DOES A ONE-SIZE-FITS-ALL MINIMUM WAGE CAUSE FINANCIAL STRESS
FOR SMALL BUSINESSES?

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NBER Working Paper No. 26523
December 2019
JEL No. G33,G38,J30

ABSTRACT

Do increases in federal minimum wage impact the financial health of small businesses? Using intertemporal variation in whether a state's minimum wage is bound by the federal rate and credit-score data for approximately 15.2 million establishments for the period 1989–2013, we find that increases in the federal minimum wage worsen the financial health of small businesses in the affected states. Small, young, labor-intensive, minimum-wage sensitive establishments located in the states bound to the federal minimum wage and those located in competitive and low-income areas experience higher financial stress. Increases in the minimum wage also lead to lower bank credit, higher loan defaults, lower employment, a lower entry and a higher exit rate for small businesses. The results are robust to using nearest-neighbor matching and geographic regression discontinuity design. Our results document some potential costs of a one-size-fits-all nationwide minimum wage, and we highlight how it can have an adverse effect on the financial health of some small businesses.

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An online apendix is available at http://www.nber.org/data-appendix/w26523

1 Introduction

The existence of a mandated minimum wage has been the focus of substantial debate by academics and policymakers.[1] This debate centers on a few crucial questions: Should there be a mandated minimum wage? If so, what is the ideal minimum wage? Should a minimum wage policy be implemented at the federal, state, or local level? What is the impact of a minimum wage on employment and wages? And, who ultimately bears the cost of minimum wage increases: firms or consumers? In this paper, we contribute to this debate by analyzing the impact of federal minimum wage increases on the financial health of small businesses. By doing this, we shed some additional light on the costs of one-size-fits-all federal minimum wage increases.

We focus on the financial health of small businesses, as they are a vital component of the U.S. economy, accounting for almost 50% of the non-farm GDP. The opening and closing of small businesses that have fewer than 10 employees account for more than 70% of job gains and losses in 2018 (Bureau of Labor Statistics (BLS)). Wages comprise a significant fraction of the costs faced by many small businesses. An increase in labor costs due to an increase in the minimum wage may not cause financial stress to a firm if it has the flexibility to immediately adjust its capital-to-labor ratio or pass on the increased costs to its customers. Or, alternately, the firm can maintain profit margins by reducing other costs or by increasing productivity. But, a firm's inability to do so may impact profit margins and financially stress the firm.

Although labor market conditions vary substantially with geography (e.g., availability, productivity, the bargaining power of workers) and despite the significant geographic differences in the economic conditions (e.g., local product market competition), 14 states in the U.S. have a minimum wage rate equal to the federal rate.[2] In this paper, we study the impact of one-size-fits-all federal minimum wage increases on the financial health of small establishments located in states where the effective minimum wage is equal to the federal rate (the *bounded* states) relative to those in states where wage rates are higher than the federal rate (the *unbounded* states). Further, we study how firm-level, industry-level, and local economic conditions that

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[1]See Belman and Wolfson (2014) for a survey of the vast literature on the minimum wage.

[2]In addition, 2 states have rates below the federal rate, and 5 states have no state minimum wage requirement. Since 1981, seven federal changes occurred during 1990–1991, 1996–1997, and 2007–2009. Under the provisions of the Fair Labor Standards Act (FLSA), employers have to pay workers the highest minimum wage prescribed by federal, state, and local law.

may impact the ability of these businesses to pass on the increased labor costs to consumers, moderate or amplify these wage increases.

We use intertemporal variation in whether a state's minimum wage is bound by the federal minimum wage and the Dun and Bradstreet (D&B) *Paydex Credit Score* data for approximately 15.2 million establishments for 1989–2013. *Paydex Score* is a dollar-weighted numerical indicator of how a firm paid its bills based on trade experiences reported to D&B through its 4,000 trade exchange participants in the U.S. It evaluates the likelihood that a business will make payments to suppliers or vendors on time, hence it can affect the availability of credit and interest rates for small businesses (Barrot and Nanda, 2019). We find that a dollar increase in the federal minimum wage corresponds to an almost 1.0-point reduction in an establishment's *Paydex Credit Score* in a *bounded* state compared to a similar establishment in an *unbounded* state. This 1.0-point reduction implies a delay of 1-2 days beyond the typical payment terms of 30 days. In our sample, the median establishment will delay its payment by five days, on average, beyond the payment terms.

Further, we observe large threshold effects wherein an establishment's 1.0-point decline in credit score from 80 points (i.e., payment within terms) to 79 points (i.e., payment two days beyond terms) that arises from an increase in the federal minimum wage corresponds to an increase in the exit probability by 2.2 percentage points (pp) or a 25% increase from the 8.5% unconditional annual exit probability.[3]

One potential concern in identifying the effect of federal minimum wage changes is that two of the three increases were enacted during the recession years, i.e., 1990-1991 and 2007-2009. Broadly, the concern is whether our results can be attributed to the business cycles at the national level or the business cycles in the bounded states rather than the minimum wage increases themselves. However, mitigating this concern, we find that the bounded and unbounded states followed similar business cycles before and after the federal minimum wage increases. Further, the unbounded states seem to be affected more by the downturns in the overall economy.

More broadly, if the federal government's decision to adjust minimum wages is affected by, or

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[3]Note that customer–supplier may renegotiate the terms of credit after an increase in the federal minimum wage. Unfortunately, we do not observe such data. We may underestimate our effect on *Paydex Score*, if customer firms have renegotiated the terms beyond 30 days.

correlated with, some other observable and unobservable differences in the economies of bound versus unbound states, we may not be able to identify our effect. We control for the various state, county, and ZIP code-level observable characteristics in the regressions. We also use them in matching methods to identify the right control group. Further we use state×year and county×year fixed effects in various cross-sectional tests to ensure that different unobservable local economic conditions in the bounded versus unbounded states are not driving our results.

The aforementioned credit score results are robust to using the nearest neighbor matching method. In our matching method, we use the credit score one year before the minimum wage increase, and we exactly match establishments in the bounded states (the treatment group) with the set of possible control establishments within the same NAICS4 industry group in the unbounded states (the control group). Next, for the exactly matched control sample based on one year before credit score, we compute the Euclidean distance between the treatment and control samples based on establishment-, state-, county- and ZIP code-level observable characteristics. We use (a) *establishment-level* variables such as sales, employees, employee-to-sales ratio and sales growth; (b) *state-level* variables such as GSP and population (both its level and growth), state political partisanship; (c) *county-level* variables such as unemployment rate (both its level and growth); and (d) *ZIP code–level* variables such as aggregate sales growth, personal income, and house prices (both its level and growth). Also, our results are robust if we exactly match on credit scores three years before the minimum wage increases.

To our baseline results, we also implement geographic regression discontinuity design. We follow Dube, Lester, and Reich (2010) and control for local economic conditions by analyzing establishments located in contiguous state-border counties. The underlying assumption for this identification strategy is that the adjacent counties at state borders have similar economic conditions in all aspects other than their respective minimum wages. In our estimation, we include county-pair × year fixed effects, and we also control for time-varying establishment-, state-, county-, and ZIP code-level observable characteristics. We find consistent results for establishments in the bordering county of the bounded states: After controlling for time-varying observable characteristics and time-varying county-pair specific unobservables, a one dollar increase in the federal minimum wage decreases a firm's *Paydex Score* by 0.53 additional points compared to establishments located in the bordering county of the unbounded state.

We also analyze the dynamics of the impact of minimum wage. Before the federal minimum wage increases, we observe parallel trends in the average *Paydex Score* for establishments in both bounded and unbounded states. Within two years of a federal minimum wage increase, there is a sharp decline in the *Paydex Score* for establishments in bounded states. Finally, we observe that the difference between the *Paydex Score* for establishments in the bounded and unbounded states converges over the next three to five years. These results suggest that establishments that managed to survive are stronger on some dimensions or may be able to pass on some of these extra labor costs to customers over a longer period. Further, our results are robust to (a) states switching from bounded to unbounded, (b) time-varying, industry-specific unobservables, and (c) different industry samples.

So far, we have established the negative impact of one-size-fits-all federal minimum wage increases on the financial health of the affected small establishments. Affected establishments may not experience any financial stress if they can immediately pass on these increased wage costs entirely to their customers. On the other hand, any constraints faced by small businesses in passing on their wage costs may impact their financial health. In line with some small businesses facing constraints, we find that establishments within the same industry, those located in the more competitive counties, and those located in the low-income ZIP codes find it challenging to pass on their increased labor costs, hence they experience a more significant decrease in their credit score.

We also find that small and young establishments, which are more likely to have financial constraints, experience a more significant decrease in their credit scores. Establishments that are labor intensive (i.e., they have high labor costs) and those that have an ex ante lower *Paydex Score* seem to find it more difficult to absorb minimum wage increases and hence experience a more significant decline in their credit scores[4].

Similarly, we find that this negative impact is more pronounced in industries that employ more minimum wage workers (e.g., restaurants, retail), but it is not limited to these industries.

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[4]In our cross-sectional tests, we absorb state×year or sometime county×year fixed effects. So, all our cross-sectional regressions incorporate time-varying unobservables at the state or county level that may be associated with the timing of federal minimum wage change. While some large firms may cut down job hours, or close locations to rebalance their workforce (Gopalan, Hamilton, Kalda, and Sovich, 2018), our sample is restricted to small businesses and excludes multi-establishment firms. The scope of our analysis is also limited by the lack of detailed data on worker hours. Our estimates can be considered a lower bound in case some businesses cut work hours to maintain the labor costs.

One possible explanation may include a spillover effect on other sectors. Barrot and Nanda (2019) find that accelerated payments by the federal government to small business contractors can have a significant positive impact on employment. However, it is difficult to document spillover effects on suppliers or vendors because of limitations on data on the input–output matrix and on the network of a firm's vendors and suppliers for the very small firms that we analyze.

Next, we test the implications of lower credit scores on loans granted. Using data from the Small Business Administration (SBA) for almost one million small business guaranteed loans, we find that for a one dollar increase in the federal minimum wage, the loan amount reduces by 9% more for establishments in bounded states compared to those in unbounded states, where the median loan size is $100,000. We also find that establishments located in bounded states are 12% more likely to default on bank loans compared to those in unbounded states around the federal minimum wage increases.

We conduct a county–industry–level entry–exit analysis by calculating the exit and entry rates of businesses within each county for each NAICS5 industry. We find significant increases in the exit rates and significant reductions in the entry rates for counties in the bounded states one year after the federally mandated minimum wage increase. The results are dominated by restaurants, businesses with no Paydex scores and those employing fewer than 10 workers. Our results are consistent with Luca and Luca (2018), who find that a minimum wage increase leads to higher exit rates for restaurants that have a lower rating.

Finally, we test whether the financial burden on businesses has any aggregate real implications. We utilize publicly available county–industry–level employment and establishment data from the BLS Quarterly Census of Employment and Wages (QCEW) database. We find that aggregate employment declines significantly more for restaurants (9.5%) and for retail businesses (8.2%) in bounded states. Also, the negative effect is prominent in counties with lower personal income. We find similar results for the aggregate number of establishments. Overall, our results document the unintended effect of a federally imposed uniform rule that increases the minimum wage in areas where businesses may not be able to absorb the increased cost of labor and thereby experience financially stressed or may even default on debt and cut employment.

Our study is related to the recent work that examines the effect of minimum wages on the

entry and exit of restaurants (Aaronson, French, Sorkin, and To, 2018; Luca and Luca, 2018). Consistent with the above studies, we do find that the increase in minimum wages leads to a higher exit risk for affected small businesses. However, we can characterize the effect based on the firm, the geography and the industry's ability to absorb higher wage costs or to pass on the costs to consumers. Further, we provide comprehensive evidence on the impact of one-size-fits-all federal minimum wage increases on a large number of industries. We can also provide direct evidence of financial stress, i.e., credit score data, for 15 million small businesses in the U.S.

