, as all of these features generate higher expected taxes. To explore this, we estimate a version of model (6) in which we interact each 2-digit NAICS sector $n$ with the new employer tax, such that we now estimate a vector of $\beta_n$'s instead of a single $\beta$. Figure 4 presents these sector-specific estimates. The industries where firm entry decreases the most when UI taxes are higher exhibit characteristics we posit make UI taxes more costly, and thus salient; real estate, construction, and accommodation/food are labor-intensive industries that hire many workers, many of whom only work part-time/seasonally or turn over quickly. On the other hand, the only industry where higher UI taxes (statistically insignificantly) predict a *higher* firm entry rate is health care, an industry with other barriers to entry that may dominate the effect of new employer tax costs. Manufacturing falls in the middle of the distribution of coefficients, suggesting that tradability is not a driving determinant of the entry effects.

The fact that a majority of industries are responsive to new employer taxes also suggests that experience rating plays less of a role on the entry margin than the immediate financial

burden of new employer taxes. Table A.2 reports mean statutory versus effective UI tax rates by sector in 2011, a year with particularly high UI tax rates as a result of the Great Recession. Statutory tax rates are a measure of experience rating, as sectors such as construction and manufacturing have the highest employer-specific tax rates due to high utilization of UI benefits. Effective tax rates, which are calculated by dividing UI taxes by *total* wages, also highlight tax burden; sectors with lower wages will have higher effective tax rates, and thus higher tax burdens. This table shows that aside from construction, the accommodation/food sector had the largest tax burden relative to payroll (an effective tax rate of 1.5%), yet had the lowest level of experience rating (a statutory rate of only 2.6%) because relatively few workers in this sector claim UI benefits. Thus entry responses in sectors with low UI risk are less likely to be the result of experience rating concerns.

## 5.4 Border Counties

While the agreement of our event study and TWFE model estimates push us towards interpreting our TWFE estimates causally, there remain potential identification threats in the TWFE setup that are not sufficiently addressed by our event study. Most importantly, while the event studies leverage large increases in taxes, our TWFE models include all variation in taxes; in the latter case, there could be variation in taxes that, e.g., correlates with other economic conditions in a way that generates omitted variable bias. We argue that this is not the case through our border county analysis in which we estimate model (7) and compare new firm entry in neighboring counties at state borders.

Table 3 presents results for both the number of new firms and the entry rate.[24] We start by estimating model (7) without year-by-county pair fixed effects, on the sample of border counties, and find similar elasticies to our main TWFE model estimates. In column (1), we estimate an elasticity of new firms to the tax base of –0.1. This effect is robust to controlling for local economic conditions common within neighboring counties, as captured

[24]Table A.3 presents estimates for firm entry at the county level in general (i.e., without pairing neighboring counties), showing that higher tax bases also predict lower firm entry at the county level.

by year-county pair fixed effects in column (2): on average, a county facing double the taxes its neighbor faces can expect 8.7 percent fewer entrants, relative to its neighbor. In other words, higher UI taxes predict lower firm entry, even in markets facing similar local conditions. We see similar patterns in terms of entry rates: a county facing double the tax base its neighbor faces can expect a 0.8 percentage point lower entry rate than its neighbor (column (4)).

## 5.5 Robustness

Thus far we have provided evidence across multiple research designs that new employer taxes deter firm entry. We now present additional robustness checks to address measurement concerns.

First, our main measure of firm entry is based on when firms first hire employees. It is possible that would-be firms respond to higher new employer taxes by still entering *without* employees, in which case we would not capture their entry in our data. We use state-level data on business applications (which capture both firms with and firms without employees) to test whether applications respond similarly to state UI tax bases as our firm entry measure. Table A.4 estimates an elasticity of the number of new employers to the UI tax base of -0.13, and we estimate an elasticity of –0.07 for both the number of new firm applications and the number of applicants that the Census Bureau predicts will eventually employ workers.[25]

Second, we explore sensitivity to using the statutory UI tax base in our measure of per worker new employer tax costs. While the majority of states have very low tax bases (such that most workers' pay exceeds the base), some states have large enough tax bases such that this definition may overestimate the wages subject to taxation. At the extreme, Washington's tax base in 2014 was $41,300.

As a robustness check, we construct an alternative measure of new employer taxes that replaces the statutory tax base with an "adjusted" tax base equal to the minimum of the

[25]The Census Bureau classifies applicants as likely to eventually employ workers using criteria including legal formation, plans for employees, and sector.

statutory base and sector-specific average annual wages. Because wages may be endogenous to UI tax costs and local economic conditions, we construct a time-invariant measure of wages, $\text{wage}_{js}$, at the state-by-sector level that takes the mean value of average weekly wages reported in the Quarterly Census of Employment and Wages from 2003-2014. We then adjust for inflation before defining an adjusted tax base equal to $\min(\text{base}_s, \text{wage}_{js} \times 52)$. In practice, this "adjusted base" differs from the statutory tax base for only 6 percent of our observations.[26] In Table A.5 we report our TWFE estimates using this adjusted base measure, and the estimates are very close to the original estimates in Table 2, suggesting that this measurement error does not substantially contaminate our results.[27]

Finally, we demonstrate that our results are not driven by our weighting scheme. Table A.6 presents estimates of model (6) in which we weight all estimates equally. We estimate smaller but still significant elasticity estimates, suggesting that while weighting does matter (elasticies are larger in state-sector-year cells with more firms), it does not fully account for our results.[28] The table also presents unweighted estimates from regressions performed on subsamples in which we drop relatively small state-sector-year cells (i.e., cases in which there are few active firms of any age); this exercise demonstrates what the weighting does, as weighting effectively removes from the estimation smaller state-sector-year cells.

Taken together, these results demonstrate that higher new employer taxes robustly predict lower firm entry. Recall that these taxes are nominally small—many firms are only paying a few hundred dollars per worker. Yet, even small per-worker costs can be prohibitively costly to nascent firms. Next, we explore firms' responses to these taxes in the first years after entry.

[26]The most impacted sectors are retail trade (17%), arts/recreation (21%), and accommodation/food (32%). On the other hand, 8 out of 15 sectors are not affected at all by this alternative definition.

[27]Columns (2)-(3) and (5)-(6) of Table A.5 shows that our entry results are robust to splitting the sample by above or below median tax base; consistent with our measure being a better approximate for the cost for firms facing lower tax bases, we find stronger results for states with below-median bases.

[28]Our estimates for the entry rate are less sensitive to weighting, which is likely because the entry rate variable already normalizes entry by the size of the state-sector-year cell.

# 6 Survival and Growth

After firms hire their first employees, are they still affected by the burden of payroll taxes? On the one hand, the relative costs of these taxes may decrease for firms as they grow and increase their revenues; on the other hand, each additional hire adds to their total tax costs, as the tax is effectively a surcharge on employment. Furthermore, inexperienced entrepreneurs may learn about these taxes as they gain experience paying them; in this way, the taxes may become more salient as a firm ages, such that the firm may respond more strongly to increases in taxes over time.

We investigate the impact of UI taxes on firms' post-entry outcomes, including firm survival, growth, and labor demand across the first few years of firms' lives. We do this through two approaches. First, we adapt our broad event study (model (4)) to study how post-entry outcomes vary across cohorts of new firms based on the tax rate they faced at entry; namely, we leverage the aggregate BDS data to consider how outcomes differ for cohorts entering after larger tax increases. This exercise gives us insight on how tax increases may generate selection in addition to different post-entry firm behavior, as the new firms that enter despite higher taxes may be, for instance, less sensitive to the taxes.

Second, we adapt our TWFE model (6) to study how outcomes vary as firms age, using aggregate BDS data to study survival and firm-level LBD data to study employment decisions. To do this, we consider the relevant taxes a firm faces as it ages: in the first few years, the firm faces the new employer tax rates that we studied for entry and initial hiring. After that, the firm transitions to a firm-specific tax rate that depends on their layoff history and is capped at a state-specific maximum tax rate; as we do not observe these firm-specific rates, we focus on maximum rates, multiplied by the tax base, as a proxy for tax costs.

Below, we find that higher UI taxes predict higher exit rates, lower employment among survivors, and a shift in labor demand toward non-taxed contract labor.

## 6.1 Exit Rates

We first study firm survival by estimating how exit rates vary with taxes. To measure exit rates, we return to the aggregate BDS data and define the exit rate at each age from 1 to 5 as the number of firm deaths (i.e., not surviving to the next age) divided by the total number of firms, in a given age group, state, sector, and year cell; values are scaled to range from 0 to 100 percentage points. Note that a firm "dies" if it never again employs workers, and so this measure of exit is symmetric to our employment-based entry measure.

### 6.1.1 Event Study Cohort Analysis

In our cohort analysis, we adapt model (5) with the age 1 exit rate as the dependent variable. As in our entry analysis, this event study compares state-sector-year cells before and after large increases in taxes; in this way, we are studying what fraction of new firms in cohorts facing higher taxes exit within a year of entering, relative to cohorts facing lower taxes.[29] Firm exits are very common: on average, 24% of age 1 firms exit before they turn 2.

Panel A of Figure 5 presents the estimates and show that exit rates increase immediately following large increases in taxes. In the first year following the increase (year 0), new cohorts of firms experience 1.5 percentage points higher age 1 exit rates, amounting to a 6.3% higher exit rate relative to the mean. We interpret these findings as evidence that taxes prove costly for firms after entry, pushing some to exit faster than they might otherwise.

These findings also suggest a lack of strong positive selection. If higher taxes deter entrants that are particularly likely to be constrained or unprofitable, we might have expected exit rates to *decrease* following tax increases. Instead, either there is not strong positive selection, or there is a sufficient treatment effect (i.e., higher taxes making survival more difficult) that offsets this selection. On net, this analysis suggests that higher taxes lead to

[29]Note that age 1 is the first "full" year of operating with employees; entry happens at age 0. We time the event study based on the entry year, i.e., age 0, as in our entry event study analysis.

lower survival rates for new firms.

### 6.1.2 TWFE Firm Lifecycle Analysis

Given that higher taxes at entry appear to increase exit rates soon after entry, what happens when taxes increase after a firm enters? We adapt our TWFE model (6) to study how UI taxes affect the survival of new firms from age 1 to 5. We estimate the following regression for observations at the age $a$, state $s$, 2-digit NAICS sector $n$, and year $t$ level:

$$\begin{aligned}\text{Exit Rate}_{asnt} = \alpha_a + \sum_{a=1}^{5} \beta_a \log(\text{new rate*base})_{snt} \\ + \sum_{a=1}^{5} \gamma_a \log(\text{max rate*base})_{st} + X'_{st}\delta + \mu_{sn} + \nu_{nt} + \epsilon_{snta}.\end{aligned} \tag{8}$$

$\beta_a$ and $\gamma_a$ are the coefficients of interest and distinguish between the impact of new employer rates (which only apply for ages one and two) and maximum UI rates (which come into play starting at age two or three, depending on the state and quarter in which a firm entered). The vector of controls $X'_{st}$ includes additional time-varying state level policies such as corporate and personal income tax rates, log maximum weekly UI benefits, minimum wage, and state unemployment rate as well as fixed effects for ventiles of the unemployment rate distribution and deciles of the unemployment benefit distribution, as in model (6). We also include state-sector-entry year cohort fixed effects. Given our significant findings on the entry margin, these cohort fixed effects serve as a way to control for the initial tax regime at entry, which could impact a firm's likelihood of survival irrespective of subsequent tax rates.

Panel B of Figure 5 plots the $\beta_k$ and $\gamma_k$ coefficients estimated from model (8); for ease of interpretation, we report the coefficients scaled to reflect the predicted increase in exit from a one standard deviation increase in the new or maximum per-capita tax. Consistent with the event study analysis, we find that increases in taxes after entry predicts an increase in the likelihood of exit.

Crucially, the tax measure (new versus maximum) that predicts higher exit at each

age is precisely the tax measure that *should* matter at each age—young firms' survival is predicted by the new employer taxes they face, while relatively older firms' survival depends on the maximum taxes they may pay at their age. At age 1, when all firms are charged the new employer rates, a one standard deviation increase in the log new employer tax at age 1 increases the likelihood of exit by 0.63 percentage points (an increase of 2.7 percent relative to the mean exit age 1 rate of 23.6 percent).[30]

Starting in age 2, the new employer tax coefficient is close to zero and no longer statistically significant, because firms will have either graduated into experience rating already, or will be graduating in the next year. Instead, it is a measure of current tax costs—the maximum potential UI tax—that significantly predicts firm survival. As firms age, a one standard deviation increase in the log maximum tax increases the likelihood of exit by 0.37, 0.47, 0.54, and 0.67 percentage points from ages 2 to 5, respectively. Because mean exit rates also decline with age (16.2 percent of firms exit at age 2, but only 10.9 percent do so by age 5), the relative effect of UI taxes grows stronger with age. The age 5 effect accounts for a 6 percent increase in the likelihood of exit, relative to the mean likelihood at that age.

The growing impact of the maximum tax as firms age also reflects the fact that struggling firms may take a few years to be impacted by the maximum tax, though the precise equation by which UI claimants translate into a firm's experience tax rate varies by state and is beyond the scope of this paper. As a robustness check, Figure A.10 plots separate estimates for the subgroup of states in which firms graduate to experience rated taxes earlier (less than two years) versus later (after two years or more). Consistent with our proposed mechanism, new employer taxes affect exit more strongly than maximum UI taxes precisely for the subset of states whose new employer rates last longer.

[30] Notably, it is expressly the UI taxes that matter. In Figure A.9, we extend model (8) to include additional age interactions with corporate and personal income taxes, minimum wage, and unemployment rates. The effect of UI taxes persists with these additional controls, and neither corporate income nor personal income taxes play similar roles in increasing exit.