We contribute to the voluminous literature on the effect of minimum wages on *employment* (Katz and Krueger, 1992; Card and Krueger, 1994; Neumark and Wascher, 2000; Card and Krueger, 2000; Dube, Lester, and Reich, 2010; Giuliano, 2013; Sorkin, 2015; Meer and West, 2015; Cengiz, Dube, Lindner, and Zipperer, 2019).[5] Our study is related to Clemens and Wither (2019), who use the cross-sectional variation of bounded versus unbounded states to identify the effect of the federal minimum wage increase during the great recession on the employment and income of low-skilled workers. Our paper is also related to the effect of labor costs in general and the effect of minimum wage policies, in particular on firm outcomes such as firm profitability (Draca, Machin, and Van Reenen, 2011; Mayneris, Poncet, and Zhang, 2018; Harasztosi and Lindner, 2019) and firm investment (Gustafson and Kotter, 2018; Cho, 2016). Our paper adds to the literature that analyzes the interactions between labor costs and firm outcomes.[6] Our results also highlight how increases in minimum wages can hurt the financial health of small businesses.

The rest of the paper proceeds as follows. We discuss our empirical methodology and identification concerns in Section 2. Section 3 describes our data and provides summary statistics. Our main empirical results are presented in Section 4, and we conclude in Section 5.

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[5] For *wage dispersion*, see Dinardo, Fortin, and Lemieux (1996); Lee (1999); MaCurdy (2015); David, Manning, and Smith (2016). For *price levels*, see Aaronson (2001); Aaronson and French (2007). For *personal finance*, see Aaronson, Agarwal, and French (2012); Tonin (2011); Agarwal, Ambrose, and Diop (2018).

[6] Increases in the firing costs of workers adversely affects firm leverage (Serfling, 2016), corporate investment, and growth (Bai, Fairhurst, and Serfling, 2018). Others examine how firing costs enhance employees' innovative efforts and encourage firms to invest in risky, but potentially mold-breaking projects (Acharya, Baghai, and Subramanian, 2014). Similarly, reduction in labor unemployment risks allows firms to increase leverage by mitigating workers' exposure to unemployment risk (Agrawal and Matsa, 2013).

2 Identification Challenges and Empirical Specifications

In this section, we discuss threats to identifying the impact of minimum wage changes on the health of small businesses and our empirical strategy to ameliorate these concerns.

2.1 Empirical Setting and Identification Challenges

While the FLSA mandates broad minimum wage coverage, states are able to set separate minimum wage rates that differ from those federally mandated. Under the provisions of the FLSA, employers must pay workers the highest minimum wage as prescribed by either federal, state, or local law. Adjusting state minimum wage rates is typically done in one of two ways: (a) legislatively scheduled rate increases that may include one or several increments, and (b) a measure of inflation to index the value of the minimum wage to the general change in prices.

A natural starting point for empirical examination of the impact of minimum wages is to exploit the staggered state-level minimum wage changes in a difference-in-differences setup. However, estimates in this framework are likely to be biased, as the introduction of state-level minimum wage increases are likely to occur at non-random times and may be correlated with local economic conditions. For example, Allegretto, Dube, Reich, and Zipperer (2017) show that states that increase minimum wages have different business cycle severity, increased income inequality, and differing composition of their labor force.

However, not all states voluntarily increase their minimum wages. After the introduction of higher federal minimum wage requirements[7], states with effective minimum wages below the federal minimum are bound and must immediately match the federal minimum wage. For this study, we will refer to states with minimum wage rates that are higher than the federal rate as *unbound* (i.e., not bound to the federal minimum wage rate), and we refer to states with effective minimum wages equal to the federal rate as *bound* (i.e., bound to the federal rate).

In this study, we utilize this bounding feature to examine the differential effect of federal minimum wage increases on the financial health of establishments located in bounded states

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[7]Since July 24, 2009, the federal government has mandated a nationwide minimum wage of $7.25 per hour. As of January 2019, 29 states and the District of Columbia have minimum wage rates above the federal rate of $7.25 per hour, with rates ranging from $7.50 to $13.25. Two states have minimum wage rates below the federal rate, and five states have no state minimum wage requirement. The remaining 14 states have minimum wage rates equal to the federal rate (source: the National Conference of State Legislatures).

versus unbounded states. There have been three series of federal minimum wage increases over the past three decades: 1990–1991, 1996–1997, and 2007–2009.[8] During those same periods, there have been numerous changes in state minimum wage policies. At the beginning of our sample in 1990, the federal minimum wage was $3.80 per hour. In Figure 1, we graphically show for each state the percentage of years that a given state was bounded in our sample by the federal minimum wage. Notice that the federal minimum wage is always bounded in states such as Alabama, Georgia, Texas, and many others. This means that employers in these states have always had their minimum wage rates defined by federal laws rather than state laws. Our strategy exploits the fact that an increase in the federal minimum wage rate affects states with minimum wage rates equal to or less than the federal minimum wage (i.e., bound states) more directly than states with higher minimum wages.

In any given year, the exact number of states with a minimum wage rate above the federal rate may vary depending on the interaction between the federal rate and the mechanisms in place to adjust the state minimum wage. Before 1987, Alaska and the District of Columbia were the only two states that consistently had minimum wage rates that exceeded the federal rate. Since 1987, many states have adopted higher minimum wage rates, resulting in a divergence between the average state minimum wage and the federal rate. Because the federal and state minimum wage rates change at different times and in different increments, the share of the labor force for which the federal rate is the binding wage floor has changed over time, with many states alternating between being bound and unbound over time.

Figure 2 demonstrates this variation over time: The bars show for a given year the number of states with an average minimum wage above the average federal minimum wage. The dashed line plots the average federal minimum wage (in nominal dollars), and the solid line plots the average minimum wage in unbounded states.[9]

In our baseline analysis, we apply a difference-in-differences estimation to quantify the dif-

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[8]The law for the 1990–1991 increase was enacted on November 17, 1989, with the federal minimum wage increasing in two waves from $3.35 to $3.80 on April 1, 1990, and to $4.25 on April 1, 1991. For the 1996–97 change, the law was enacted on August 20, 1996, and the federal minimum wage was again increased in two waves from $4.25 to $4.75 on October 1, 1996, and to $5.15 on September 1, 1997. The most recent federal minimum wage change was enacted on May 25, 2007, and rates were increased from $5.15 in three waves to $5.85, $6.66, and $7.25, effective July 24, 2007, July 24, 2008, and July 24, 2009, respectively.

[9]We limit our analysis to the 1989-2013 based on the availability of Paydex score data.

ferential impact of the federal minimum wage changes on the financial health of establishments located in bounded states versus unbounded states. We do so by estimating the following equation:

$$Y_{it} = \alpha_1 Bound_{s,t-1} \times \Delta MW(F)_t + \alpha_2 Bound_{s,t-1} + \kappa X_{i,t-1} + \nu_i + \omega_t + \epsilon_{ist}, \qquad (1)$$

where subscripts i, s, t index establishments, states, and years, respectively. Our dependent variable, Y_{it}, is the average *Paydex Score*, which is our measure for an establishment's financial health. The *Paydex Score* is a business credit score generated by Dun & Bradstreet (D&B) that captures an establishment's payment performance (i.e., whether it pays its bills on time), and it assigns each establishment a numerical score from 1 to 100, with 100 signifying a perfect payment history. We explain this variable in more detail in our data section, Section 3. The expression $\Delta MW(F)_t$ measures the nominal dollar increase in the federal minimum wage in year t, and it equals zero in years with no increases. The indicator $Bound_{s,t-1}$ is a dummy variable equal to 1 if, at the beginning of fiscal year t, the establishment's state s has a minimum wage less than or equal to the federal minimum wage. We include establishment fixed effects, ν_i, to control for time-stable unobserved heterogeneity at the establishment level, and we include year fixed effects, ω_t, to control for time-specific macro-level shocks. In addition, we include a full set of establishment-level control variables ($X_{i,t-1}$) in our regressions: size (measured as Log(sales)), age (Log(age)), the number of employees (Log(employees)), and sales growth. These variables are winsorized at their 1st and 99th percentiles.

As all of our identifying variation is within-establishment due to the inclusion of ν_i, we can interpret our main coefficient of interest, α_1, as the differential effect of a federally mandated minimum wage increase for bounded firms above and beyond the effects of bounding on an establishment's performance (as captured by α_2). Our standard errors are clustered at the state level.

One critical assumption behind this specification is that it can only identify the causal effect of minimum wage increases to the extent that the Paydex score of establishments in bound and unbound states evolves similarly (i.e., we observe parallel trends) before the time of the federal minimum wage adjustment. We conduct various tests to verify this assumption.

In addition, two waves of federal government–mandated minimum wage increases occurred

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during recession years (1990-1991 and 2007-2009). This overlap may confound our analysis if the economies of firms (and thus their financial health) in bounded states are more correlated with the US economy as a whole. As such, our results may be measuring recessionary effects rather than minimum wage effects if heterogeneity exists between firms in bounded and unbounded states. To mitigate this concern, we examine the extent to which business cycles vary for bounded and unbounded states around the time of minimum wage changes. We measure state-specific business cycles using the State Leading Index provided by FRED.[10] For January of each year, we consider five years before the first federal minimum wage increase in our data set (1990) to five years after the most recent federal minimum wage increase (2007). We estimate the following regression model at the state level for the years 1985 to 2012:

$$SLI_{st} = \sum_{j=-5}^{5} \alpha_j BD_{s,t-j} + \sum_{j=-5}^{5} \alpha_j UBD_{s,t-j} + \nu_s + \epsilon_{st}, \tag{2}$$

where our dependent variable, SLI_{st}, is the mean *State Leading Index* for state s during year t. The variable $BD_{s,t}$ is defined as $Bound_{s,t-1} \times \Delta MW Dummy(F)_t$ and $UBD_{s,t}$ is defined as $(1 - Bound_{s,t-1}) \times \Delta MW Dummy(F)_t$. The indicator $\Delta MW Dummy(F)_t$ equals 1 if there is an increase in the federal minimum wage in year t, and zero otherwise. We control for state-specific unobserved heterogeneity through the inclusion of state fixed effects (ν_s).

Figure 3 plots the OLS regression coefficients of Equation (2) with 95% confidence intervals. The solid line with circles plots the regression coefficients for bounded states, while the dashed line with diamonds plots the coefficients for unbounded states. The bold, dashed line indicates the period immediately before the federal minimum wage change.

We find that the bounded and unbounded states followed similar business cycles before and after federal minimum wage changes. Further, if anything, we see that the amplitude of business cycle swings are slightly more pronounced in unbounded states than in bounded states. As such, these results provide some reassurance that we can separately discern between minimum wage effects and effects that arise from economic recessions.

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[10]The *State Leading Index* measures the current and future economic situation of a given state. The leading index for each state predicts the 6-month growth rate of the state's coincident index. In addition to the coincident index, the models include other variables that lead the economy: state-level housing permits (1 to 4 units), state initial unemployment insurance claims, delivery times from the Institute for Supply Management (ISM) manufacturing survey, and the interest rate spread between the 10-year Treasury bond and the 3-month Treasury bill.

We provide additional robustness to these results by controlling for various state-, county-, and ZIP code-level observable characteristics that may be correlated with both the timing of minimum wage enactments and firm health. We present results that directly control for a battery of local economic conditions in Section 4.1.2. Further, some bound and unbound states may increase their state-level minimum wages in response to a federal minimum wage increase. We discuss these changes in Section 4.1.3. Section 4.1.4 presents results from a nearest–neighbor matching estimator. We present results from a geographic border discontinuity design in Section 4.1.5, where we control for time-varying county-pair specific unobservables by including county-pair × year fixed effects. And last, we estimate more stringent specifications that include state × year and county × year fixed effects in various cross-sectional results presented in Section 4.2.

In summary, conditional on a variety of approaches, we show that after an increase in the federal minimum wage, firms in unbounded states serve as an appropriate counterfactual to firms in bounded states, ameliorating concerns about our identification strategy.