## 6.2 Employment Growth

We have just seen that higher UI taxes predict higher exit rates — but what happens to employment growth, particularly for the firms that survive? We address this in two parts. First, we repeat our event study cohort analysis to study how increases in taxes at entry predict initial hiring decisions, conditional on hiring *any* employees (i.e., entering). Second, we turn to study how surviving firms grow in terms of employment as they age, in the face of changing UI taxes, through TWFE models.

### 6.2.1 Event Study Cohort Analysis

We estimate a version of model (5) in which the dependent variable is the log employment per age 1 firm for a state-sector-year cell in the BDS.[31] Panel A of Figure 6 presents estimates. Following the large increase in taxes, we see an insignificant reduction in workers per firm. In the first year after the tax increase (year 0), cohorts have 2 percent lower employment per firm, but this is statistically indistinct from a null effect; this gap grows to 4 percent in year 3.

These patterns suggest that higher taxes may lead to smaller firms, but not overwhelmingly so.[32] As with our event study for firm exits, we can also interpret these patterns as indicating that taxes do not generate large positive selection effects; if tax increases particulary deter the entry of what would be small firms, we might have seen a positive effect of taxes on observed employment. Instead, either this positive selection does not appear, or it is sufficiently offset on average with a treatment effect in which new firms choose to hire fewer workers than they otherwise would.

[31] Note that the BDS reports total employment and the number of firms at each age, so this measure is not the same as log mean employment of age 1 firms.

[32] In untabulated results, we estimate a TWFE model of log employment at entry using micro firm-level data from the LBD. We find a small, statistically insignificant coefficient on UI taxes of 0.002 (standard error 0.003), consistent with no large change in employment amongst entrants when taxes are larger.

### 6.2.2 TWFE Firm Lifecycle Analysis

We next turn to studying how changes in taxes after entry affects employment. To do this, we restrict to a balanced sample of firms aged 1 through 5; that is, those who have at least one worker at all five ages. This sample consists of arguably more successful firms, as they have not exited soon after entering. For this sample, we estimate a similar regression to model (8) to study how firm-level employment in the LBD varies across ages 1 through 5 as a function of the new employer and maximum UI tax costs. We additionally include firm fixed effects in order to study relative employment patterns *within* a firm.

Panel B of Figure 6 presents the results. Within a firm, new employer taxes predict lower employment for the first five years. At age 1, a one standard deviation increase in UI taxes predicts 1.5 percent lower employment. The relatively small magnitude of the average treatment effect suggests there is still a substantial portion of young firms that do not respond to new employer taxes on this margin, as the average size of age 1 firms is only 7.7 employees. If all new firms would have had 8 employees in the absence of tax responses, but 12 percent of employers respond to the one standard deviation higher taxes by reducing their employment to 7 (a 13 percent decline), this would be consistent with our estimated average treatment effect of $12\% \times (–13\%) + (1 - 12\%) \times 0 = -1.5\%$. This effect attenuates as a firm ages, consistent with the new employer rate no longer reflecting the actual cost for the firm.

Unlike in the survival results, however, here new employer taxes appear to matter beyond when they are strictly relevant, and maximum UI taxes do not predict lower employment. This is not wholly surprising, given that we are studying a sample of relatively successful firms who likely are not laying off many workers. Due to experience rating, the maximum tax rate is only relevant to firms whose workers have claimed UI benefits; for this sample of relatively successful firms, the maximum rate may not bite. Instead, the actual tax costs they experience are likely closer to the new employer tax, consistent with the new employer tax predicting lower employment in the years after firms technically graduate beyond the

new employer status.

These employment results, coupled with the survival results, are reflective of UI taxes proving costly for firms. Even among the firms that are able to survive, higher UI taxes may stunt employment growth for many years.

## 6.3 Substituting with Non-Taxed Workers

In the face of high payroll taxes, some firms may have options beyond exiting or staying small. For example, an alternative way employers can adjust employment in response to payroll tax costs is through the use of temporary or leased workers, who are non-W-2 employees for whom firms do not pay payroll taxes. For short-run or seasonal jumps in labor demand, firms can avoid paying additional UI taxes by hiring workers as independent contractors or through staffing agencies and temporary help firms. Firms do not directly pay UI taxes for these workers, as independent contractors are not eligible for UI, and staffing agencies are responsible for paying the UI taxes for employees they lease to other firms as temporary workers. In the case of leased temporary workers, firms may indirectly pay UI taxes through their fees to the staffing agencies, but the costs would be much lower once spread across all client firms. Furthermore, the use of contract workers for seasonal demand could also allow firms to avoid future tax increases due to experience rating. Thus we hypothesize that firms' incentive to substitute regular employment with temporary or leased workers is greater when UI taxes are higher.

To test this hypothesis, we leverage Census Bureau data on contract labor usage by construction firms, as measured in the 2007 and 2012 snapshots of the CCN that is conducted every five years. To study new employers, we keep establishments that entered within two years of the census year. For example, firms in 2007 will be considered new if they entered in 2005 or 2006. Because each establishment is only identified as new once, this is a cross-

sectional rather than panel regression. We estimate the following:

$$\text{Has Any Temporary or Contract Labor}_{ist} = \beta \log(\text{new rate*base})_{st} + X'_{ist}\gamma + \epsilon_{ist}, \quad (9)$$

where we study whether establishment $i$ in state $s$ and year $y$ has any temporary or contract labor; the outcome is an indicator variable equal to 1 if the establishment reports any expenses for temporary or leased workers, and 0 otherwise. $\beta$ is the coefficient of interest, and the vector of controls $X'_{ist}$ includes additional employer characteristics such as log payroll and log employment; state-level policy, including corporate and personal income tax rates, the log of maximum weekly UI benefits, the minimum wage, and the state unemployment rate as well as fixed effects for ventiles of the unemployment rate distribution and deciles of the unemployment benefit distribution; and fixed effects for 3-digit NAICS-by-state and 3-digit NAICS-by-year.[33] To account for differential sampling rates by establishment size, we also estimate regressions weighted by either employment or employment and match rates from the LBD.[34]

Table 4 presents the estimates under two different weighting schemes. Columns (1) and (3) present pooled effects of new employer taxes on contract labor use for 2007 and 2012, while columns (2) and (4) estimate separate, but similar, coefficients for 2007 and 2012. All specifications reveal the same result: young-construction firms operating in higher UI tax regimes are disproportionately likely to use temporary contract labor, which may allow them to operate at larger scales by avoiding some UI tax costs. When we account for sampling by weighting by both employment and match rates in column (3), we see that a one standard deviation (0.66 log point) increase in new employer taxes predicts a 3.2 percentage point

[33] In previous analyses, we focused on sectoral differences and so included 2-digit NAICS. Here, we consider 3-digit NAICS in order to contrast different industries within the construction sector (2-digit NAICS 23).

[34] Despite its name, the Census of Construction only has universal coverage of large establishments. Smaller establishments are sampled at varying rates based on annual payroll thresholds. To account for this differential likelihood of being sampled, we can place greater weight on observations based on their empirical match rates to the LBD. We assign establishments to 10 bins of annual payroll and calculate the match rate to the LBD to generate the weights. These bins range from 0–50k, 50–100k, 100–250k, 250–500k, 500–1m, 1–1.5m, 1.5–2m, 2–3m, 3–5m, and over 5m.

higher likelihood of using contract labor, a 23 percent increase relative to the mean (14 percent have any contract labor usage). If we focus more on larger firms that are more likely to use contract labor (mean rate of 20 percent, column (1)), we see a larger effect, with a one standard deviation (0.65 log point) increase in new employer taxes predicting an 8 percentage point higher likelihood of using contract labor (a 40 percent increase relative to the mean).

Regardless of specification, this analysis demonstrates that some firms may be able to partially circumvent new employer taxes by hiring labor for whom they do not have to pay UI taxes directly. To the extent to which contract labor may turn over more quickly or be less productive, this could still prove costly for firms. Nonetheless, we conclude that at least some firms internalize these new employer tax costs in ways that may distort their production processes.

# 7 Conclusion

New firm entry, particularly entrepreneurship, is frequently viewed as an important source of economic growth. While the existing literature on business taxation has primarily focused on the labor demand and location decisions of mature firms, we provide evidence that new employer tax costs can also significantly impact the entry and growth prospects of nationally new businesses. In the context of state UI taxes, we estimate that greater new employer tax costs deter both firm entry and impact short-run survival and employment after entry. Because these tax costs are small in nature (1 percent of payroll on average) and not directly tied to experience rating, our results provide more generalizable evidence of how sensitive young firms can be to even small financial burdens.

This paper also highlights how state UI policies for new employers may have unintentional consequences for firm entry and outcomes. Thus, policymakers face a trade-off. On the one hand, new firms *should* potentially pay high taxes, since their high rates of exit and

likelihood for layoffs can subsequently lead to large outlays from the UI system. From an actuarial perspective, new firms are costly to state UI programs, and so it is understandable that they may be charged more. Yet, on the other hand, we have shown in this paper that higher taxes for new firms can actually lead to substantial economic costs for states, too, in the form of lower entry, higher exit, and lower employment growth.

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Table 1: Summary statistics

| | Unweighted | | | Weighted | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | Mean | Std Dev | Median | Mean | Std Dev | Median | Min | Max |
| Number of new firms | 581 | 952 | 252 | 1,869 | 1,958 | 1,126 | 0.00 | 11,052 |
| Log(number of new firms) | 5.44 | 1.52 | 5.53 | 6.97 | 1.16 | 7.03 | 0.00 | 9.31 |
| Entry rate | 8.52 | 2.88 | 8.26 | 7.98 | 3.45 | 7.62 | 0.00 | 100 |
| New rate*base | 372.61 | 264.27 | 259.20 | 347.04 | 236.14 | 243.00 | 76.51 | 2,726 |
| Log(new rate*base) | 5.74 | 0.57 | 5.56 | 5.71 | 0.49 | 5.49 | 4.34 | 7.91 |
| Log(base) | 9.45 | 0.52 | 9.26 | 9.27 | 0.47 | 9.10 | 8.85 | 10.63 |
| New rate | 2.66 | 1.09 | 2.70 | 3.02 | 1.14 | 2.70 | 1.00 | 9.88 |
| Base ($) | 14,637 | 8,517 | 10,500 | 12,098 | 7,388 | 9,000 | 7,000 | 41,300 |
| Personal inc. tax rate | 5.25 | 3.01 | 5.90 | 5.47 | 3.62 | 5.83 | 0.00 | 14.10 |
| Corporate tax rate | 6.52 | 2.88 | 7.00 | 6.47 | 2.91 | 7.10 | 0.00 | 12.00 |
| Log(UI benefits) ($) | 5.92 | 0.25 | 5.92 | 5.96 | 0.24 | 5.99 | 5.32 | 6.52 |
| Minimum wage ($) | 6.64 | 1.07 | 7.15 | 6.73 | 1.08 | 7.15 | 5.15 | 9.50 |
| State unemp. rate | 6.27 | 2.09 | 5.90 | 6.71 | 2.14 | 6.30 | 2.60 | 13.70 |

Notes: N = 9,162. This table presents summary statistics of the key variables in this paper, based on BDS data. These include the number of new firms, the firm entry rate, measures of nominal UI taxes (the level and log new rate times base, the log base, and the new rate), and other state characteristics (including the personal income and corporate tax rates, the level of UI benefits and minimum wage, and the state unemployment rate). All rates variables are scaled to lie between 0 and 100. The level of observation is a NAICS sector-state-year cell. For means, standard deviations, and medians, observations are either unweighted (columns (1)-(3)) or weighted (columns (4)-(6)) by a measure of the "size" of each cell: the total number of firms (all ages) in the sector-state-year.