3 Data and Descriptive Statistics

3.1 Data Sources and Sample Selection

We use establishment-level data for all the establishments in the U.S. from the National Establishment Time-Series (NETS) Database (Walls & Associates, 2014).[11] This database provides an annual record for a large part of the U.S. economy that includes establishment-level employment counts, sales figures, establishment failure, market segment, corporate affiliations, and historical D&B credit and payment ratings.

This database covers almost 50 million U.S. businesses. Among these firms, 15 million firms have data on their Paydex scores over 25 years (1989–2013). We exclude establishments with only one employee (which omits almost 3 million businesses). From the remaining 12.79 million establishments, we further remove non–stand–alone businesses (i.e., we omit 900,000 establishments affiliated with large firms). In addition, we exclude 3.8 million establishments

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[11]Walls & Associates converts Dun & Bradstreet (D&B) archival establishment data into a time-series database of establishment information.

in finance, real estate, utilities, and firms in professional services that are less likely to employ minimum wage workers.[12] Finally, to construct our measure of lagged sales growth (which is one of our control variables in our baseline specification), we need at least three observations, and therefore we lose an additional 3 million establishments. However, our results are robust if we include these businesses in our sample (see Section 4.1.3). As such, our final sample consists of 4.4 million small businesses that survived for three years or more.[13]

3.2 Summary Statistics

We next provide the summary statistics of our dataset. We first describe our primary variable of interest, i.e., *Paydex Score*, then how it relates to various firm characteristics. Last, we provide summary statistics on state and federal minimum wage changes.

3.2.1 Paydex Score

The *Paydex Score* is a business credit score assigned by D&B to an establishment. It is a dollar-weighted numerical indicator of how a firm paid its bills based on trade experiences reported to D&B through its trade exchange program. D&B acquires its trade data from over 12,000 trade exchange participants globally in 35 markets, of which 4,200 are located in the U.S.

The Paydex score compares payments to terms of sale. It is dollar-weighted, and it is calculated based on the overall manner of payments reported to D&B. The score rates the likelihood that a business will make payments to suppliers or vendors on time. Like a personal credit score, it is primarily used to measure the financial risk to lenders, and it can affect the premiums and interest rates that companies pay when it comes to financing bank loans or credit cards for small businesses.

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[12]Specifically, we omit establishments in the following industries: utilities (NAICS 22), finance and insurance (NAICS 52), real estate (NAICS 53), professional services and management of companies (NAICS 54, 55), educational services (NAICS 61), health care (NAICS2 62), religious organizations (NAICS 813), and public administration (NAICS 92).

[13]Crane and Decker (2019) show that the NETS database imputes employment data for some small establishments. The imputation practice must vary systematically geographically for the imputation to materially affect our results. However, Crane and Decker (2019) do not find that this imputation varies systematically with geography. They also do not explore imputation practices in the NETS database for credit information, which is our main dependent variable. Figure IA2 shows that our results are robust to establishments with more than 10 employees, reducing any concerns that the systematic imputation of credit scores may be driving our results. We discuss these results further in Section 4.2.2.

In addition to lenders, the Paydex score is used by vendors, who often deliver goods and services and invoice a business for payment afterward. As a result, vendors have some financial risk of not being paid. The Paydex score is one metric that such suppliers can use to determine whether a new client or business partner might present possible risks going forward. Poor scores may make suppliers reluctant to do business or may limit the size and scope of the services they are willing to agree to.

Figure 4 presents a histogram of observations (left-axis) in each Paydex group, while the circle dots represent the mean Paydex (right-axis) score in each bucket of our sample. Note that a score of 80 and above means that the business makes its payments on time or in advance. A perfect score of 100 implies the business makes payments one month in advance of when they are due. From the NETS dataset, we observe the minimum and maximum Paydex score for a given establishment over a given year. We take the mean of the two measures and create the *Average Paydex Score*. In our sample, the median of *Average Paydex Score* is about 76.5, which implies that the median business makes payments five days after the terms, where the term is typically 30 days.[14]

3.2.2 Establishment Characteristics

Table 1, Panel A, provides the summary statistics of our establishment sample. From our 4.4 million small businesses with Paydex scores, we obtain just over 31 million establishment-year observations. While the *Paydex Score* is available for only 42.9% of our total observations, we report information on the approximately 41 million establishment–year observations of firms that do not have Paydex scores. We do not utilize these data, but we present them here for comparison. Based on observable establishment characteristics, establishments with *Paydex Score* have lower exit rates, more sales,and more employees. In addition, these establishments are older and more labor intensive (with more employees per million sales), and they compete in more concentrated industries as measured by a higher HHI index (defined at the 5–digit NAICS level).

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[14]See https://www.dandb.com/glossary/paydex/ for more information.

3.2.3 Minimum Wage

Table 1, Panel B, reports the summary statistics on federal and state minimum wages and their growth rate. We find that the average annual state minimum wage is about \$5.50 per hour, which is above the federal minimum wage, i.e., \$5.25 per hour. This is especially true for unbounded states. Note that, whenever the federal government decides to change the minimum wage, the average level of change or growth is much higher for bounded states than unbounded states. For example, the median $\%\Delta MW(S)$ is about 6.0% for bounded states but only 3.0% for unbounded states.

4 Results

4.1 Do Increases in the Federal Minimum Wage Affect Small Business Paydex Scores?

In this subsection, we discuss our baseline Paydex results (Section 4.1.1) for Equation (1). We show that our results are robust to the inclusion of controls for local economic conditions (Section 4.1.2), for variations in the baseline model (Section 4.1.3). We construct a nearest-neighbor matched sample (Section 4.1.4) and utilize bordering county discontinuity tests (Section 4.1.5) to further addresses endogeneity concerns. In addition, we conduct tests for pre- and post-minimum wage change dynamics (Section 4.1.6).

4.1.1 Baseline Results

We begin our analysis by plotting the average *Paydex Score* for establishments in bounded states and unbounded states around the years before and after federal minimum wage increases. Figure 5 plots the average score with a 95% confidence interval. The solid line with circled data points plots the average *Paydex Score* for establishments located in bounded states, while the dashed line with diamond data points plots the average of the *Paydex Score* for unbounded states. The bold dashed line indicates the period immediately before the federal minimum wage change. As can be seen, the average *Paydex Score* for bounded and unbounded states followed parallel trends before the minimum wage enactment. Second, within two years of a federal minimum

wage increase, there is a sharp decline in the *Paydex Score* for establishments in bounded states. Finally, we observe that the difference between the *Paydex Score* for establishments in the bounded and unbounded states converges after three to five years. One possible reason may be that stronger establishments survive and may be able to pass on the increased labor cost to their customers. We explore this issue in Section 4.1.6.

It should be noted that these results do not take in to account firm-specific and time-specific unobserved heterogeneity that may lead to lower credit scores for establishments located in bounded states. To account for this potential unobserved heterogeneity we estimate our difference-in-differences Equation (1). Note that the interaction term, α_1, as captured by $Bound_{s,t-1} \times \Delta MW(F)_t$, identifies the differential effect of federally mandated minimum wage increases over and above the effect of state-level variation caused by a change in the state-determined minimum wage and the changing status of the focal state from bound to un-bound (or vice versa). As previously discussed in Section 2.1, the number of states that are bound by the federal minimum wage changes across time. In addition, we also control for establishment fixed effects and year fixed effects to ensure that identification arises only from within-establishment variation after controlling for macroeconomic trends. We report these results in Table 2.

In Columns (1)–(3), we estimate the regression equation without establishment controls, while Columns (4)–(6) report results with a full set of establishment-level control variables $(X_{i,t-1})$ in our regressions: size (measured as ln Sales), age (ln Age), number of employees (ln Employees), and sales growth, all of which are winsorized at their $1st$ and $99th$ percentiles. Columns (1) and (4) report results for a minimum Paydex score during the year, while Columns (2) and (5) report results for a maximum Paydex score during the year. In Columns (3) and (6), we report results for an average score during the year, measured as the mean of the minimum and maximum score during the year.

Our preferred specification presented in Column (6). It shows a point estimate of -0.73, implying that for a dollar increase in the federal minimum wage, establishments in bounded states experience a reduction in their average *Paydex Score* by 0.73 points relative to changes in the *Paydex Score* of establishments in unbounded states. The median establishment in our sample has a *Paydex Score* of 76.5, which implies that the median establishment pays bills an

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average of five days beyond the term. As such, a reduction in the *Paydex Score* by 0.73 points to 75.77 points implies a delay of 6 days beyond the term (or a 20% increase in delay).

4.1.2 Is the Impact of Federal Minimum Wage Increases on Paydex Scores Driven by Local Economic Conditions?

The decision by state governments to set their minimum wages at (or above) the federal level may not be random. States that increase their minimum wages tend to differ in their business cycle severity, their economic inequality, and the composition of their labor force (Allegretto, Dube, Reich, and Zipperer, 2017). In this section, we test for state-level variables that may affect a state's decision to keep minimum wages at the federal level.

Table IA1 reports the results of our regression of the bound dummy on state-level economic conditions and political partisanship. We find that states with large populations and states with Democratically controlled senates are more likely to keep state minimum wages above the federal minimum wage. Hence, in later results, we explicitly control for these state-level variables. In addition, counties and ZIP codes in unbounded and bounded states may differ in other economic conditions such as unemployment rate, per capita income, house prices, and aggregate demand. These factors may influence the credit score of establishments located in bounded states and as such it will be critical to control for these factors as well.

In this section, we report results for regression estimates in which we control for various state-, county-, and ZIP code-level observable characteristics. In Table 3, we present results that are robust to the inclusion of various state-, county- and ZIP code-level control variables. In Column (1), we control for lagged state-level economic conditions by including both the level of and growth in GSP and population. After controlling for state economic conditions, the negative effect increases from -0.73 to -0.83 and remains statistically significant. In Column (2), we control for state-level political partisanship, and we find consistent results. In Column (3), we include the county-level lagged unemployment rate, labor force participation, and contemporaneous changes in the county-level unemployment rate. We find that establishments located in counties with a high unemployment rate (in terms of its level and changes) have low credit scores. The effect of the minimum wage diminishes to -0.67 but remains statistically significant.

In Columns (4)–(6), we control for ZIP code-level controls, including aggregate sales growth, personal income (lagged level and growth), and house prices (lagged level and growth), respectively. We find that an establishment's credit score is positively correlated with these variables. In Column (7), we show complete robustness to various local economic factors by including all state-, county- and ZIP code- level controls.[15] Although the number of observations is significantly reduced as a result of missing covariate data, we continue to find a significant and negative effect of minimum wage changes on credit scores of establishments in bounded states. As a further robustness check, in Section 4.1.4, we use these variables to create a matched control sample.

4.1.3 Robustness Tests

In this section, we test the robustness of our main result reported in Column (6) of Table 2 to various potential confounding factors. We present the results of these robustness checks in Table 4.

One potential concern with the interpretation of the results presented so far is that they may be driven by the entry of numerous small, unhealthy firms into bounded states. To account for this, we interact all establishment controls with the bound dummy, and we report results in Column (1). We find that the negative effect declines from -0.73 to -0.70 but remains statistically significant. In order to address this issue further, in Section 4.1.4, we use nearest-neighbor matching to construct counterfactual establishments.

Another potential concern may be that industry-specific, time-varying, unobserved heterogeneity in an establishment's Paydex Score is driving our results. We address this concern by including NAICS4 × year fixed effects in Column (2) instead of year fixed effects in our baseline specification. Our results are robust to the inclusion of these fixed effects.

In order to address any concerns about the construction of our sample, in Column (3), we include all the establishments that we omit from our baseline. We make use of 90 million observations for 15 million establishments. Although the magnitude falls by 0.10 points, it remains significant. In Column (4), we include all the industries that we omitted from our

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[15]We calculate aggregate sales growth using NETS data. For personal income we use publicly available IRS ZIP code-level individual income data, and we use Zillow's house price index at the ZIP code-level.

baseline sample, and we find similar results.

In our baseline specification, we excluded multi–establishment firms since they are typically larger, they are different from single–establishment firms, and they are less likely to be affected by minimum wage increases. In Column (5), we include multi-establishment businesses, and we find that our negative effect reduces the magnitude but remains statistically significant at the 1% level. In Column (6), we report results for businesses connected with multiple–establishment firms. We find an almost insignificant effect on their credit scores.