Table 2: Higher new employer taxes predict lower firm entry

| | Log(Number of New Firms) | | | Entry Rate | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Log(new rate*base) | -0.105*** | -0.100*** | | -0.432*** | -0.426*** | |
| | (0.013) | (0.010) | | (0.111) | (0.090) | |
| Log(base) | | | -0.146*** | | | -0.816*** |
| | | | (0.023) | | | (0.174) |
| New rate | | | -0.029*** | | | -0.071 |
| | | | (0.005) | | | (0.044) |
| Personal inc. tax rate | | 0.007** | 0.006** | | 0.067*** | 0.056** |
| | | (0.003) | (0.003) | | (0.025) | (0.025) |
| Corporate tax rate | | 0.006*** | 0.006*** | | -0.006 | -0.002 |
| | | (0.002) | (0.002) | | (0.019) | (0.018) |
| Log(UI benefits) ($) | | -0.213*** | -0.199*** | | 0.350 | 0.422 |
| | | (0.066) | (0.065) | | (0.575) | (0.564) |
| Minimum wage ($) | | -0.028*** | -0.026*** | | -0.279*** | -0.267*** |
| | | (0.005) | (0.005) | | (0.057) | (0.058) |
| State unemp. rate | | -0.022*** | -0.022*** | | -0.227*** | -0.230*** |
| | | (0.006) | (0.006) | | (0.062) | (0.062) |
| $R^2$ | 0.994 | 0.995 | 0.995 | 0.914 | 0.922 | 0.922 |
| Mean Outcome | 6.972 | 6.972 | 6.972 | 8.521 | 8.521 | 8.521 |
| Sector-Year FEs | X | X | X | X | X | X |
| Sector-State FEs | X | X | X | X | X | X |
| Unemp. and Benefit Bin FEs | | X | X | | X | X |
| Firm Weights | X | X | X | X | X | X |
| N | 9,162 | 9,162 | 9,162 | 9,162 | 9,162 | 9,162 |

Notes: This table presents regressions of how the level of firm entry in a sector-state pair varies with the UI tax regime. Columns (1)-(3) regress the log number of new (age 0) firms (plus 1) on UI taxes and controls; columns (4)-(6) present similar regressions for the firm entry rate, given by the number of new firms divided by the total number of firms (all ages) in the sector-state pair in the previous year (multiplied by 100). The main independent variable is the log(new rate * base), which captures the log of the product of the new employer UI tax rate and the UI tax base. Starting in columns (2) and (5), we add additional controls (including the personal income and corporate tax rates, the level of UI benefits and minimum wage, and the state unemployment rate as well as fixed effects for unemployment rate ventiles and benefit deciles); columns (3) and (6) consider the roles of the UI tax rate and tax base separately. All columns additionally include sector-year and sector-state fixed effects. All rates variables are scaled to lie between 0 and 100. In all columns, the level of observation is a NAICS sector-state-year cell; in all columns, observations are weighted by a measure of the "size" of each cell: the total number of firms (all ages) in the sector-state-year. Standard errors are clustered at the sector-state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Higher UI tax bases predict lower firm entry, across state borders

| | Log(Number of New Firms) | | Entry Rate | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Log(base) | -0.101*** | -0.086** | -0.810*** | -0.752*** |
| | (0.039) | (0.039) | (0.282) | (0.256) |
| $R^2$ | 0.993 | 0.997 | 0.803 | 0.915 |
| Mean Outcome | 5.866 | 5.866 | 7.416 | 7.416 |
| Year FEs | X | | X | |
| County FEs | X | X | X | X |
| Unemp. and Benefit Bin FEs | X | X | X | X |
| Year-County Pair FEs | | X | | X |
| N | 31,250 | 31,250 | 31,250 | 31,250 |

Notes: This table presents regressions of how the level of firm entry in a county varies with the UI tax regime, as compared to neighboring counties across state borders. The sample consists of counties that sit at state borders, paired to one or more neighboring counties across the border. In the case a county pairs to more than one other county, they appear in the data multiple times; the observation level is a county-year-county neighbor pair. In this analysis we focus on the tax base, as the tax rate can vary across sectors, which are pooled in the county-level data.

Columns (1) and (2) regress the log number of new (age 0) firms (plus 1) on the UI tax base and controls; Columns (3) and (4) present similar regressions for the firm entry rate, given by the number of new firms divided by the total number of firms (all ages) in the sector-state pair in the previous year (multiplied by 100). All regressions include controls listed in the footer as well as economic controls, which include the personal income and corporate tax rates, the level of UI benefits and minimum wage, and the state unemployment rate as well as fixed effects for unemployment rate ventiles and benefit deciles. All rates variables are scaled to lie between 0 and 100. Standard errors are clustered at the county level.

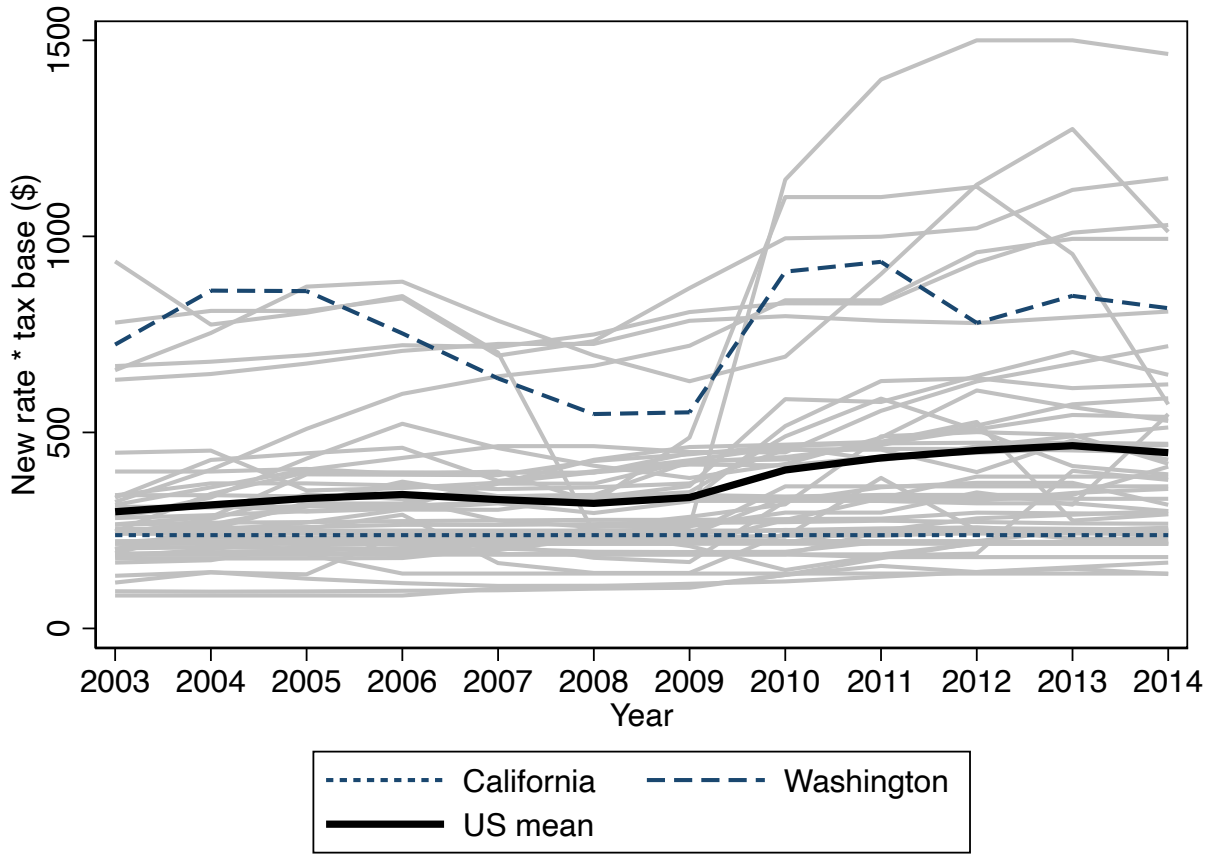
Odd columns include year and county fixed effects, while even columns add year-by-county neighbor pair fixed effects. Because counties can appear multiple times, if they have multiple cross-border neighbors, we use weights that are adjusted to (a) be equivalent across counties within a pair and (b) approximate the number of firms within the county pair. If county $i$ and county $j$ are neighbors and have (all ages) firm counts $w_i$ and $w_j$ in a given year, respectively, there are two observations for this pair (one for county $i$ and one for county $j$). For both observations, we assign a weight equal to $(w_i \frac{w_j}{\sum_{j'} w_{j'}} + w_j \frac{w_i}{\sum_{i'} w_{i'}})$, where $j'$ denotes *all* counties that $i$ neighbors and $i'$ all counties that $j$ neighbors. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$.

Table 4: Higher new employer taxes predict usage of contract labor in construction

| | Has Any Temporary or Contract Labor | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Log(new rate*base) | 12.30*** | | 4.902*** | |
| | (3.650) | | (1.662) | |
| Log(new rate*base) × | | 13.29*** | | 6.287*** |
| 2007 | | (4.488) | | (1.887) |
| Log(new rate*base) × | | 12.70*** | | 5.469*** |
| 2012 | | (3.751) | | (1.569) |
| Mean Outcome | 19.96 | 19.96 | 14.17 | 14.17 |
| NAICS3-Year FEs | X | X | X | X |
| NAICS3-State FEs | X | X | X | X |
| Economic controls | X | X | X | X |
| Log(payroll) | X | X | X | X |
| Weighting | Emp | Emp | Emp + Match | Emp + Match |
| N | 24,000 | 24,000 | 24,000 | 24,000 |

Notes: This table presents regressions of how firm contract labor usage at entry varies with the UI tax regime, for young Construction sector firms covered by the 2007 and 2012 Census of Construction Industries (CCN). The sample is constructed by matching young firms in the LBD to firms in the CCN; for the 2007 CCN we take firms that entered in 2005 or 2006, while for the 2012 CCN we take firms that entered in 2010 or 2011. The dependent variable is an indicator equal to 100 if the firm employs any temporary labor, and 0 otherwise. In all columns, the level of observation is a firm-sector-state-year cell. In columns (1) and (2), observations are weighted by employment in order to capture how taxes affect contract labor usage at larger employers (who are more likely to use contract labor). In columns (3) and (4), we additionally weight by the match rate for firms of different sizes, since the CCN has better coverage for larger firms; in practice, this weighting "down-weights" larger employers who are more likely to be matched to the CCN. Standard errors are clustered at the sector-state level. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$.

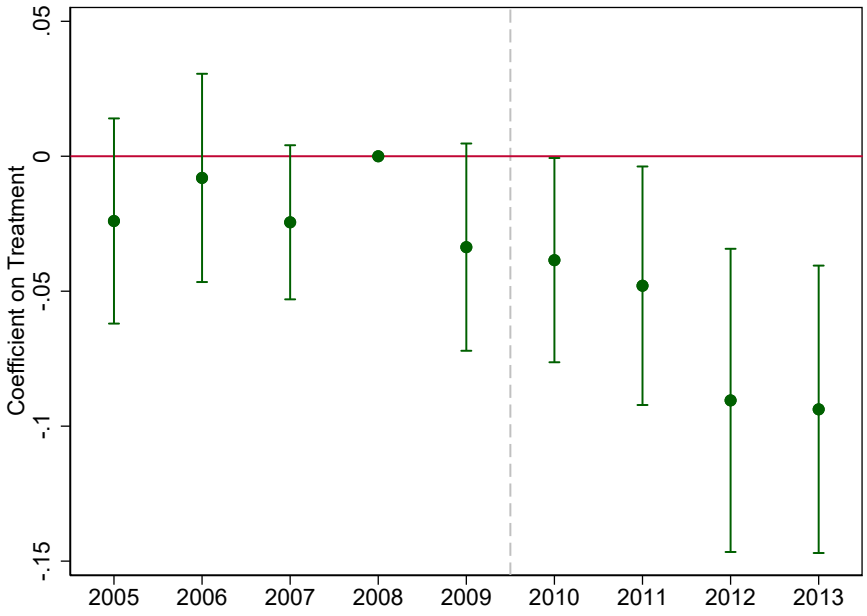
Figure 1: State per-capita new employer taxes over time (2003-2014)



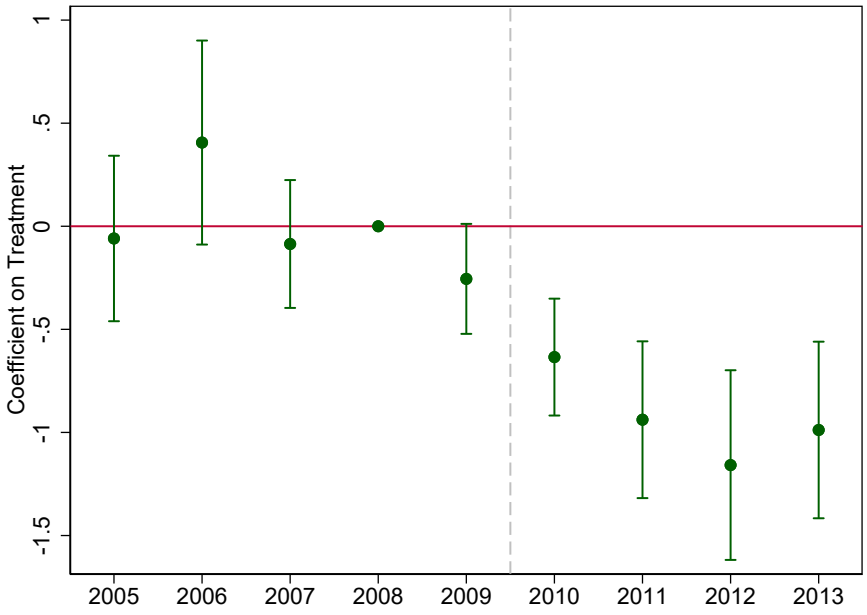

Notes: This figure plots the taxable wage base multiplied by the average new employer rate for each state in the US. Values are in nominal dollars, and top-coded at $1,500 for readability (only affects Hawaii in 2012-2013). Highlighted in bold is the unweighted national average.