In Columns (7) and (8), we test the robustness of our baseline results to our definition of minimum wage changes. We define $\Delta MW Dummy(F)_t$ as an indicator variable equal to 1 if there is an increase in the federal minimum wage in year t and 0 otherwise. While $\%\Delta MW(F)_t$ captures the percentage change in the minimum wage by the federal government in year t, and equals 0 if no change occurred in year t. For example, in the year 2007, the federal minimum wage increased from \$5.15 to \$7.25, which implies an increase of almost 40%. We replace $\Delta MW(F)_t$ with $\%\Delta MW(F)_t$ and $\Delta MW Dummy(F)_t$, respectively, and we report the regression results. The regression coefficient suggests a decline in Paydex scores by $(0.40 \times 3.85=)$ 1.85 points. This reduction in score implies a delay in payment by nearly three days. We find consistent results when we use a dummy instead of a change measure.

In Column (8), we report the dynamics of the three main federal minimum wage increases under examination. $\Delta MW Dummy(F)_t$ Yr1 is an indicator variable equal to 1 that identifies the years 1990, 1996, and 2007. $\Delta MW Dummy(F)_t$ Yr2 identifies the years 1991, 1997, and 2008. $\Delta MW Dummy(F)_t$ Yr3 identifies the year 2009. We find that the effect is negative and reduces over time. We further explore the dynamics in Section 4.1.6.

Additional robustness tests of our baseline specification (Equation (1)) are presented in Table IA2. As shown in Figure 2, many states switch from being bound to unbound before a federal minimum wage increase. In addition, some bound and unbound states may increase their state minimum wages in response to federal minimum wage increases.[16] In our robustness tests, we omit all observations in the state–years in which bounded and unbounded states respond

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[16]As an example, in response to the 2007 federal minimum wage increase (from \$5.15 to \$7.25 through three consecutive annual increases of \$0.70), the state of Ohio increased its state minimum wage from \$5.15 to \$7.30, with annual increments of \$1.00, \$0.15 and \$0.30 in the years 2007, 2008, and 2009, respectively. Similarly, the state of California increased its state minimum wage from \$6.75 to \$8.00, with annual increments of \$0.75 and \$0.50 in 2007 and 2008, respectively.

to federal minimum wage increases. In Column (1), we omit establishments located in those state–years in which bounded states have increased their minimum wage more than the federal minimum wage increase. Column (2) omits establishments located in those state–years where unbounded states have increased the minimum wage in response to the federal minimum wage increase. In Column (3), however, we omit both types of establishment–years. The results are consistent with our previously reported results.

Our baseline specification treats all unbound states equally. Yet, per our empirical strategy, establishments in unbound states should not respond to federal minimum wage changes. Thus, we can conduct a falsification test in which we regress *Paydex Score* on indicators that capture the dollar amount by which the unbound states are above the federal minimum wage. Consequently, we expected to see no statistical difference between establishments that are in states whose state minimum wage is \$1 above the federal minimum wage from those whose state minimum wage is \$1.50 above the federal minimum wage. We present results from this placebo analysis in Column (4). We find that establishments located in unbounded states with $\Delta < \$1$ have a credit score that is 0.58 points higher than establishments located in bounded states. We find a similar effect for $\$1 < \Delta \leq \$1.5$ of 0.58. For states that have $\Delta \geq \$1.5$, we find slightly smaller differences but this difference is insignificant at conventional levels. These results imply that all unbound states can serve collectively as appropriate control states. In addition, the matching estimates presented in Section 4.1.4 and the bordering county estimates presented in Section 4.1.5 further strengthen our counterfactual analysis through more stringent control group construction.

4.1.4 Addressing Selection on Levels or Trends in Observable Characteristics: Nearest–Neighbor Matching

As we discussed in the previous section, a critical concern for the identification of our results arises if establishments in unbounded states do not serve as appropriate controls for establishments in bounded states. For example, they may differ in terms of financial health or some other observable characteristics. To control for this potential selection on observable characteristics, we utilize a narrow event window, and in the pre-event year, we match establishments in the bounded states (treatment group) with those in unbounded states (control group) based

first on the pre-shock level of, then based on trends in the treated establishments' credit scores as well as establishment-, state-, county- and ZIP code-level observable characteristics.

In 2007, the federal minimum wage increased from \$5.15 to \$7.25, which is an increase of almost 40%. We match firms in 2006 for this particular series of the federal minimum wage increases. To construct our control sample, we first use the credit score in the year 2006 and exactly match establishments in the bounded states (treatment group) with the possible set of control establishments within the same NAICS4 industry group in the unbounded states (control group). Next, for the exactly matched control sample, we compute the Euclidean distance between the treatment sample and the control sample, based on establishment-, state-, county- and ZIP code-level observable characteristics.

Table IA3 reports the means of the Euclidean distance based on nearest–neighbor pairs in 2006. Panel A reports the matching balance in 2006 for establishment-level characteristics (i.e., credit score, sales, employees, employee-to-sales ratio, and sales growth). Note that by construction, the average Paydex score is the same for the treatment and control group establishments in 2006. After matching on the Euclidean distance, we find a decline in the differences between the means of establishment-level characteristics. At the state level, we match state-level economic conditions by including both the level of and growth in GSP and population. Next, we match on state-level political conditions, i.e., we match for state-level partisanship. At the county-level, we match on unemployment rate, labor force, and changes in the unemployment rate. At the ZIP code level, we match for aggregate sales growth, personal income (lagged level and growth) and house prices (lagged level and growth). Note that for establishments located in bounded states in 2006, we find between 600,000 and 800,000 matched pairs in different matching models. Finally, in Table IA3, Panel H, we report the matching balance when we include all establishment-, state-, county-, and ZIP code-level observable characteristics. After matching, the t-stat for the two-sample t-statistic of mean equality is greater than 2 only for the employee–sales ratio variable, where the differences in magnitude are not very large. We next use the above matched sample and estimate Equation (1).

Table 5 reports the results from our baseline regression Equation (1) between 2006 and 2013 for the *matched pairs*. The dummy variable $Bound_{s,t-1}$ equals 1 if at the beginning of fiscal year t, state s has a state minimum wage less than or equal to the federal minimum wage.

The expression $\Delta MW(F)_t$ is the dollar increase in the federal minimum wage in 2007, 2008, and 2009, otherwise zero. Therefore, the interaction–term, $Bound_{s,t-1} \times \Delta MW(F)_t$, identifies the differential effect of federally mandated minimum wage increases over and above the effect of state-level variation caused by a change in state-determined minimum wages and changing status from bound to unbound or vice versa. In Columns (2) - (8), we add the matching variables as controls (with increasing granularity) to the establishment-level controls already present in Column (1). In addition, we also include matched-pair fixed effects and year fixed effects. Notice that for the matched sample, we find consistent results in all specifications, and the magnitude in Column (8) matches our baseline estimates.

One concern with our interpretation of our results as causal is that even if we match establishments on levels of *Paydex Score*, establishments may follow distinct trends before the federal minimum wage increases. We address this concern by exactly matching, in 2005 and 2006, the average Paydex score for establishments in the bounded states (treatment group) with the possible set of control establishments within the same NAICS4 industry group in the unbounded states (control group). We then match establishment-, state-, county-, and ZIP code-level observable characteristics. Table IA4, Panel A, reports the regression results for sample firms in 2005-2013. In Panel B, we restrict our sample to 2006-2013. As a further test of robustness, we attempt exact matching on *Paydex Score* in 2004, 2005, and 2006. Panel C and Panel D report the regression results. In all these tests, the regression coefficient on $Bound_{s,t-1} \times \Delta MW(F)_t$ is negative and statistically significant. Meanwhile, the magnitude of the estimate decreases because it requires the sample firms to have more than three observations before the minimum wage increase and thus introduces some survivor bias, which will be positively associated with an establishment's *Paydex Score*.

The results suggest that for establishments in the bounded state, after a one dollar increase in the federal minimum wage, the *Paydex Score* declines by an additional 0.75 points, compared to similar establishments located in the unbounded state. We conclude that selection on the levels and trends in the observable characteristics that we consider is not driving our main results.

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4.1.5   Controlling for Local Economic Conditions: Bordering Counties

We have already included some observable local economic conditions in the nearest–neighbor matching exercise in Section 4.1.4. We attempt to further control for local economic conditions by analyzing the establishments located in the contiguous counties next to state borders. The underlying assumption for this identification strategy requires that the adjacent counties at state borders have similar economic conditions along all dimensions other than the minimum wage.

Consistent with our analysis in Section 4.1.4, we utilize the federal minimum wage increase of 2007 and test how establishments located in the contiguous counties of bounded and unbounded states are effected. We follow Dube, Lester, and Reich (2010) and identify 1,135 unique contiguous counties at state borders. For 2006, we found 497 unique contiguous counties and 982 county pairs in which across the state border, one state was bounded by the federally mandated minimum wage and the other was not. We start our analysis with the establishments in 2006 that are located in county pairs in which *bounded* states bordered on *unbounded* states. Then, we track their *Paydex Score* from 2004 to 2009. As previously discussed, in 2007, the federal minimum wage increased from $5.15 to $7.25, with equal annual increments of $0.70 in 2007, 2008, and 2009. To ensure sufficient variation in the treatment and control groups after this federal minimum wage increase, we drop county pairs for which the 2006 difference between the state minimum wage and federal minimum wage is less than $0.70.

We estimate Equation (1) and include county pair × year fixed effects to control for any time-varying county pair–level unobservables. We also control for time-varying establishment-, state-, county-, and ZIP code-level observable characteristics, as in Section 4.1.2. The inclusion of county pair × year fixed effects and time-varying observable characteristics should satisfy the identification assumption; i.e., the assumption that adjacent counties at state borders have similar economic conditions except for their respective minimum wage bounded status.[17] Table 6 reports our results.

In Columns (1)-(3), we exclude establishment fixed effects and thus present extensive margin

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[17]Although some minimum wage workers near state borders may commute across the state border to earn a higher minimum wage, potentially causing market wages in the bounded stated to converge toward those of the unbounded state. The potential for these spillover effects implies that our results provide a lower–bound estimate of the effect of minimum wages in our setting.

results. Conversely, in Columns (4)-(6), we include establishment–level fixed effects, providing intensive margin results. In Column (1), we find that for establishments in the bordering county of the bounded state, a one dollar increase in the federal minimum wage reduces the *Paydex Score* by 0.53 points more than establishments located in the bordering county of the unbounded state after controlling for time-varying establishment-, state-, county-, and ZIP code-level observable characteristics and time-varying county pair–specific unobservables.

In Column (2), we test how these effects vary based on the distance between the centroid of the bordering counties. We find that the decline in *Paydex Score* is larger when the distance between the centroid of the bordering counties is less than 25 miles, but this estimate is not statistically significant. Similarly, we test how these effects vary based on the difference between the minimum wage of the bordering counties. We notice that the declines in *Paydex Score* are greater for county pairs with larger minimum wage differences, but again, they are statistically insignificant. We find qualitatively similar results in Columns (4)–(6) when we include establishment fixed effects.

Overall, the results from Section 4.1.2, Section 4.1.4 and Section 4.1.5 indicate that after an increase in the federal minimum wage, establishments in bounded states experienced a reduction in their average *Paydex Score* relative to changes in the *Paydex Score* of establishments in unbounded states. These results are robust after controlling for various time-invariant and time-varying observable and unobservable characteristics that may be correlated with the timing of the federal minimum wage increase. In the next section, we test whether establishments in bounded and unbounded states follow similar trends around the time of the federal minimum wage increases.

4.1.6 Dynamics in the Paydex Scores of Affected Establishments Before and After Minimum Wage Increases

As discussed before in Section 2.1, our above results can only identify the causal effect of minimum wage increases to the extent that the *Paydex Score* of establishments in bounded and unbounded states are following similar trends around the time that the federal government adjusts minimum wages. We test this assumption in this subsection. We estimate the following

equation:

$$Y_{it} = \sum_{j=-5}^{5} \alpha_j BD_{s,t}(j) + \sum_{j=-5}^{5} \alpha_j Bound_{s,t}(j) + \kappa X_{i,t-1} + \nu_i + \omega_t + \epsilon_{ist}. \qquad (3)$$

In the above equation, $BD_{s,t}$ is defined as $Bound_{s,t-1} \times \Delta MW Dummy(F)_t$, and all the controls are similar to those included in Equation (1). The inclusion of the dummy $Bound_{s,t-1}$ for both pre- and post- window controls for the changing status of bound to unbound or vice versa. Here, we estimate these interaction terms for the five years before and the five years after the minimum wage increase.

We present our regression results graphically in Figure 6. The bar plots the regression coefficients of the interaction term, identifying bounded states for five years before and after the federal minimum wage increase, while dashed lines correspond to a 95% confidence interval. The bold dashed line indicates the period immediately before the federal minimum wage change.

Similar to Figure 5, we observe that establishments in bounded states did not experience differential trends prior to the introduction of federal minimum wage changes. This increases our confidence that the results we present can be interpreted as causal. Second, we note that in the year of the federal minimum wage increase, there is a sharp decline in the Paydex score for establishments in bounded states. This is consistent with our baseline results reported in section 4.1.1. Finally, we observe that the difference between the Paydex score for establishments in the bounded and unbounded states converge over three to five years. One possible reason for this could be that establishments that managed to survive, which is potentially an indicator of the stronger establishments, may be able to pass on some of these extra labor costs to customers over a more extended period.

4.2   How Does the Impact of One-Size-Fits-All Federal Minimum Wage Increases Vary Across Firms, Industries and Geography?

As discussed before, there is significant heterogeneity across firms, industries, and labor market conditions across the U.S. In this section, we analyze how the one-size-fits-all federal minimum wage increases impact the cross-section of firms, industries, and geography in the U.S. In particular, we examine how the minimum wage–induced *Paydex Score* effects vary with the

sensitivity of the establishment's industry to the minimum wage, the establishment's labor intensity, its size, age, local competition, local personal income, and ex-ante credit worthiness.

4.2.1 Industry Heterogeneity: Minimum Wage–Sensitive Industries

According to the 2015 Current Population Survey, Restaurants (NAICS 72) and Retail Trade (NAICS 44, 45) are the only industries in which over 10% of employees earn the minimum wage. In this subsection, we test whether the magnitude of the impact is higher for such industries. We estimate Equation (3) separately for each industry and plot the regression coefficient of the interaction terms in Figure 7. We find that the negative effect is larger for restaurants and retail, but this impact is not limited to these industries. The pre and post dynamics are similar to baseline results on dynamics.

4.2.2 Labor Intensity

We next test the differential effect of a federal minimum wage increase on the establishment's financial health based on its labor utilization. In our data, the median establishment employs 12 employees per $ 1 million in sales. We hypothesize that the negative effect of the federal minimum wage increase should be more severe for labor-intensive businesses. First, we partition our sample into quintiles based on labor intensity one year before the federal minimum wage change. Then, we re-estimate Equation (1) where we interact the equation by each quintile group. In Figure 8, we plot the regression coefficient on triple interaction terms with a 95% confidence interval. We find that with the minimum wage increase, the more labor-intensive establishments are more adversely affected than less labor-intensive establishments.

As discussed before in Section 2.1, one threat to our identification strategy is whether the federal government's decision to adjust minimum wages is affected by or correlated with unobservable differences in the economies of bound versus unbound states, thus biasing our point estimates. To ensure that local economic conditions in the bounded vs. unbounded states are not driving our results, we also control for state-year fixed effects in our cross-sectional results. Table 7 reports the results of our analysis using triple interaction.

We partition our sample into two groups using the median establishment labor-intensity one year before the federal minimum wage change. We define *MoreLabor* as an indicator

variable equal to 1 if the establishment's labor-intensity measure is above median labor-intensity, and 0 otherwise. We define *LessLabor* as 1-*MoreLabor*. For *LessLabor* and *MoreLabor* establishments, we run our baseline model (i.e., Column (6) of Table 2), and we report the results in Column (1) and Column (2) of Table 7, respectively. Note that we find strong negative results for both *LessLabor* and *MoreLabor* establishments, while the negative effect is more severe for *MoreLabor* establishments. In Column (3), we include establishment controls, establishment fixed effects, and state-year fixed effects. In Column (4), we further include NAICS4 × year fixed effects. We find consistent results.

We extend our analysis by calculating labor cost instead of labor intensity. We measure the establishment's labor cost as the number of employees × average salary divided by sales. We use QCEW data to estimate the average compensation at the county-NAICS4 level. Table IA5 reports the regression results. The results are similar to the labor-intensity results.

Further, using both measures of labor utilization, we re-estimate Equation (3) by interacting the equation with a dummy equal to 1 if the establishment's labor intensity or labor costs are above the median. The Figure IA1 plots the regression coefficients with a 95% confidence interval. The solid line with circles plots the regression coefficients for establishments that are more labor intensive or have higher labor costs, while the dashed line with diamonds plots the coefficient for establishments that are less labor intensive or have higher labor costs. The bold dashed line indicates the period immediately before the federal minimum wage change.

Consistent with the findings presented earlier, the difference between the Paydex score before the minimum wage increase is insignificant across the two groups, while this difference increases after the minimum wage increase is enacted. Overall, we find consistent negative results for labor-intensive businesses.

As we discussed in Section 3, Crane and Decker (2019) recommend that we should be cautious when using the NETS data set, especially for small firms. As a robustness test, we re-estimate Equation (1) where we interact the equation with different labor groups. Figure IA2 plots the regression coefficient on the triple interaction terms with a 95% confidence interval. We find statistically significant effects for each group. Overall, we find that with the minimum wage increase, establishments with more employees are more adversely affected than establishments with less employees.

4.2.3 Establishment Size and Age

In this subsection, we test the differential effect of a federal minimum wage increase on an establishment's financial health based on its size and age. These measures may proxy for the ability of the businesses to absorb the financial shock caused by an increase in labor cost. We test this hypothesis and report the results in Table 8 and Table 9.

Similar to our treatment of labor intensity, we partition our sample into quintiles based on size (measured by sales) and age one year before the federal minimum wage change. We then re-estimate Equation (1) where we interact the equation with each quintile group. In Figure 9, we plot the regression coefficient on triple interaction terms with a 95% confidence interval. We find that with the minimum wage increase, small and young establishments are more adversely affected.

Next, we partition our sample into two groups divided along the median of sales. We define this size-median one year before the federal minimum wage change. We also define *Small* by an indicator variable equal to 1 if an establishment's sales are below median sales, and 0 otherwise. We define *Large* as 1-*Small*. For *Small* and *Large* establishments, we run our baseline model (i.e., Column (6) of Table 2), and we report the results in Column (1) and Column (2), respectively. Note that we find strong negative results for both *Small* and *Large* establishments, while the negative effect is more for *Small* establishments.

In Column (3), we include establishment controls, establishment fixed effects, and state-year fixed effects. We are able to hold all state–year– specific heterogeneity constant through the inclusion of these state-year fixed effects, and we identify our triple interaction effect through within state–year across firm-size variation by interacting *Small* with our main coefficient $(Bound_{s,t-1} \times \Delta MW Dummy(F)_t)$ from Equation (1). We find that the effect is stronger for small establishments relative to large establishments within the bounded states. Finally, in Column (4), we further strengthen the veracity of our results by including NAICS4 $\times$ year fixed effects to absorb any industry–year–specific heterogeneity that may exist.

We conduct the same analysis for establishment age, and we report our results in Table 9. We find similar results: Younger firms experience larger decreases in their *Paydex Score* than older firms.

4.2.4 Local Product Market Competition

With the increase in labor cost, the cost of goods sold (COGS) increases for businesses. If establishments can completely and immediately pass on these increased costs to their customers, then they may not feel any additional financial stress as a result. In this subsection, we test this possibility by examining the relative local competitiveness in a given firm's industry. The establishments in our sample are relatively small businesses, and local competition determines their cash flows. We expect that an establishment within the same industry and located in a less competitive neighborhood may find it easy to pass on the increased labor costs compared to other establishments, and they may experience a smaller reduction in Paydex scores.

To test the effect of local competition on a firm's ability to pass on these costs, we measure local product market competition using the HHI index, measured at the NAICS5-county-year. To create the HHI index we use the full set of 50 million establishments in the NETS dataset. Similar to the previous subsection, we first partition our sample into quintiles based on the HHI index one year before the federal minimum wage change. We then estimate Equation (1) and interact our main coefficient with each quintile group. In Figure 9, we plot the regression coefficient on triple interaction terms with a 95% confidence interval. We find that with a minimum wage increase, establishments in more competitive locations are adversely affected, while establishments in less competitive locations are not negatively affected at all.

We also partition our sample into two groups and split the HHI index at its median one year before the federal minimum wage change. We define $HighCompetition$ as an indicator variable equal to 1 if an establishment's NAICS5-county-year HHI measure is below the median HHI, and 0 otherwise. We define $LowCompetition$ as 1-$HighCompetition$. For establishments in $HighCompetition$ and $LowCompetition$ industry–county–years, we run our baseline model (i.e., Column (6) of Table 2), and we report the results in Table 10, Column (1) and Column (2), respectively. We find that the effect is very strong and dominant for establishments in more competitive areas.

In Columns (3) and (4), we include a triple interaction to identify our effect of interest. In Column (3), we include establishment controls, establishment fixed effects, and state-year fixed effects. In Column (4), we further include NAICS4 × year fixed effects. As such, our

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tests effectively compare two establishments in the same industry and the same bounded state, and we exploit only variation in competition across industry–states. We find a strong negative effect for establishments located in counties with more competition.

Overall, these results suggest that small businesses located in bounded states are more affected by federally imposed minimum wage increases, especially those located in more competitive counties. Thus, establishments may not be able to completely pass on these increased costs to their customers immediately, and therefore they experience some financial stress.

4.2.5   Local Personal Income

Similar to local competitiveness, the local personal income of a firm's customers may determine the firm's ability to immediately transfer its increased labor costs entirely to those customers. The increase in the minimum wage, on one hand, increases labor costs for businesses, but at the same time, it increases the per capita local income. If businesses can pass on these costs to customers in low-income ZIP codes, then we should not find a decline in their Paydex scores. Otherwise, we should expect a more negative effect in a low-income neighborhoods.

To test the effect of local personal income on a firm's ability to transfer these costs, we use ZIP code–level IRS data on personal income. Similar to the previous sub-section, we first partition our sample into quintiles based on local personal income one year before the federal minimum wage change. Then, we re-estimate Equation (1) where we interact the equation with each quintile group. In Figure 9, we plot the regression coefficient on the triple interaction terms with a 95% confidence interval. We find that with the minimum wage increase, establishments in the lowest-income neighborhoods are the most adversely affected.

Next, we partition our sample into two groups and define personal income one year before the federal minimum wage change. We define $HighIncome$ as an indicator variable equal to 1 if an establishment's ZIP code has an above–median income, and 0 otherwise. We define $LowIncome$ as 1-$HighIncome$. For establishments in $HighIncome$ and $LowIncome$ ZIP codes, we run our baseline model (i.e., Column (6) of Table 2), and we report the results in Table 11, Column (1) and Column (2), respectively. We find that the effect is very strong and dominant for establishments in low-income areas.

In Columns (3) and (4), we conduct this analysis using triple interactions. In Column (3),

we include establishment controls, establishment fixed effects, and county-year fixed effects. In Column (4), we further include NAICS4 × year fixed effects. Here, our tests essentially compare two establishments in the same industry and the in the same bounded state; we find a strong negative impact on establishments located in ZIP codes with low income.

4.2.6 Ex Ante Paydex Score Group

In this subsection, we test whether a firm's ex ante financial health affects the magnitude of the impact of a federal minimum wage increase. In other words, if the business already delays payments and has cash flow problems, then we expect that the adverse effects will be more severe for these financially stressed firms. We test this hypothesis and report the results in Figure 10.