Figure 2: Great Recession event study of firm entry (2005-2013)

(A) Great Recession event study estimates of log number of firms



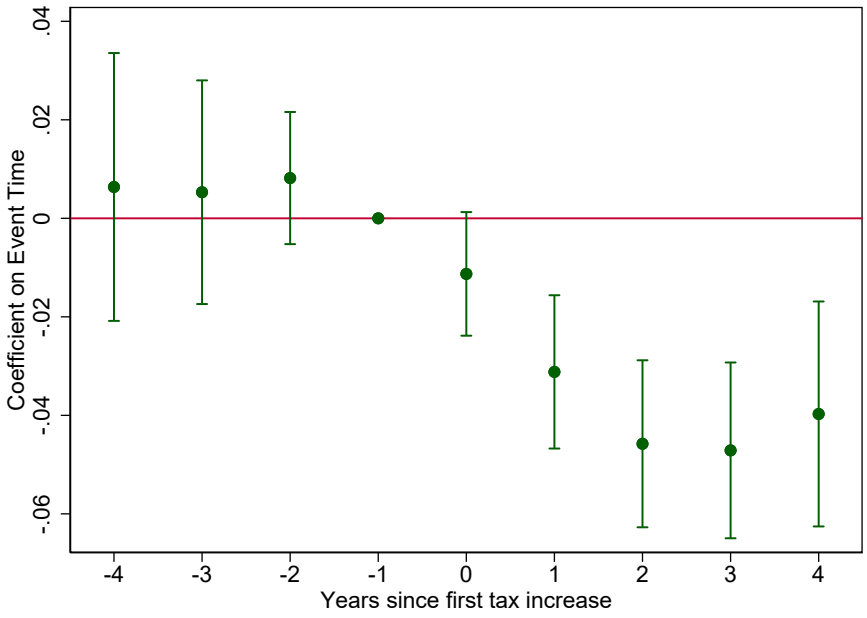

(B) Great Recession event study estimates of entry rate



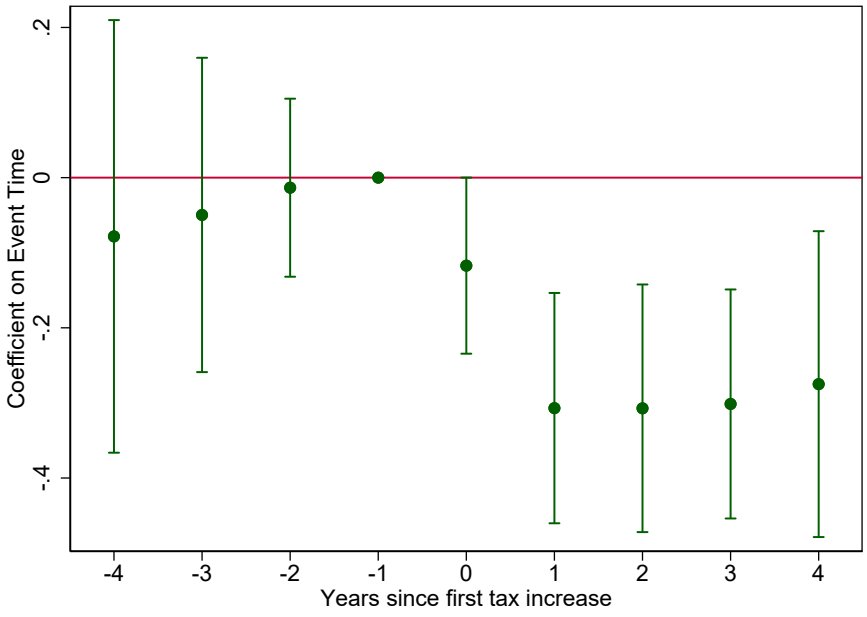

Notes: $N = 2,293$. This figure presents regression estimates at the state-sector-year level of how firm entry varies over time for eleven treatment states with variable new employer tax rates, relative to six control states whose tax rates are fixed. Regressions are weighted by the total number of firms (all ages) in the sector-state-year, and additional controls include corporate and personal income tax, UI benefit, minimum wage, and state unemployment rate. Also included are fixed effects for: unemployment rate ventiles, UI benefit deciles, sector-year, and sector-state. Error bars denote 95% confidence intervals for robust standard errors clustered at the sector-state level. The mean log number of new firms in this sample is equal to 6.3, and the mean entry rate is equal to 8.3.

Figure 3: Broader event study of firm entry (2005-2013)

(A) Broader event study estimates of log number of firms



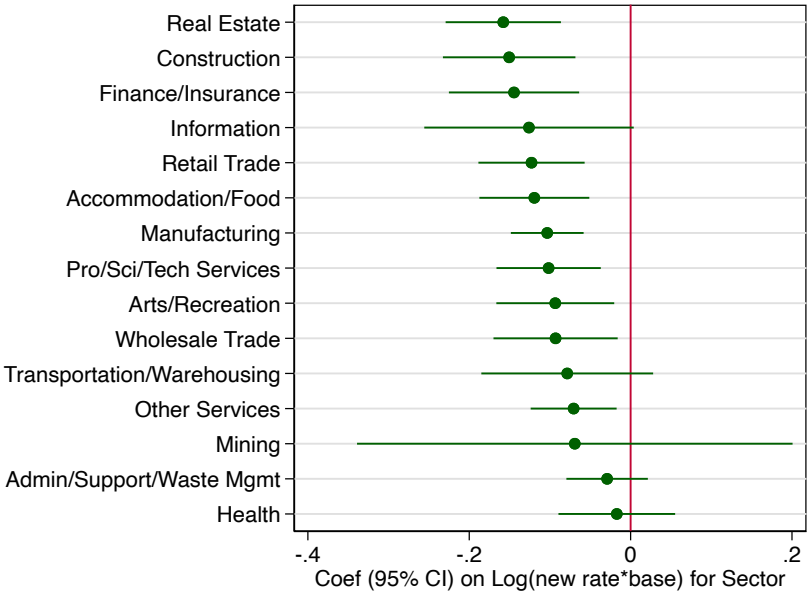

(B) Broader event study estimates of entry rate



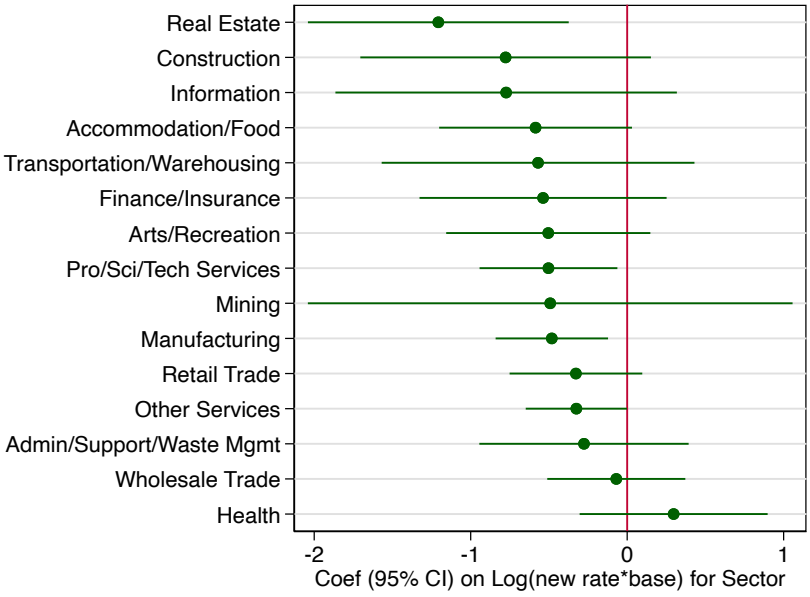

Notes: $N = 7,154$. This figure presents event study regression estimates at the state-sector-year level, estimated using the interaction weighted event study proposed by Sun and Abraham (2021). Event time is defined relative to the first year a state-sector experiences a new employer tax increase of 20 percent or more. Never-treated observations serve as the control group. Regressions are weighted by the total number of firms (all ages) in the sector-state-year, and additional controls include corporate and personal income tax, UI benefit, minimum wage, and state unemployment rate. Also included are fixed effects for: unemployment rate ventiles, UI benefit deciles, sector-year, and sector-state. Error bars denote 95% confidence intervals for robust standard errors clustered at the sector-state level. The mean log number of new firms is 7.04, and mean entry rate is 8.63.

Figure 4: Effect of new employer taxes on firm entry by sector

(A) Effect on log(number of new firms)



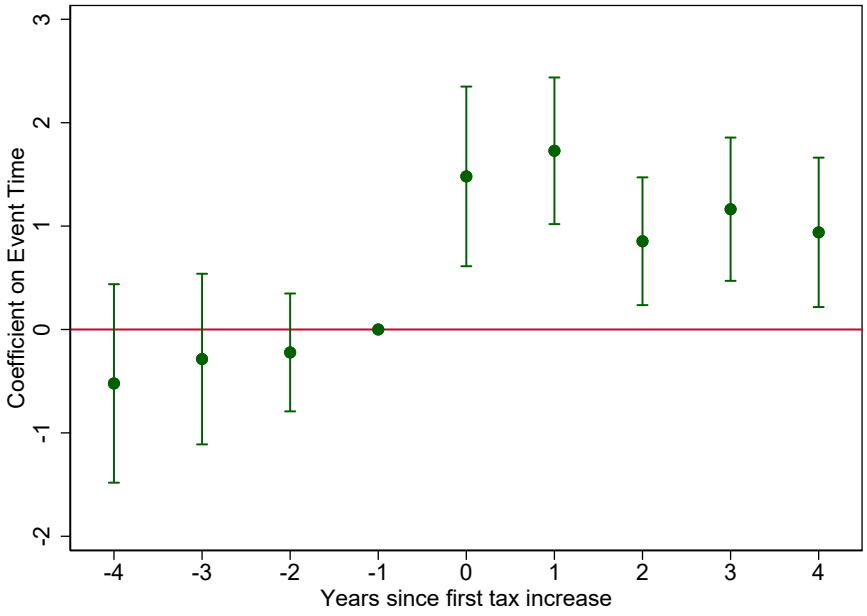

(B) Effect on entry rate



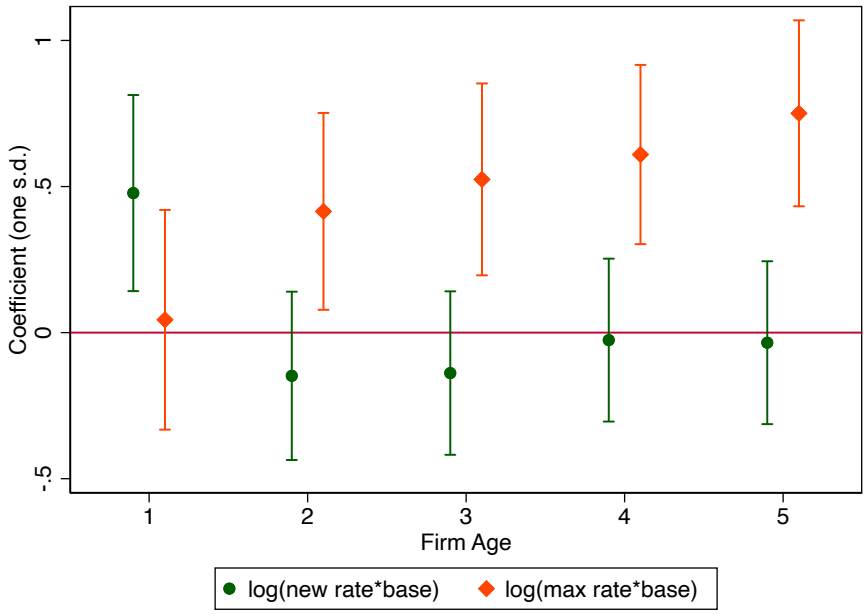

Notes: $N = 9,162$. This figure presents separate coefficient estimates on UI tax by sector, for the log number of new firms (Panel A) and the entry rate (Panel B). The specification is based on column (5) of Table 2.

Figure 5: Higher new employer taxes increase likelihood of exit for young firms

(A) Event study estimates of exit rates at age 1



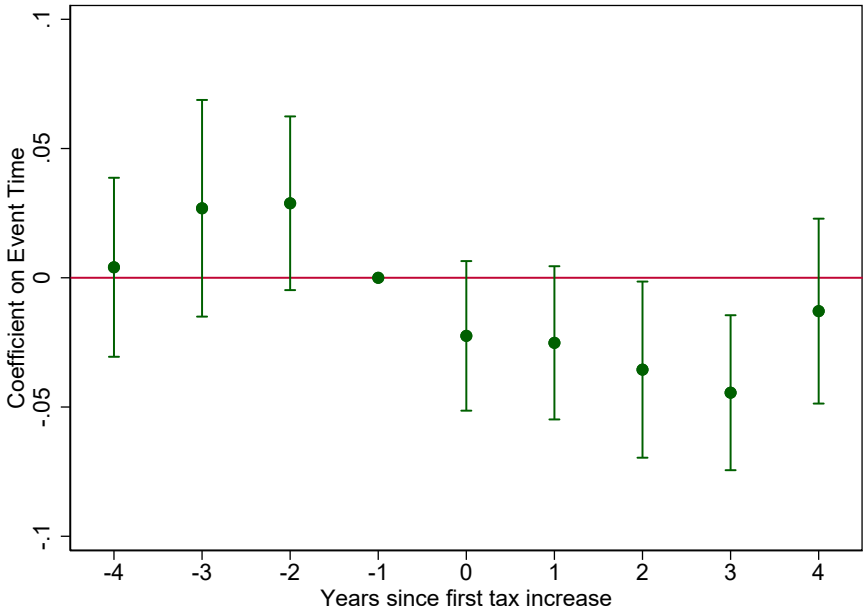

(B) TWFE estimates of exit rates for firms aged 1-5



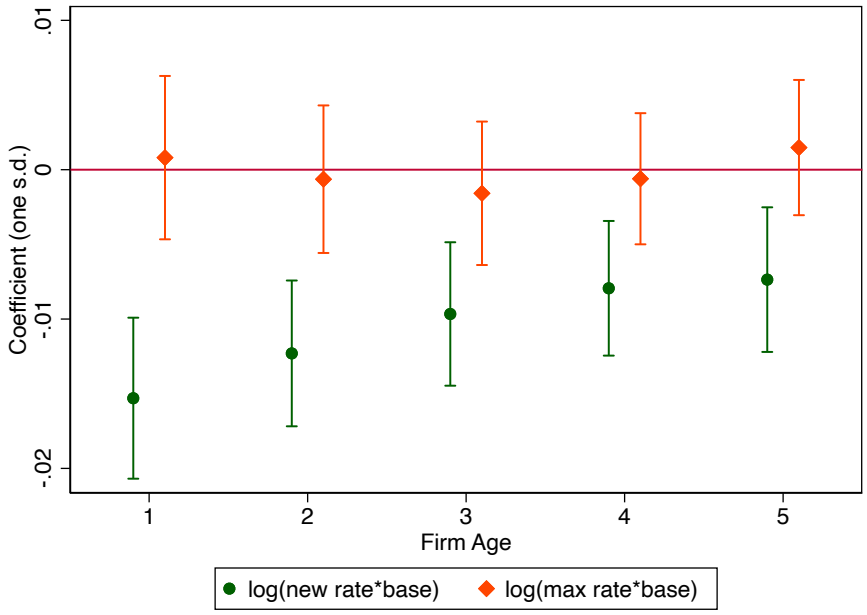

Notes: $N = 7,055$ and $N = 40,309$. Panel A plots event study regression estimates at the state-sector-year level, estimated using the interaction weighted event study proposed by Sun and Abraham (2021). Event time is defined relative to the first year a state-sector experiences a new employer tax increase of 20 percent or more, and never-treated observations serve as the control group. Panel B plots TWFE regression estimates at the age-state-sector-year level from a single regression of firms aged 1-5, with log(new rate*base) interacted with firm age and log(max rate*base) interacted with firm age. UI tax measures are normalized to have a standard deviation of one. Both regressions are weighted by the total number of firms (all ages) in the sector-state-year, and additional controls include corporate and personal income tax, UI benefit, minimum wage, and state unemployment rate as well as fixed effects for unemployment rate ventiles, benefit deciles, sector-year, and sector-state. Panel B also includes age and state-sector-entry year cohort fixed effects. Error bars denote 95% confidence intervals for robust standard errors clustered at the sector-state level. Mean exit rates at each age are 23.6, 16.2, 13.6, 11.9, and 10.9 respectively.

Figure 6: Higher new employer taxes predict lower employment at young ages

(A) Event study estimates of log age 1 employment per firm




(B) TWFE estimates of log employment for firms aged 1-5




Notes: $N = 7,055$ and $N = 7,284,000$. Panel A plots event study regression estimates at the state-sector-year level, estimated using the interaction weighted event study proposed by Sun and Abraham (2021). Event time is defined relative to the first year a state-sector experiences a new employer tax increase of 20 percent or more, and never-treated observations serve as the control group. Panel B plots TWFE regression estimates at the firm-age level from a single regression on a balanced sample of firms aged 1-5, of log(new rate*base) interacted with firm age and log(max rate*base) interacted with firm age. UI tax measures are normalized to have a standard deviation of one. Both regressions are weighted by the total number of firms (all ages) in the sector-state-year, and additional controls include corporate and personal income tax, UI benefit, minimum wage, and state unemployment rate as well as fixed effects for unemployment rate ventiles, benefit deciles, sector-year, and sector-state. Panel B also includes fixed effects for firm, NAICS2-year, NAICS2-state, age, and entry year. Error bars denote 95% confidence intervals for robust standard errors clustered at the sector-state level. Mean employment at each age equals 7.7, 8.3, 8.7, 9.0, and 9.2.

# Supplemental Appendix

## A.I Data Appendix

### A.I.1 New Employer Tax Dataset

We construct a dataset of new employer tax rates at the state, year, and 2-digit NAICS level, summarized in Table A.1. Statutory new employer rates are summarized in the Department of Labor's annual reports of *Significant Measures of State UI Tax Systems*. While the majority of states assign all new employers a uniform rate, 8 states assign industry-specific new employer rates for higher experience industries, and an additional 18 states assign higher rates specifically for employers in the construction sector. Some states publish their industry-specific new employer rates, and we use these published rates whenever available. For states without industry rate information, we impute the industry average using empirical tax rates calculated from the Quarterly Census of Employment and Wages.

Some states have time-varying new employer rates, which are often calculated based on average employer costs, or the solvency of the UI trust fund. In these states, we supplement with ETA 204 Experience Rating Reports that states submit to the Department of Labor. Within these reports, states reveal the average rate charged to all employers who are ineligible for experience rating. There will sometimes be a discrepancy between new employer rates reported in the Significant Figures reports and the ETA 204 reports, and we resolve discrepancies in favor of ETA 204.

## A.I.2 U.S. Census Bureau Data

### A.I.2.1 Longitudinal Business Database (LBD) and Business Dynamics Statistics (BDS)

The LBD tracks all U.S. business establishments and firms with paid employees, starting in 1976. For each establishment, the LBD provides information on March 12th employment, annual payroll, and location (state) and industry (NAICS6). The BDS summarizes this data for public use, and we use the BDS to measure firm entry counts at the state, NAICS sector, and year level; in appendix results, we additionally use a version of the BDS that captures firm entry at the county and year level. We assign zeroes for cells that are suppressed due to disclosure risk, as the smallest count that is publicly disclosed is a count of three.

In addition to firm outcomes, we use the LBD to identify new firms entering the economy. To do this, we use Census-provided measures of the first year each establishment employs workers. To find the age of a given firm, we follow Haltiwanger et al. (2013) and take the earliest first year, among all establishments belonging to the firm nationally.

### A.I.2.2 County Adjacency File

The Census Bureau provides public datasets that identify all pairs of neighboring counties. We use the 2010 version and focus on pairs located in different states.[35]

### A.I.2.3 Census of Construction (CCN)

The CCN is compiled every five years as part of the Census Bureau's Economic Census, and we use data from the 2007 and 2012 censuses for our analysis. Importantly, the CCN requires firms to report the annual amount of money spent on hiring temporary staff and leased workers,[36] and this value is our outcome of interest. In 2002 and prior, the form asks

[35] The dataset is accessible at https://www.census.gov/geographies/reference-files/time-series/geo/county-adjacency.html.

[36] See Section 16 of https://www2.census.gov/programs-surveys/economic-census/2012/questionnaires/forms/cc23601.pdf.

about leased workers but not temporary workers, resulting in reported values that are not consistent with 2007 and 2012 amounts.

## A.II Appendix Tables and Figures

Table A.1: State new employer taxes (2003-2014)

| State | Tax Formula | Mean Tax Base | New Rate | Construction |
|---|---|---|---|---|
| Alabama | Benefit Ratio | $8,000 | 2.7% | |
| Alaska | Payroll Variation | $31,900* | Industry Avg (IA) | IA |
| Arizona | Reserve Ratio | $7,000 | 2-2.7% | |
| Arkansas | Reserve Ratio | $10,800 | 3.3-4%† | |
| California | Reserve Ratio | $7,000 | 3.4% | |
| Colorado | Reserve Ratio | $10,300 | 2-4.6%† | IA |
| Connecticut | Benefit Ratio | $15,000 | 2.1-4.8%† | |
| Delaware | Benefit Wage | $10,300 | 2.1-2.6%† | IA |
| DC | Reserve Ratio | $9,000 | 2.7% | |
| Florida | Benefit Ratio | $7,250 | 2.7% | |
| Georgia | Reserve Ratio | $8,700 | 2.62% | |
| Hawaii | Reserve Ratio | $31,400* | 1.9-4.7%† | |
| Idaho | Reserve Ratio | $31,600* | 1-3.3%† | |
| Illinois | Benefit Ratio | $11,700 | higher 3.1% or IA | IA |
| Indiana | Reserve Ratio | $7,800 | 2.5-2.7% | lesser 4% or IA |
| Iowa | Benefit Ratio | $23,000* | 1-1.9%† | 7.5-9% |
| Kansas | Reserve Ratio | $8,000 | 3-4%† | 6% |
| Kentucky | Reserve Ratio | $8,300 | 2.7% | Max |
| Louisiana | Reserve Ratio | $7,300 | IA | IA |
| Maine | Reserve Ratio | $12,000 | 1.4-3.1%† | |
| Maryland | Benefit Ratio | $8,500 | 2.1-2.6%† | |
| Massachusetts | Reserve Ratio | $13,700 | 2.1-2.8%† | IA |
| Michigan | Benefit Ratio | $9,000 | 2.7% | IA |
| Minnesota | Benefit Ratio | $25,500* | 1-3%† | 8% |
| Mississippi | Benefit Ratio | $9,300 | 1.2-2.7% | |
| Missouri | Reserve Ratio | $11,500 | 3.5% | IA |
| Montana | Reserve Ratio | $24,200* | IA | IA |
| Nebraska | Reserve Ratio | $8,400 | 1.3-3.5%† | Max |
| Nevada | Reserve Ratio | $25,000* | 2.95% | |
| New Hampshire | Reserve Ratio | $10,000 | 2.7% | |
| New Jersey | Reserve Ratio | $27,800* | 2.8-3.3%† | |
| New Mexico | Benefit Ratio | $19,900* | 2-2.7% | |
| New York | Reserve Ratio | $8,650 | 4% | |
| North Carolina | Reserve Ratio | $18,700* | 1.2% | |
| North Dakota | Reserve Ratio | $23,900* | 1.2-2.1%† | IA |
| Ohio | Reserve Ratio | $9,000 | 2.7% | IA |
| Oklahoma | Benefit Wage | $15,500* | 1-2%† | |
| Oregon | Benefit Ratio | $30,400* | 2.4-3.3%† | |
| Pennsylvania | Both RR and BR | $8,100 | 3.5-3.8%† | 9% |
| Rhode Island | Reserve Ratio | $16,900* | 1.6-2.8%† | |
| South Carolina | Benefit Ratio | $8,500 | 2-3.9%† | |
| South Dakota | Reserve Ratio | $9,600 | 1.2% | |
| Tennessee | Reserve Ratio | $7,800 | higher 2.7% or IA | IA |
| Texas | Benefit Ratio | $9,000 | 2.7% | IA |
| Utah | Benefit Ratio | $26,500* | IA | IA |
| Vermont | Benefit Ratio | $10,600 | 1% | IA |
| Virginia | Benefit Ratio | $8,000 | 2.5-3.2%† | |
| Washington | Benefit Ratio | $34,400* | IA | IA |
| West Virginia | Reserve Ratio | $9,700 | 2.7% | 7.5% |
| Wisconsin | Reserve Ratio | $11,750 | 2.7-3.6% | 6.6% |
| Wyoming | Benefit Ratio | $20,100* | IA | IA |

Notes: Source: US Dept of Labor *Significant Provisions of State Unemployment Insurance Laws.*
*Indicates tax base that is indexed to state average wages. † Indicates new employer rates that are determined annually (based on state average, or trust fund solvency).

Table A.2: UI tax costs by sector (2011)

| Sector | Mean Statutory UI Rate | Mean Effective Rate |
|---|---|---|
| Mining | 3.6% | 0.6% |
| Construction | 5.5% | 1.7% |
| Manufacturing | 4.3% | 1.0% |
| Wholesale Trade | 3.5% | 0.7% |
| Retail Trade | 2.8% | 1.1% |
| Transportation/Warehousing | 3.4% | 1.0% |
| Information | 3.8% | 0.7% |
| Finance/Insurance | 3.2% | 0.5% |
| Real Estate | 3.6% | 1.0% |
| Prof/Sci/Tech Services | 3.6% | 0.6% |
| Admin/Support/Waste Mgmt | 4.2% | 1.6% |
| Health | 2.6% | 0.4% |
| Arts/Recreation | 3.7% | 1.1% |
| Accommodation/Food | 2.6% | 1.5% |

Notes: Source: Quarterly Census of Employment and Wages (2011). Tax rates are calculated after summing UI contributions, taxable wages, and total wages across all states. Statutory UI rate divides total contributions by the sum of taxable wages, and effective rate divides total contributions by the sum of total wages.

Table A.3: Higher UI tax bases predict lower firm entry: County-level

| | Log(Number of New Firms) | | Entry Rate | |
|---|---|---|---|---|
| Sample: | All Counties | Border Counties | All Counties | Border Counties |
| | (1) | (2) | (3) | (4) |
| Log(base) | -0.130*** | -0.125*** | -0.740*** | -0.784*** |
| | (0.024) | (0.038) | (0.185) | (0.292) |
| $R^2$ | 0.995 | 0.994 | 0.861 | 0.831 |
| Mean Outcome | 6.287 | 6.182 | 7.911 | 7.617 |
| Year FEs | X | X | X | X |
| Unemp. and Benefit Bin FEs | X | X | X | X |
| County FEs | 37645 | 14178 | 37645 | 14178 |

Notes: This table presents regressions of how the level of firm entry in a county varies with the UI tax regime. The sample consists of either all counties (columns (1) and (3)) or counties that sit at state borders (columns (2) and (4)). The observation level is a county-year pair. In this analysis we focus on the tax base, as the tax rate can vary across sectors, which are pooled in the county-level data.

Columns (1) and (2) regress the log number of new (age 0) firms (plus 1) on the UI tax base and controls; Columns (3) and (4) present similar regressions for the firm entry rate, given by the number of new firms divided by the total number of firms (all ages) in the sector-state pair in the previous year (multiplied by 100). All regressions include controls listed in the footer as well as economic controls, which include the personal income and corporate tax rates, the level of UI benefits and minimum wage, and the state unemployment rate as well as fixed effects for unemployment rate ventiles and benefit deciles. All rates variables are scaled to lie between 0 and 100. Observations are weighted by a measure of the "size" of each cell: the total number of firms (all ages) in the county-year. Standard errors are clustered at the county level. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$.