Figure 10 plots the regression coefficients of Equation (1) with a 95% confidence interval for different Paydex groups defined one year before the federal minimum wage change. We do find a significant negative effect on the Paydex score for establishments with ex ante low scores, and this effect diminishes with higher ex ante Paydex scores.

4.3 Bank Loan and Default Results

As discussed in Section 3.2.1, the *Paydex Score* is frequently used by lenders to measure the financial risk of potential borrowers. In this section, we directly test whether minimum wage increases also affect a small businesses' ability to obtain bank loans.

We make use of 1 million publicly available transactions of all 7(a) and 504 loans approved since January 1, 1990, from the US Small Business Administration (SBA). The SBA 7(a) Loan Guarantee program is one of the most popular loan programs offered by the agency and is the most common SBA loan. A 7(a) loan guarantee is provided to lenders so they are more willing to lend money to small businesses that have "weaknesses" in their loan applications. We drop all canceled loans and, to be consistent with our Paydex sample, we apply the same industry filters as well. The average loan is about $100,000 with a maximum loan size $0.5 million. In this section, we test the differential effect of federally mandated minimum wage increases on the amount of SBA–guaranteed bank loans offered to small businesses. We also consider the default risk on previously issued loans around the time of minimum wage increases.

4.3.1 Loan Amount

We estimate our dynamic regression (i.e., Equation (3)), using logged loan amounts as our dependent variable. We report our results in Table 12. Column (1) reports results with state and NAICS4 × year fixed effects. We report only interaction terms five years before and after the minimum wage increase. We find no difference in loan amounts between the bounded and unbounded states before the federally mandated minimum wage increase. We find that loan amounts decrease by 15% one year after the minimum wage increase. This result implies a 9% decline for a one dollar increase in federal minimum wage. Similar to the Paydex results, the difference between bounded and unbounded states diminishes within five years. In Column (2), we add state-level controls for economic conditions, i.e., GSP and population (both level and growth). In Columns (3) and (4), we replace state fixed effects with borrower ZIP code fixed effects. We find consistent negative results across all these specifications.

4.3.2 Loan Default

Next, for the loans issued, we test whether the probability of default on granted loans increases with an increase in the minimum wage. In Figure 11, we plot the regression coefficient of the dynamics of the differential effect of the federal minimum wage for establishments located in bounded versus unbounded states on the defaults on bank loans issued before the minimum wage increase. The figure plots the regression coefficients of Equation (3) with a 95% confidence interval, where we run the Cox survival model stratified over the loan term and NAICS4 × year after controlling for loan size. The bars plot the regression coefficients of the interaction term identifying bounded states for five years before and after the federal minimum wage increase, while the dashed lines plot the 95% confidence interval. The bold dashed line indicates the period immediately before the federal minimum wage change. We find that for a one dollar increase in the federal minimum wage, the risk of default on a loan increases by almost 12% by the end of the five years after the minimum wage increase.

4.4 Entry and Exit of Establishments After Minimum Wage Increases

In the previous sections, we find that with an increase in the minimum wage by the federal government, there is a differential effect on the Paydex scores of establishments located in bounded versus unbounded states. This effect is stronger for labor–intensive, small, and young businesses and those businesses located in low–income and competitive neighborhoods. Further, we find lower loan amounts and higher default risk on bank loans. In this context, it is important to understand whether this increased cost of labor significantly affects the entry and exit of small businesses.

Note that the Paydex score is one of the metrics that suppliers can use to determine whether a new client or business partner might present risks going forward. Low Paydex scores may make suppliers reluctant to do business with a firm or may limit the size and scope of the services they are willing to agree to. In Section 4.2.6, we observe a 1–point decline in average Paydex score for firms in groups that have ex ante credit scores between "70-79" and "80 and above". Figure 4 suggests that about 70% of the establishments in our database have a score of more than 70, while the average of 80.35 for the group "80 and above" suggests a lumping of data at 80. Next, we test the importance of making payment "on time" or having a "perfect score" (i.e., 80 points) and how this score affects the probability of exit. Table 13 reports the regression results.

Our dependent variable is $Exit_{t+1}$, a dummy variable equal to 1 if the establishment exits in year $t+1$. We interact our baseline Equation (1) with $SameScore_{it}$ (80), a dummy variable identifying establishment–years in which the establishment does not observe any change in its score (i.e., 80) from year t-1 to year t. Column (1) reports the coefficient from this triple interaction term, which is negative and significant indicating, that establishments located in bounded states that do not observe a decline in their credit score after federal minimum minimum wage changes have a lower exit probability in the following year. Next, in Column (2), we test the differential effect on establishments that observe a decline in credit score across a threshold. We find that a 1–point decline in their credit score from 80 to 79 implies a 2.2% increase in the probability of exit. The unconditional probability of exit is 8.5%. Therefore, a one dollar increase in the federal minimum wage, along with a 1–point decline in credit score from 80 to

79, increases the exit probability by 25% more for establishments located in bounded states.

We do not find such an exit effect for the decline in credit scores from 81 to 80 (Column (3)). However, we find a similar effect for a 1–point decline in credit scores from 70 to 69 (Column (4)), while the results are weak for declines in credit scores from 71 to 70 (Column (5)). In Column (6), we include all the groups and find similar results. In Table IA6, we report results in which we replace the $SameScore_{it}$ (80) dummy with the $SameGroup_{it}$ (80+) dummy. Here, $SameGroup_{it}$ (80+) is a dummy that identifies the establishment–years in which the establishment retains an "80 and above" score both in year t-1 and year t. We continue to observe similar threshold effects.

Next, we perform an aggregate county–industry analysis. We calculate the exits within each county at the NAICS5–digit level. We define our dependent variable, $Log(1+exits)$, where we count the number of firm exits within each county–NAICS5 industry in a given year. Figure 12 plots the regression coefficient of the dynamics of the differential exit effect of federal minimum wage for establishments located in bounded versus unbounded states. The figures here plot the regression coefficients of Equation (3) with 95% confidence intervals, where the exits at the county FIPS–NAICS5 level are calculated using NETS data. In the regressions, we include county and NAICS5 × year fixed effects. The bars plot the regression coefficients of the interaction term identifying bounded states for five years before and after the federal minimum wage increase, while dashed lines plot the 95% confidence interval. The bold dashed line indicates the period immediately before the federal minimum wage change. We find that the exits increase by 5% one year after the minimum wage increase. We observe that the exit rate is higher for firms without a Paydex score.

We find a similar pattern of exits for restaurants and businesses that employ fewer than 10 workers. We also find a similar pattern for the entry of new businesses. Figure 13 plots the regression coefficient of the dynamics of the differential effect of the federal minimum wage on the entry rates for establishments located in bounded versus unbounded states. We observe nearly 4% decline in the entry rate during the year of minimum wage increases, and we find a similar pattern for businesses without Paydex scores, those in the restaurant industry and those with fewer than 10 workers.

Overall, we find that establishments located in bounded states experience a decline in their

credit scores around the time of federal minimum wage increases, and they are more likely to exit in the following year. We also find that in states bounded by the federal minimum wage, after an increase in the minimum wage, there is an increase in exits and a decline in entries for all industries, including industries sensitive to the minimum wage.

4.5 Aggregate Employment Results

So far, we find that with an increase in the minimum wage by the federal government, small establishments located in bounded versus unbounded states observe a decline in credit scores, lower loan amounts, and higher default risk on bank loans. Further, we find an increase in exits and a reduction in entries of small businesses.

Finally, in this section, we test the aggregate employment effect. We test the differential effect of the federal minimum wage on (a) aggregate employment and (b) the aggregate number of establishments in the bounded versus unbounded states. We utilize the annual frequency of the BLS Quarterly Census of Employment and Wages (QCEW) database for each county-NAICS2 for the period 1990-2013, and we define our dependent variables, *Log(1+Employment)* and *Log(1+Establishment)*. One caveat of this data set is that we cannot separate the effect for small and large businesses. We use this data to test the differential effect based on (a) industry and (b) local personal income. We estimate the regression from Equation (1) and plot the regression coefficients of with a 95% confidence interval in Figure 14. We interact the equation with each industry group and quartile group based on county-level local personal income one year before the federal minimum wage change. All regressions include county and year fixed effects.

We find that with an increase in the minimum wage by the federal government, the differential effect on the aggregate employment for counties located in bounded versus unbounded states is negative but statistically insignificant. When we interact the equation with each industry group, we find that employment declines in restaurants and retail by 9% and 7%, respectively. We find similar results for the number of establishments. Alternatively, we interact the equation with each county-level local personal income quartile one year before the federal minimum wage change. We find a decline in employment and a decline in the number of establishments for the two poorest quartiles.

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Overall, using aggregate data, we find that with an increase in the federal minimum wage, some of the establishments located in bounded states may not be able to absorb the increase in wage costs. As a result, there is a decline in aggregate employment in the affected states, especially among industries sensitive to the minimum wage and industries located in low-income areas.

5   Conclusion

The ongoing policy discussion on increasing the federal minimum wage to $15 *per hour* requires a thorough analysis of its impact on small businesses, because as wages comprise a significant portion of their operating costs. Not all affected firms would have the flexibility to immediately adjust their capital–to–labor ratio or pass on the increased costs to their customers. And, not all firms can maintain profit margins by reducing other costs or by increasing productivity. Moreover, despite the substantial geographic differences in labor market conditions (e.g., availability, productivity, the bargaining power of workers) and despite the significant differences in economic conditions and local product market competition, 14 states in the U.S. have minimum wage rates equal to the federal rate and are thus immediately affected by a one-size-fits-all federal minimum wage increase.

Using inter-temporal variation in whether a state's minimum wage is bound by the federal minimum wage and using credit score data for approximately 15.2 million establishments for 1989 –2013, we find that increases in the federal minimum wage worsen the financial health of small businesses in the affected states. Small, young, labor-intensive, minimum-wage sensitive establishments located in bounded states and businesses located in competitive and low-income areas experience higher financial stress and eventually leads to a higher exit rate and a lower entry rate.

Our evidence suggests that some small businesses, industries, and areas may face frictions in absorbing the increased cost of labor due to an increase in the federal minimum wage. As a result, they experience financial stress or may even default in extreme cases. Overall, our results document the unintended negative effect of one-size-fits-all federal minimum wage increases on the financial health of some small establishments.

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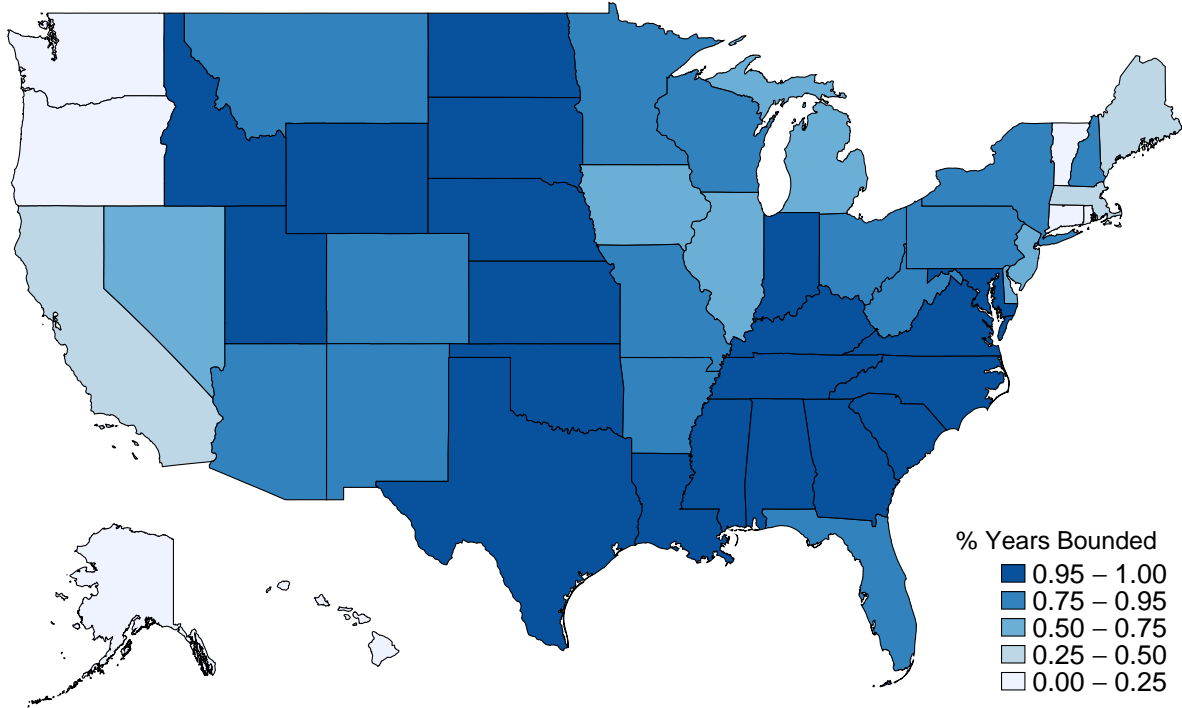
Figure 1: Bounded States by Year: The map plots the percentage of years during 1989-2013 a given state has an average minimum wage bounded by federal minimum wage. The dark shade reflects states that are mostly bounded by the federal mandated minimum wage. Calculated based on Source: Bureau of Labor Statistics.
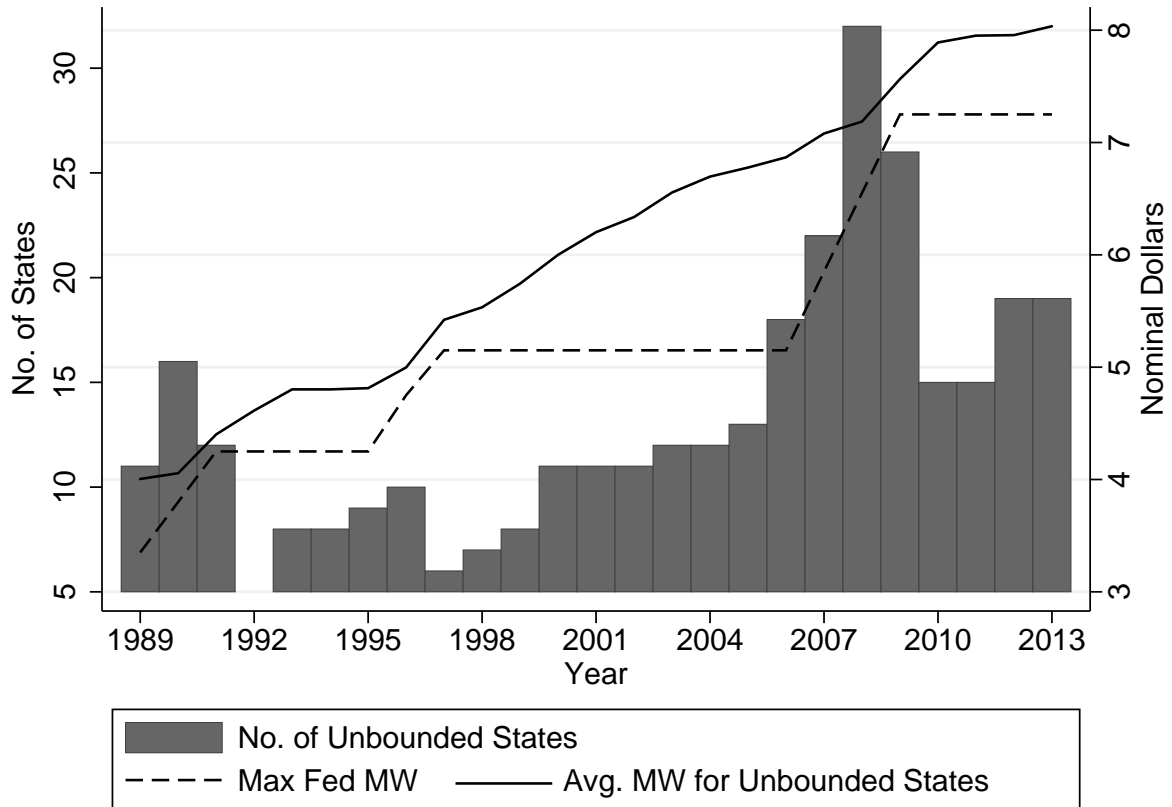
Figure 2: Minimum Wage and Unbounded States: The bar (left axis) shows by year the number of states with a minimum wage above the federal mandated minimum wage (unbounded states) in each year between 1989 and 2013. The dashed line and solid line (right axis) plots the average federal minimum wage per hour and the average minimum wage in unbounded states, respectively. Calculated based on Source: Bureau of Labor Statistics.
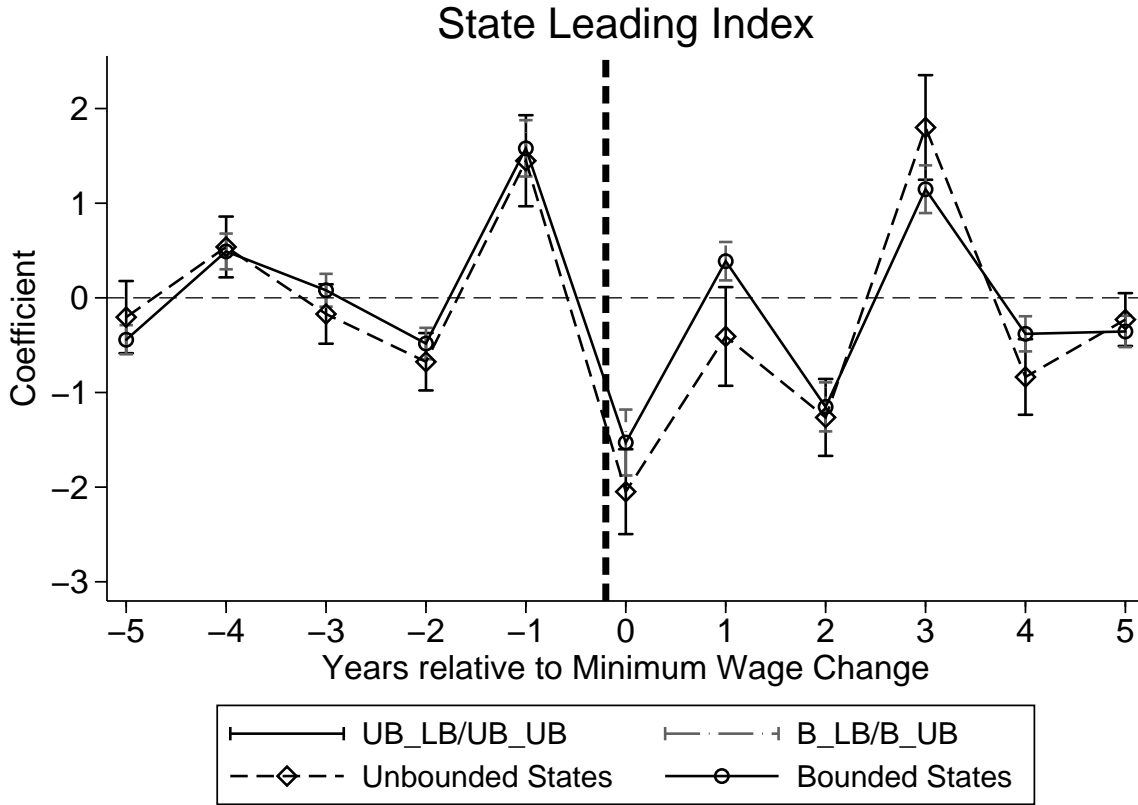
Figure 3: State Leading Index Dynamics: We test the dynamics of the differential trends of bounded versus unbounded states around federal minimum wage increases. This figure plots the regression coefficients of Equation (2) with 95% confidence interval. The solid line with circles plots the regression coefficients for bounded states, while the dashed line with diamonds plots the coefficient for unbounded states. The bold dashed line indicates the period immediately before the federal minimum wage change.
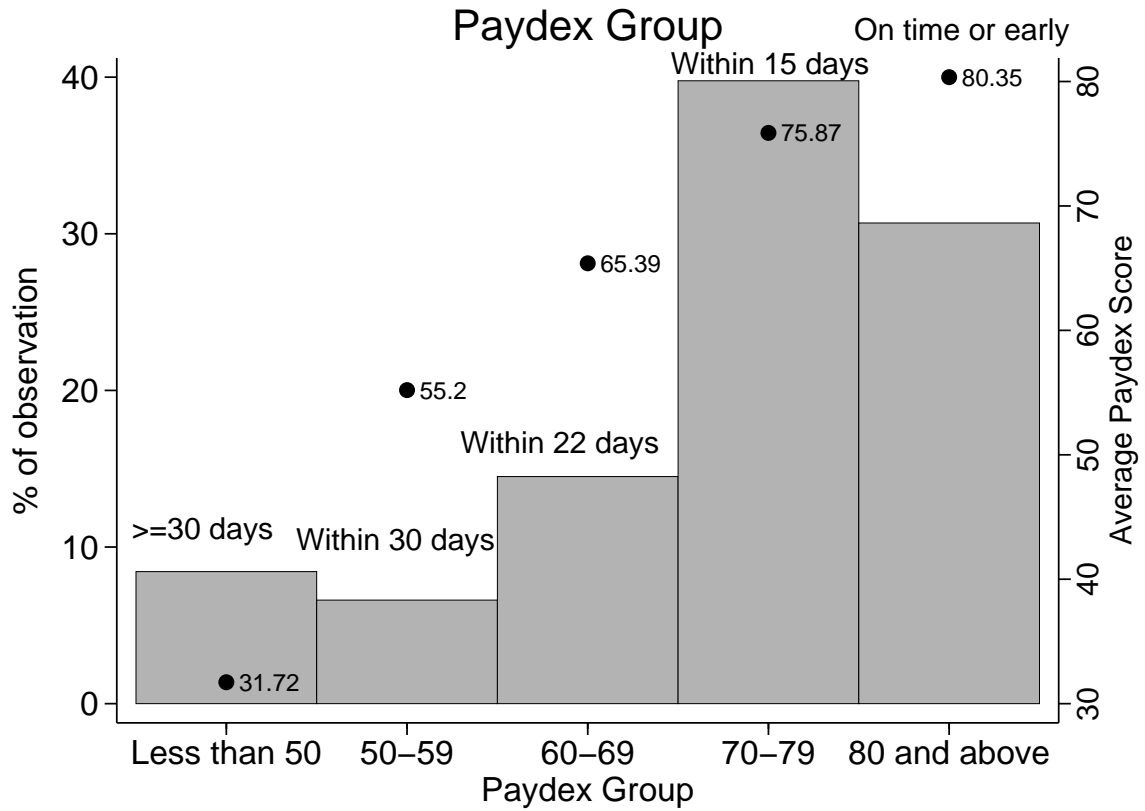
Figure 4: Paydex Group Summary: The bars in the figure plot the percentage of observations (left axis) in each Paydex group, while the dots represent the mean Paydex (right axis) score in each group.
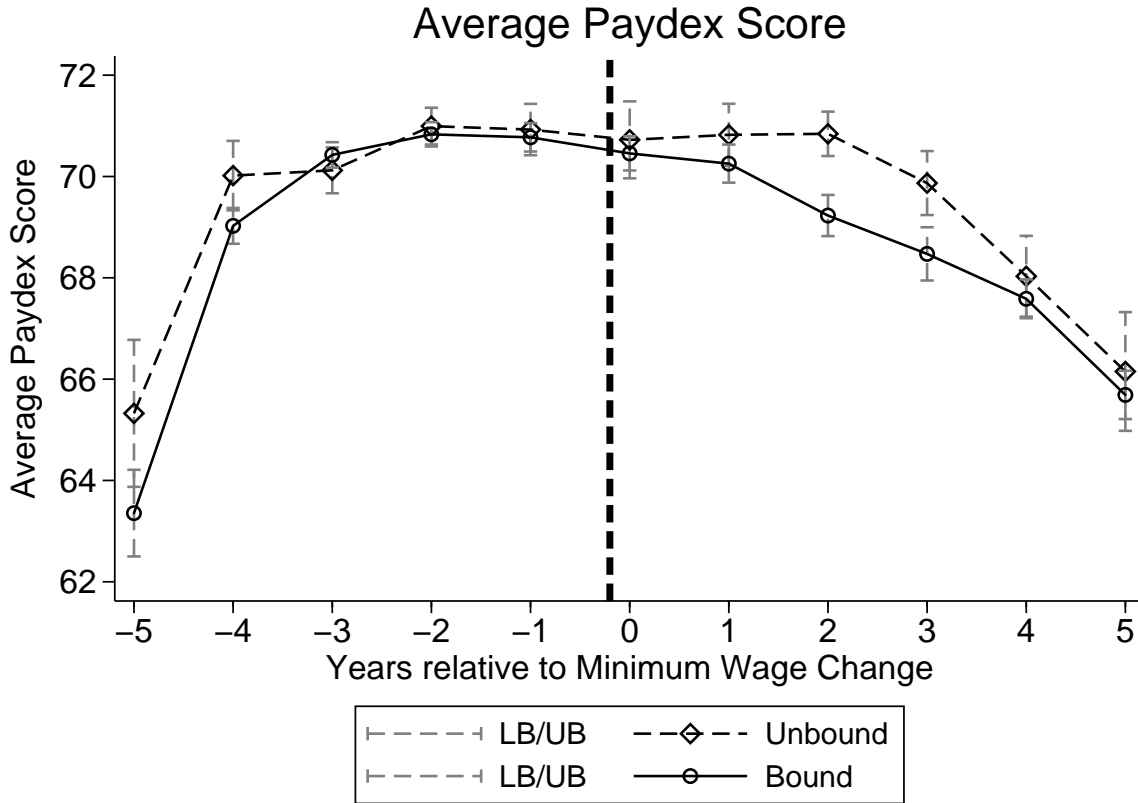
Figure 5: Paydex Score Dynamics I: We test the dynamics of the differential effect of the federal minimum wage on the Paydex scores for establishments located in bounded versus unbounded states. This figure plots the average Paydex Score with 95% confidence interval. The solid line with circle plots the average Paydex score for establishments located in bounded states, while the dashed line with diamonds plots the average Paydex score for unbounded states. The bold dashed line indicates the period immediately before the federal minimum wage change. Standard errors are in brackets and are clustered at the state level.