Table A.4: Higher UI tax bases also predict fewer business registrations

| | Log(Number of New Firms) | Log(Number of Applications) | Log(Number of Applications Likely to Become Firms) |
|---|---|---|---|
| | (1) | (2) | (3) |
| Log(base) | -0.129*** | -0.072*** | -0.065** |
| | (0.030) | (0.026) | (0.031) |
| Personal inc. tax rate | -0.003 | -0.006 | 0.006 |
| | (0.005) | (0.004) | (0.006) |
| Corporate tax rate | 0.008*** | -0.003 | 0.001 |
| | (0.003) | (0.002) | (0.003) |
| Log(UI benefits) ($) | -0.094 | -0.148** | -0.062 |
| | (0.097) | (0.073) | (0.099) |
| Minimum wage ($) | -0.032*** | -0.006 | -0.032*** |
| | (0.010) | (0.007) | (0.010) |
| State unemp. rate | -0.019* | -0.002 | -0.015 |
| | (0.010) | (0.011) | (0.014) |
| $R^2$ | 0.998 | 0.999 | 0.999 |
| Mean Outcome | 9.236 | 11.219 | 10.486 |
| Year FEs | X | X | X |
| State FEs | X | X | X |
| Unemp. and Benefit Bin FEs | X | X | X |
| N | 510 | 510 | 510 |

Notes: This table presents regressions of how the level of firm entry and business applications in a state varies with the UI tax regime. Column (1) regresses our main measure of firm entry (from BDS which captures firms with employees, pooling across all sectors with a state in a given year) on log(UI tax base) and controls. Columns (2) and (3) consider alternative measures of firm entry in the form of business applications (from the Business Formation Statistics (BFS) data from the Census Bureau; see https://www.census.gov/econ/bfs/index.html for details); these measures capture annual business application counts, including firms with and without employees. Column (2) considers all new business applications. Meanwhile, column (3) restricts to business applications that the Census Bureau classifies as likely to become firms with employees (i.e., firms we would see in BDS); these include business applications (a) from corporations, (b) that indicate having or planning to have employees, or (c) operating in high-employment rate sectors (i.e., accommodation and food services and parts of construction, manufacturing, retail, professional/science/technical services, education, and health care. In all columns, we include state controls (including the personal income and corporate tax rates, the level of UI benefits and minimum wage, and the state unemployment rate as well as fixed effects for unemployment rate ventiles and benefit deciles) as well as state and year fixed effects. All columns restrict to 2005-2014 (because the BFS data begins in 2005). In all columns, the level of observation is a state-year cell; observations are weighted by a measure of the "size" of each cell in the BDS: the total number of firms (all ages) in the state-year. Standard errors are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5: Higher new employer taxes predict lower firm entry, for both low- and high-base states

| | Log(Number of New Firms) | | | Entry Rate | | |
|---|---|---|---|---|---|---|
| Sample | All | Low Base ($\leq \$10,500$) | High Base ($> \$10,500$) | All | Low Base ($\leq \$10,500$) | High Base ($> \$10,500$) |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Log(new rate*base) | | -0.098*** | -0.090*** | | -0.709*** | -0.177 |
| | | (0.015) | (0.022) | | (0.151) | (0.211) |
| Log(new rate*adjusted base) | -0.100*** | | | -0.415*** | | |
| | (0.011) | | | (0.092) | | |
| Personal inc. tax rate | 0.007** | 0.005 | 0.004 | 0.067*** | 0.131*** | 0.014 |
| | (0.003) | (0.005) | (0.003) | (0.025) | (0.042) | (0.027) |
| Corporate tax rate | 0.006*** | -0.003 | 0.005** | -0.006 | -0.042 | -0.012 |
| | (0.002) | (0.007) | (0.002) | (0.019) | (0.055) | (0.021) |
| Log(UI benefits) ($) | -0.214*** | 0.039 | -0.340*** | 0.343 | 1.027 | 0.207 |
| | (0.066) | (0.118) | (0.090) | (0.575) | (1.238) | (0.907) |
| Minimum wage ($) | -0.028*** | -0.002 | -0.044*** | -0.279*** | -0.261*** | -0.371*** |
| | (0.005) | (0.007) | (0.007) | (0.057) | (0.060) | (0.082) |
| State unemp. rate | -0.022*** | -0.020** | -0.026*** | -0.226*** | -0.336*** | -0.184** |
| | (0.006) | (0.010) | (0.007) | (0.062) | (0.087) | (0.079) |
| $R^2$ | 0.995 | 0.991 | 0.996 | 0.922 | 0.901 | 0.939 |
| Mean Outcome | 6.972 | 6.323 | 7.270 | 8.521 | 7.946 | 8.784 |
| Sector-Year FEs | X | X | X | X | X | X |
| Sector-State FEs | X | X | X | X | X | X |
| Unemp. and Benefit Bin FEs | X | X | X | X | X | X |
| Firm Weights | X | X | X | X | X | X |
| N | 9,162 | 4,450 | 4,697 | 9,162 | 4,450 | 4,697 |

Notes: This table presents regressions of how the level of firm entry in a sector-state pair varies with the UI tax regime, with the sample split into two bins based on the median nominal tax base ($10,500). Columns (1)-(3) regress the log number of new (age 0) firms on UI taxes and controls; columns (4)-(6) present similar regressions for the firm entry rate, given by the number of new firms divided by the total number of firms (all ages) in the sector-state pair in the previous year (multiplied by 100). The main independent variable is either the log(new rate*adjusted base) or the log(new rate*base), which captures the log of the product of the new employer UI tax rate and the adjusted or raw UI tax base. All columns include controls for the personal income and corporate tax rates, the level of UI benefits and minimum wage, and the state unemployment rate, as well as sector-year and sector-state fixed effects and fixed effects for unemployment rate ventiles and benefit deciles. All rates variables are scaled to lie between 0 and 100. In all columns, the level of observation is a NAICS sector-state-year cell; in all columns, observations are weighted by a measure of the "size" of each cell: the total number of firms (all ages) in the sector-state-year. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.6: Higher new employer taxes predict lower firm entry, without weighting

| | Log(Number of New Firms) | | | Entry Rate | | |
|---|---|---|---|---|---|---|
| Sample: Total # firms ≥ | 0 | 500 | 3,429 | 0 | 500 | 3,429 |
| i.e., truncate at _ percentile | 0th | 10th | 50th | 0th | 10th | 50th |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Log(new rate*base) | -0.068*** | -0.083*** | -0.092*** | -0.501*** | -0.537*** | -0.467*** |
| | (0.013) | (0.011) | (0.014) | (0.114) | (0.088) | (0.125) |
| Personal inc. tax rate | -0.002 | 0.002 | 0.007** | 0.056 | 0.051 | 0.094*** |
| | (0.005) | (0.005) | (0.003) | (0.043) | (0.031) | (0.029) |
| Corporate tax rate | 0.009*** | 0.006** | 0.005** | 0.037 | 0.012 | -0.019 |
| | (0.003) | (0.002) | (0.002) | (0.024) | (0.026) | (0.023) |
| Log(UI benefits) ($) | 0.049 | -0.026 | -0.087 | 0.443 | 0.220 | 0.503 |
| | (0.085) | (0.069) | (0.069) | (0.572) | (0.483) | (0.528) |
| Minimum wage ($) | -0.011 | -0.012** | -0.024*** | -0.267*** | -0.239*** | -0.243*** |
| | (0.007) | (0.006) | (0.005) | (0.088) | (0.045) | (0.048) |
| State unemp. rate | -0.025*** | -0.019*** | -0.005 | -0.289*** | -0.262*** | -0.119** |
| | (0.009) | (0.006) | (0.005) | (0.071) | (0.055) | (0.053) |
| $R^2$ | 0.987 | 0.992 | 0.991 | 0.734 | 0.903 | 0.936 |
| Mean Outcome | 5.439 | 5.809 | 6.577 | 7.981 | 8.125 | 8.234 |
| Sector-Year FEs | X | X | X | X | X | X |
| Sector-State FEs | X | X | X | X | X | X |
| Unemp. and Benefit Bin FEs | X | X | X | X | X | X |
| Firm Weights | | | | | | |
| N | 9,162 | 8,083 | 4,565 | 9,162 | 8,083 | 4,565 |

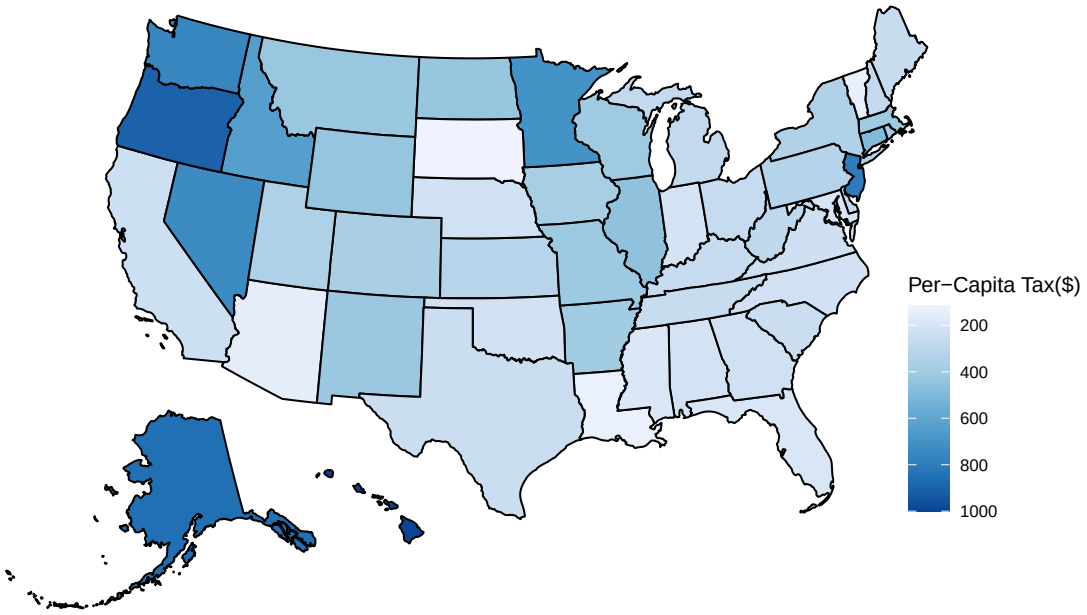
Notes: This table presents regressions of how the level of firm entry in a sector-state pair varies with the UI tax regime, without weighting, for subsamples in which we drop sector-state-year pairs with few firms of any age. Columns (1)-(3) regress the log number of new (age 0) firms on UI taxes and controls; columns (3)-(6) present similar regressions for the firm entry rate, given by the number of new firms divided by the total number of firms (all ages) in the sector-state pair in the previous year (multiplied by 100). The main independent variable is the log(new rate*base), which captures the log of the product of the new employer UI tax rate and the UI tax base. All columns include controls for the personal income and corporate tax rates, the level of UI benefits and minimum wage, and the state unemployment rate, as well as sector-year and sector-state fixed effects and fixed effects for unemployment rate ventiles and benefit deciles. All rates variables are scaled to lie between 0 and 100. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure A.1: Entry rate of age 0 Firms (1978-2020)



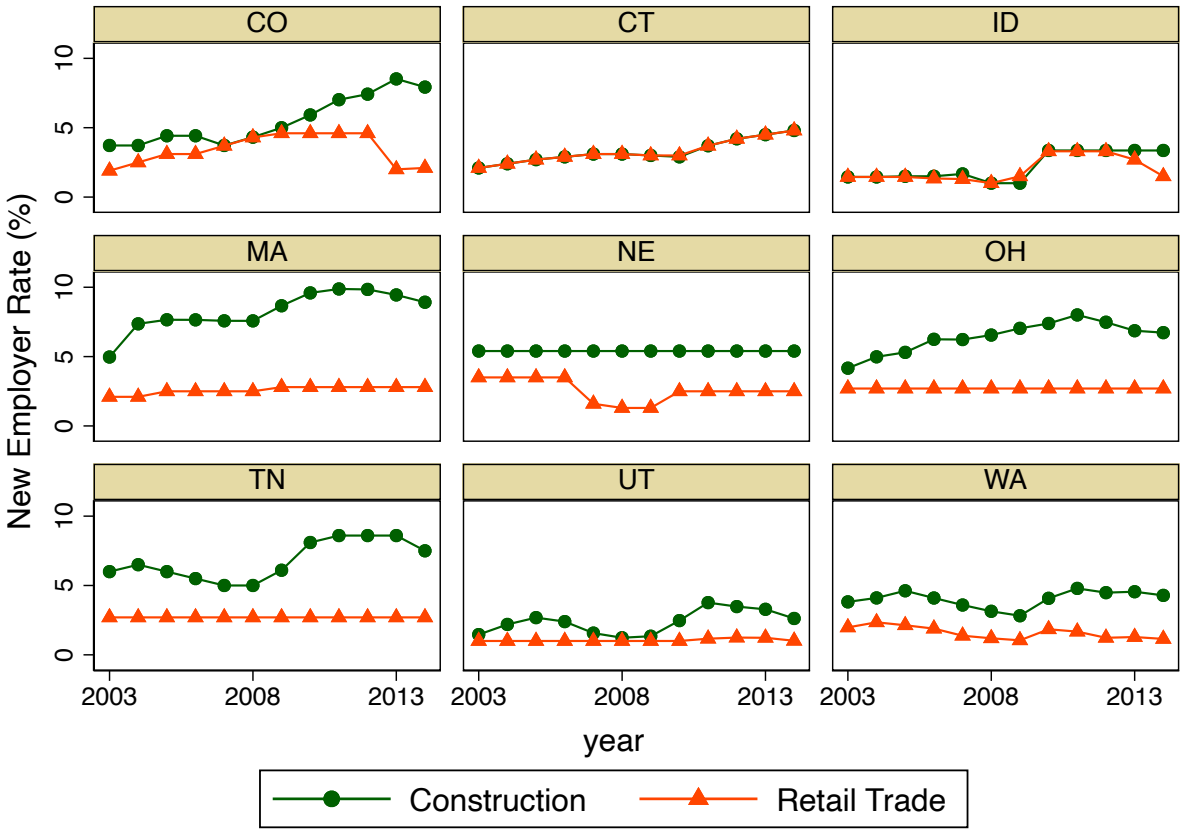

Notes: This figure plots the ratio of age 0 firms divided by the total number of firms, source from the Business Dynamics Statistics.

Figure A.2: Average new employer tax costs by state



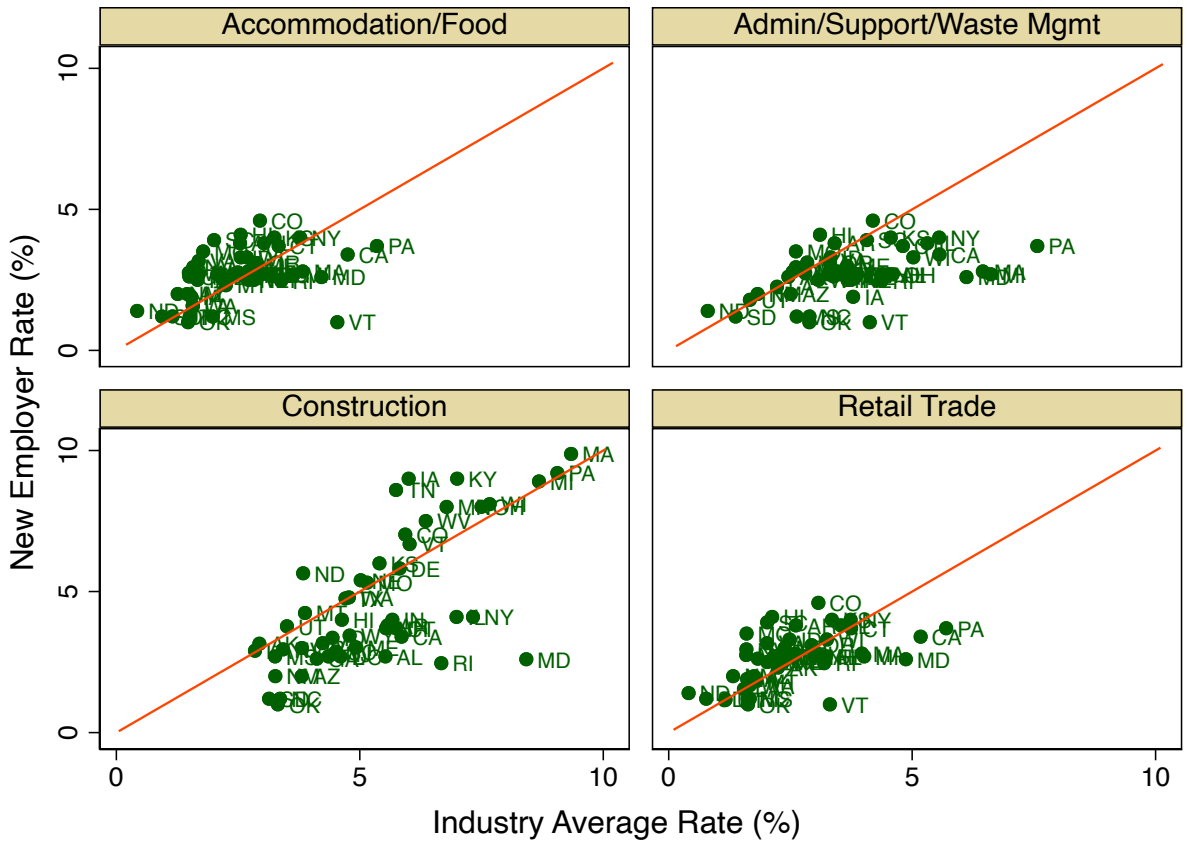

Notes: This figure plots each state's average per-capita new employer tax cost from 2003 to 2014. The tax is calculated by multiplying each state's taxable wage base by the mean of new employer rates across all sectors and years.

Figure A.3: Sectoral variation in new employer rates over time (2003-2014)



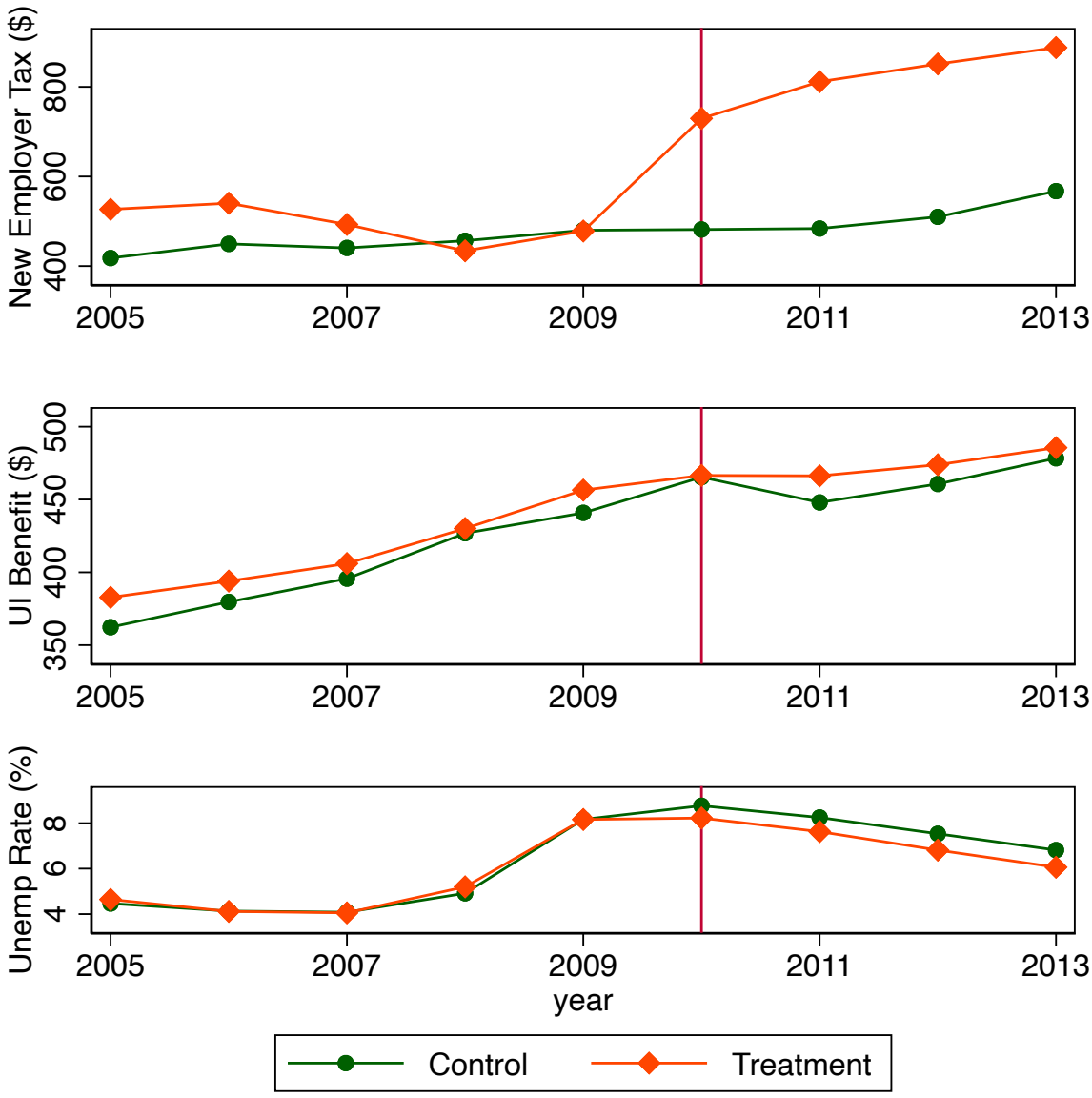

Notes: This figure demonstrates time, sectoral, and state variation in new employer rates by plotting how new employer rates evolve for Construction and Retail Trade firms in a selection of states.

Figure A.4: Comparison of new employer rates and industry averages (2011)



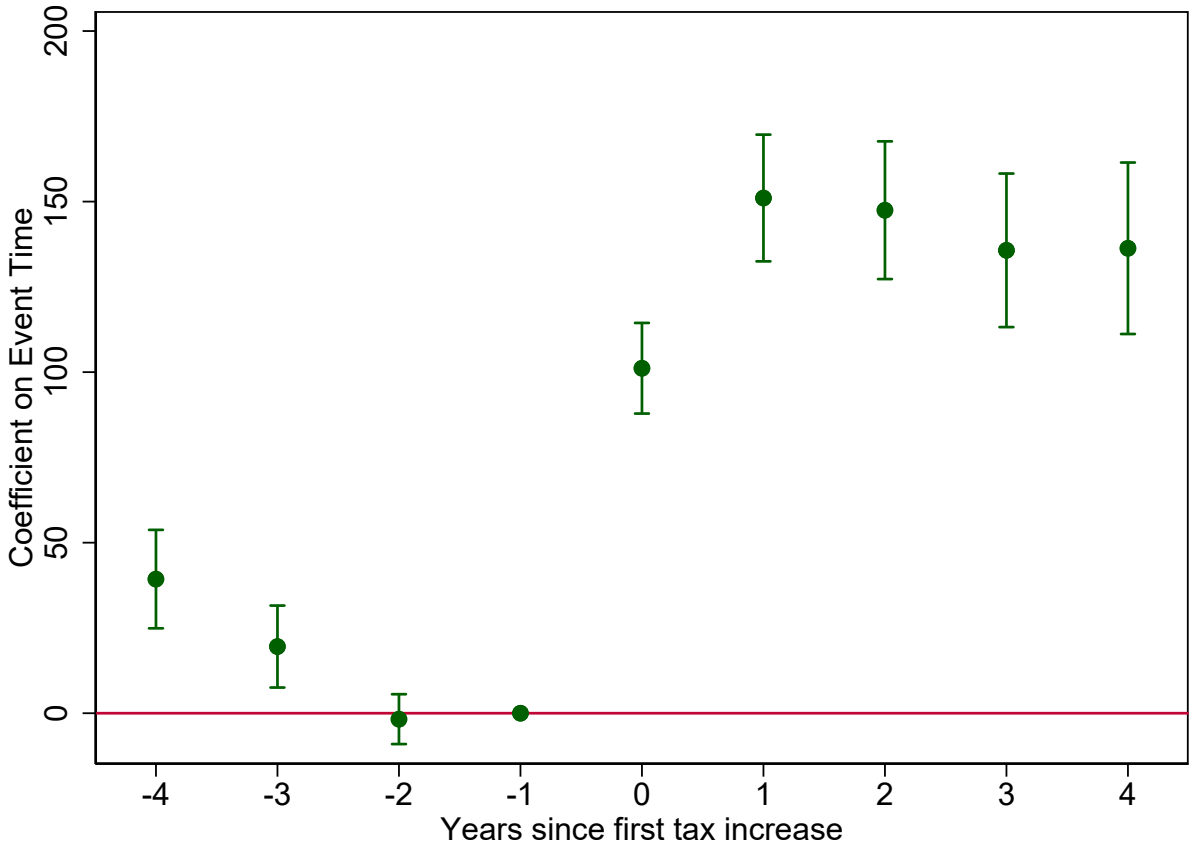

Notes: This figure plots the four sectors with the highest share of taxable wages. Average industry rates calculated from the Quarterly Census of Employment and Wages, and equal to UI contributions divided by total taxable wages.

Figure A.5: Case Study: State policy variables over time (2005-2013)




Notes: This figure plots the mean across treatment and control states for three state-level variables: New employer tax, UI maximum weekly benefit, and unemployment rate. Treatment states: AK, HI, ID, IA, MN, MT, OR, RI, UT, WA, WY. Control states: NV, NJ, NM, NC, ND, OK.

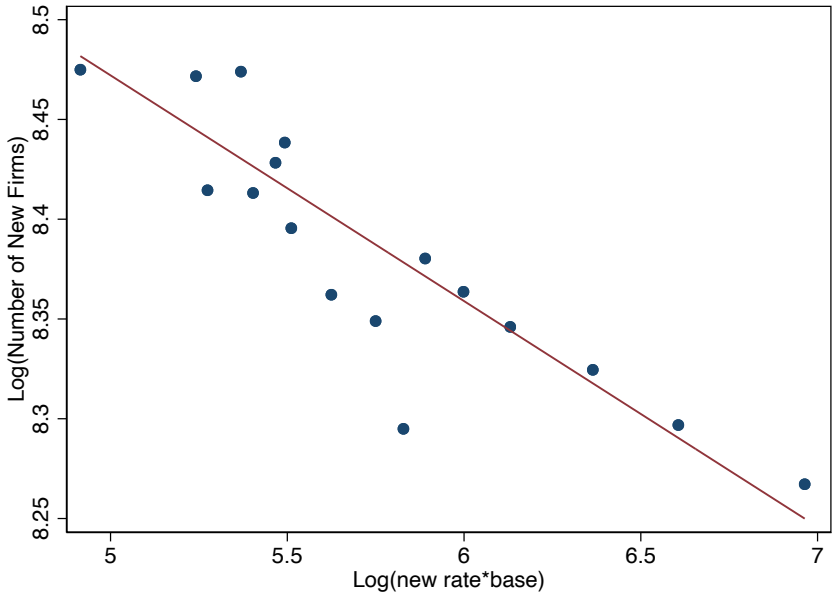
Figure A.6: Event Study: New employer taxes per worker



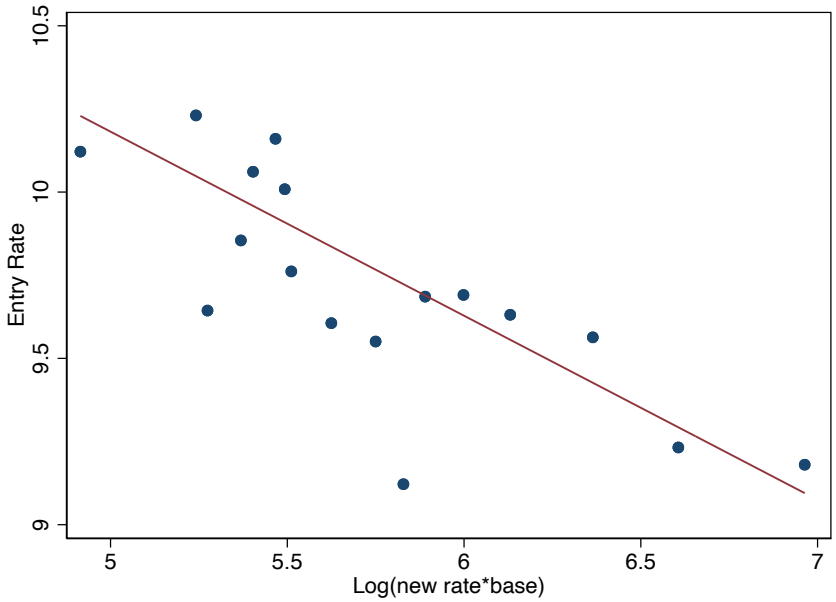

Notes: $N = 7,154$. This figure presents event study regression estimates at the state-sector-year level, estimated using the interaction weighted event study proposed by Sun and Abraham (2021). Event time is defined relative to the first year a state-sector experiences a new employer tax increase of 20 percent or more. Never-treated observations serve as the control group. Regression weighted by the total number of firms (all ages) in the sector-state-year, and additional controls include corporate and personal income tax, UI benefit, minimum wage, and state unemployment rate. Also included are fixed effects for: unemployment rate ventiles, UI benefit deciles, sector-year, and sector-state. Error bars denote 95% confidence intervals for robust standard errors clustered at the sector-state level. The mean new employer tax is $329.

Figure A.7: Effect of new employer taxes on firm entry across tax level

(A) Effect of new employer tax on log(number of new firms) by tax level



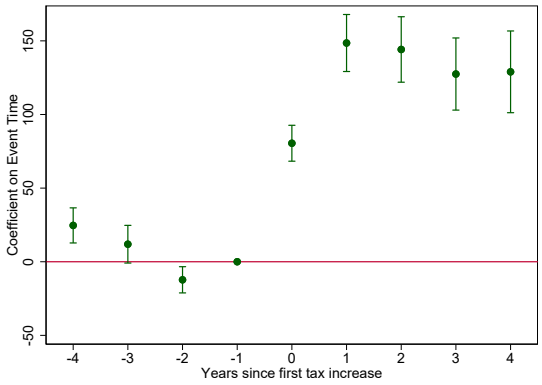

(B) Effect of new employer tax on entry rate by tax level



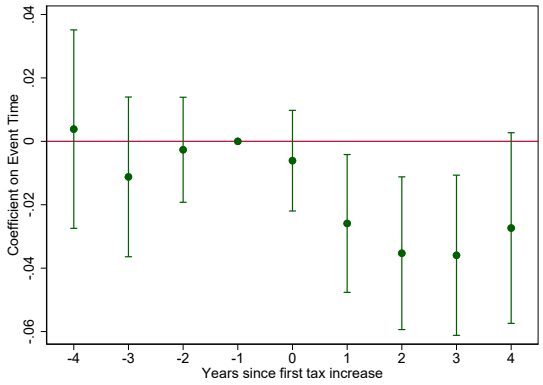

Notes: This figure presents binscattered regressions of firm entry on UI taxes, for the log number of new firms (Panel A) and the entry rate (Panel B). Specifications are based on columns (2) and (5) of Table 2.

Figure A.8: Broader event study - excluding 2010 and 2011 events

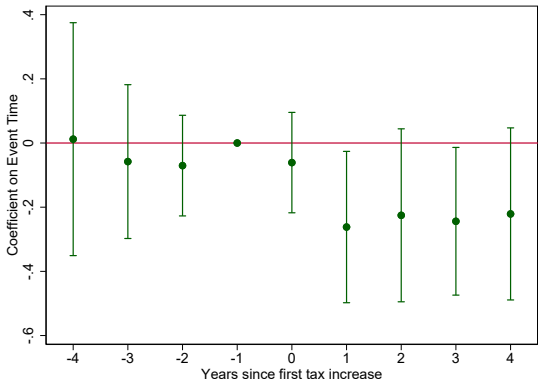
(A) New employer taxes per worker



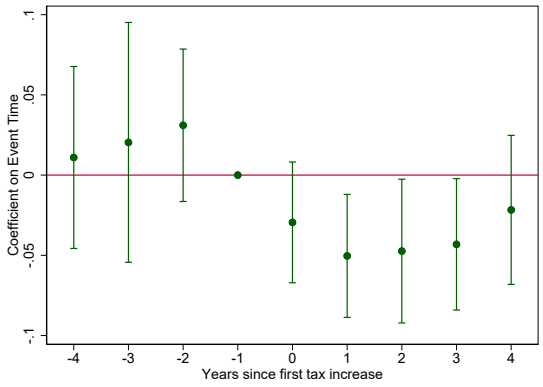

(B) Log number of firms




(C) Entry rate



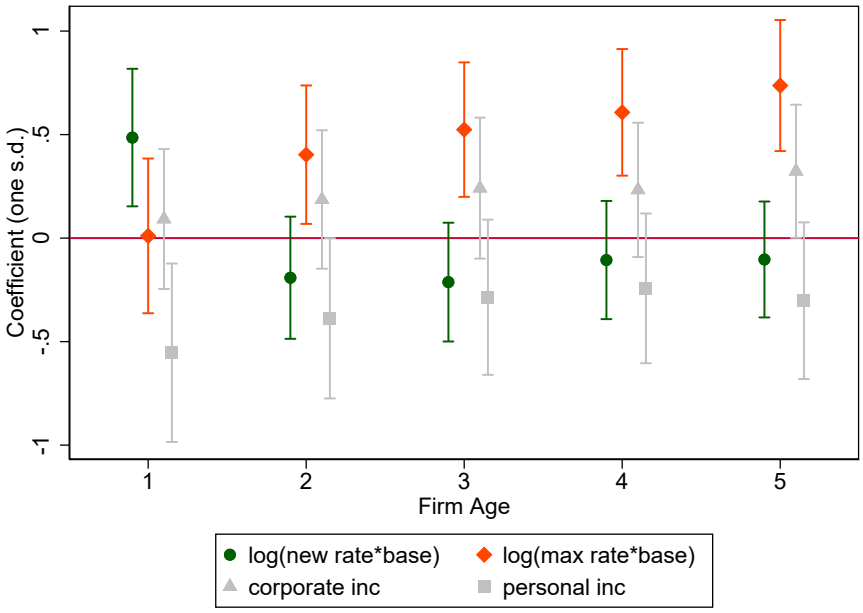

(D) Log age 1 employment per firm



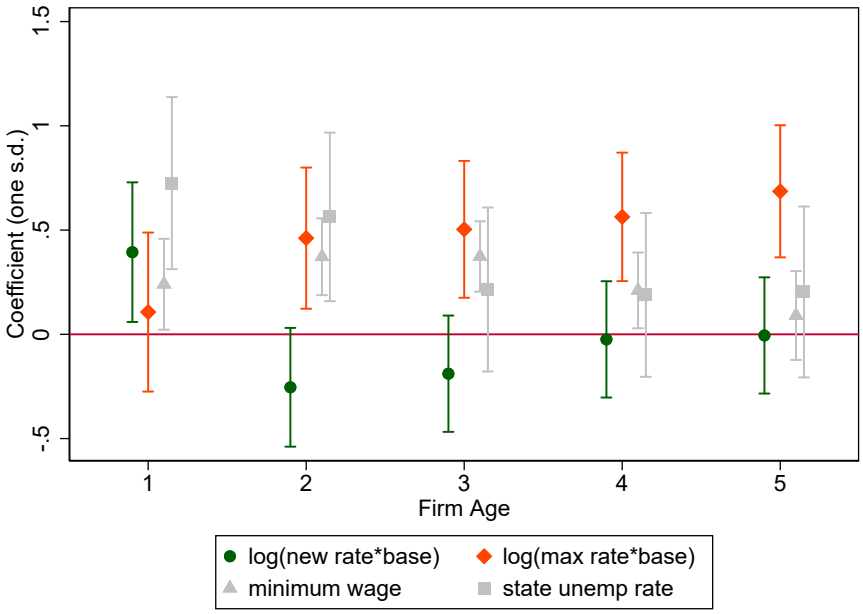

Notes: $N = 5,120$. This figure presents event study regression estimates at the state-sector-year level, estimated using the interaction weighted event study proposed by Sun and Abraham (2021). Event time is defined relative to the first year a state-sector experiences a new employer tax increase of 20 percent or more, and increases that occurred in 2010 and 2011 are excluded. Never-treated observations serve as the control group. Regressions are weighted by the total number of firms (all ages) in the sector-state-year, and additional controls include corporate and personal income tax, UI benefit, minimum wage, and state unemployment rate. Also included are fixed effects for: unemployment rate ventiles, UI benefit deciles, sector-year, and sector-state. Error bars denote 95% confidence intervals for robust standard errors clustered at the sector-state level.

Figure A.9: Benchmarking to other state variables

(A) State income taxes have no impact on exit rates



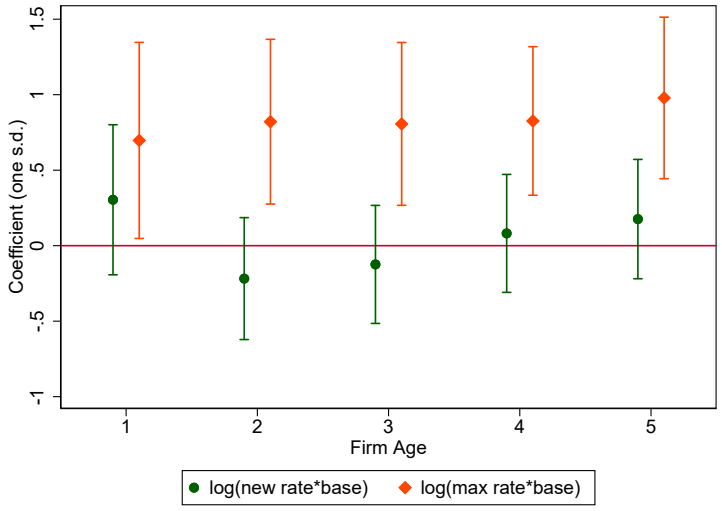

(B) UI taxes matter even with inclusion of minimum wage and unemployment rates



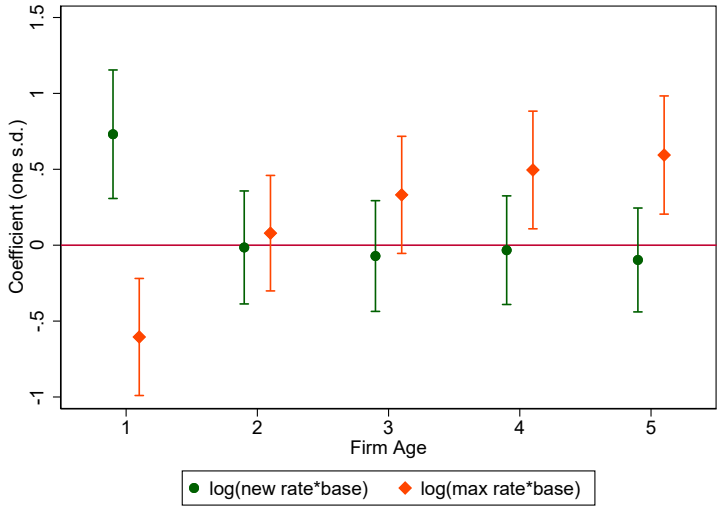

Notes: $N = 40,309$. This figure presents regression estimates at the age-state-sector-year level of how exit rates vary by age with various state variables. Panel (a) plots coefficients from a single regression of the following variables interacted with firm age: log(new rate*base); log(max rate*base); state corporate income tax rate; and state personal income tax rate. Panel (b) plots coefficients from a single regression of the following interacted with firm age: log(new rate*base); log(max rate*base); state minimum wage; and state unemployment rate. All state measures are normalized to have a standard deviation of one. Regressions are weighted by the total number of firms (all ages) in the sector-state-year, and additional controls include corporate and personal income tax, UI benefit, minimum wage, and state unemployment rate as well as fixed effects for unemployment rate ventiles and benefit deciles. Regressions also include sector-by-year, sector-by-state, age, and entry year fixed effects. Error bars denote 95% confidence intervals for robust standard errors clustered at the sector-state level. Mean exit rates at each age are 23.6, 16.2, 13.6, 11.9, and 10.9 respectively.

Figure A.10: Effect of new employer taxes on firm exit, by age and time to graduation

(A) Graduate to experience-rated tax rates within 2 years




(B) Graduate to experience-rated tax rates after 2+ years




Notes: $N = 18,992$ (Panel A) and $N = 21,317$ (Panel B). This figure present regression evidence that taxes calculated using new employer rates disproportionately predict lower survival *when* they are the relevant tax rates, while taxes calculated using maximum rates disproportionately predict lower survival when the new rates are no longer relevant. Each panel plots coefficients of tax measures interacted with firm age, for either the sample of states that graduate firms to experience-rated tax rates before age 2 (Panel A) or the sample that graduate after age 2 (Panel B). Regressions are weighted by firm count, and additional controls include corporate and personal income tax, UI benefit, minimum wage, state unemployment rate, as well as fixed effects for unemployment rate ventiles and benefit deciles and sector-by-year, sector-by-state, entry-year, and age fixed effects.