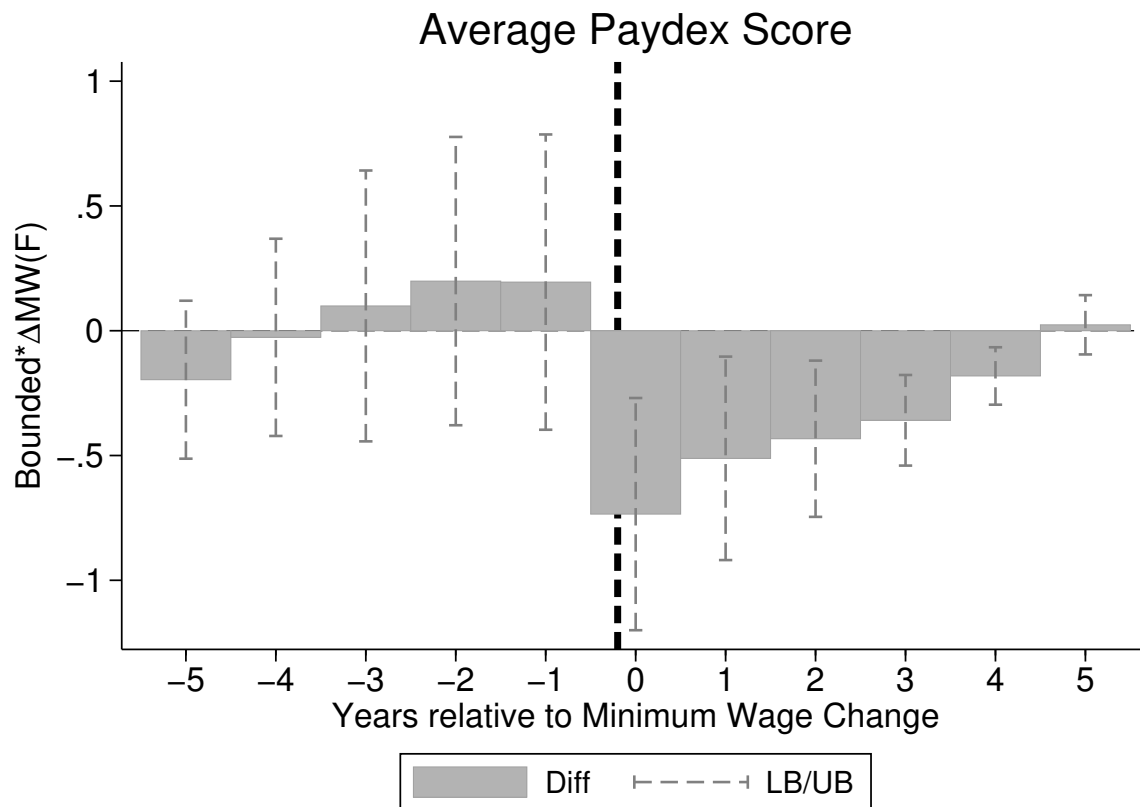
Figure 6: Paydex Score Dynamics II: We test the dynamics of the differential effect of the federal minimum wage on the Paydex scores for establishments located in bounded versus unbounded states. This figure plots the regression coefficients of Equation (3) with 95% confidence interval. The bars plot the regression coefficients of the interaction term identifying bounded states for five years before and after the federal minimum wage increase, while the dashed lines plot the 95% confidence interval. The bold dashed line indicates the period immediately before the federal minimum wage change.
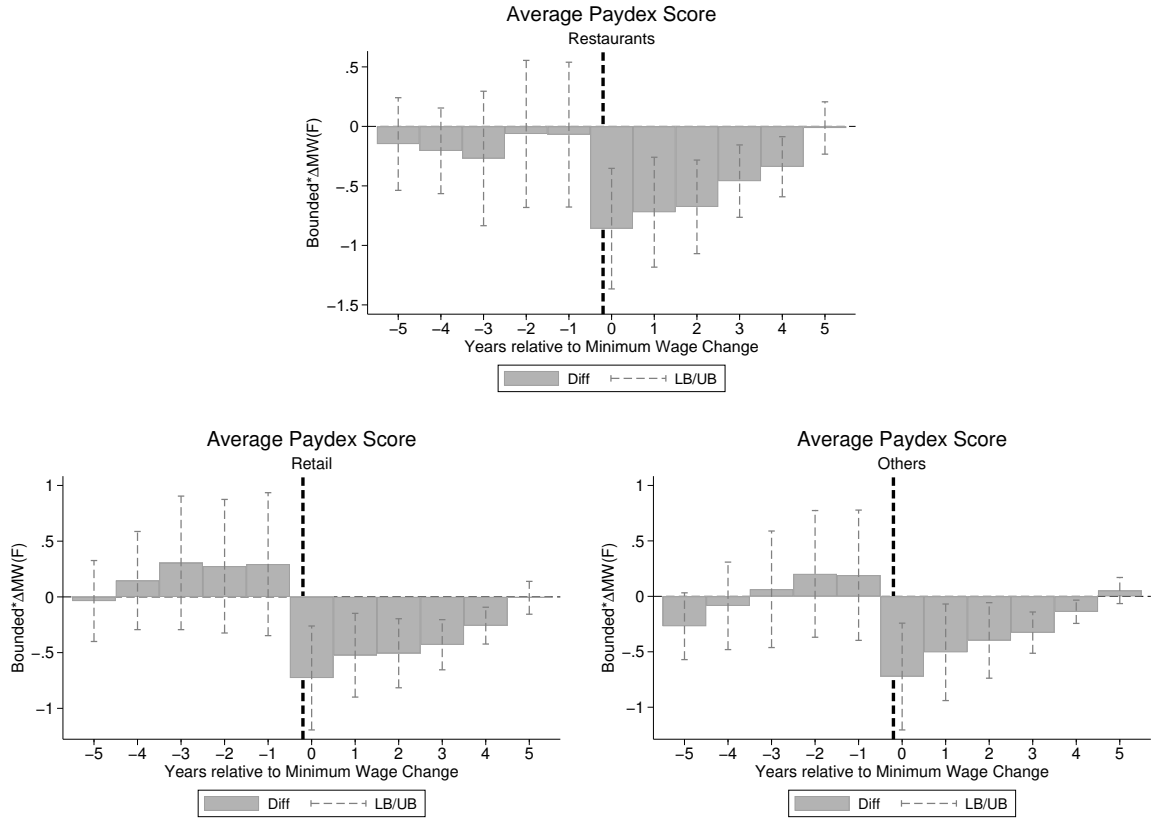
Figure 7: Paydex Score Dynamics–Industry Heterogeneity: We test the dynamics of the differential effect of the federal minimum wage on the Paydex scores for establishments located in bounded versus unbounded states based on industry heterogeneity. These figures plot the regression coefficients of Equation (3) with a 95% confidence interval for each group. The bold dashed line indicates the period immediately before the federal minimum wage change. We present plots for (a) Restaurants (NAICS2 72), (b) Retail (NAICS2 44 and 45), and (c) Others.
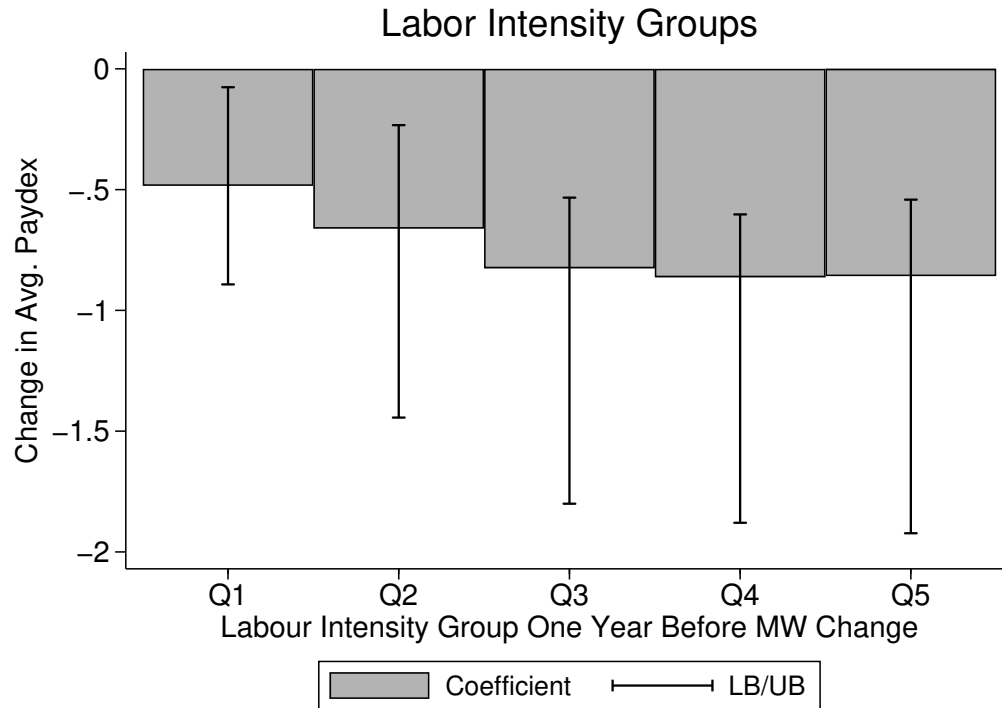
Figure 8: Paydex Score–Labor Heterogeneity: We test the differential effect of the federal minimum wage on the Paydex scores for establishments located in bounded versus unbounded states based on the establishment's labor intensity. These figures plot the regression coefficients of Equation (1) with 95% confidence interval, where we interact the equation with each quintile group based on labor intensity one year before the federal minimum wage change.
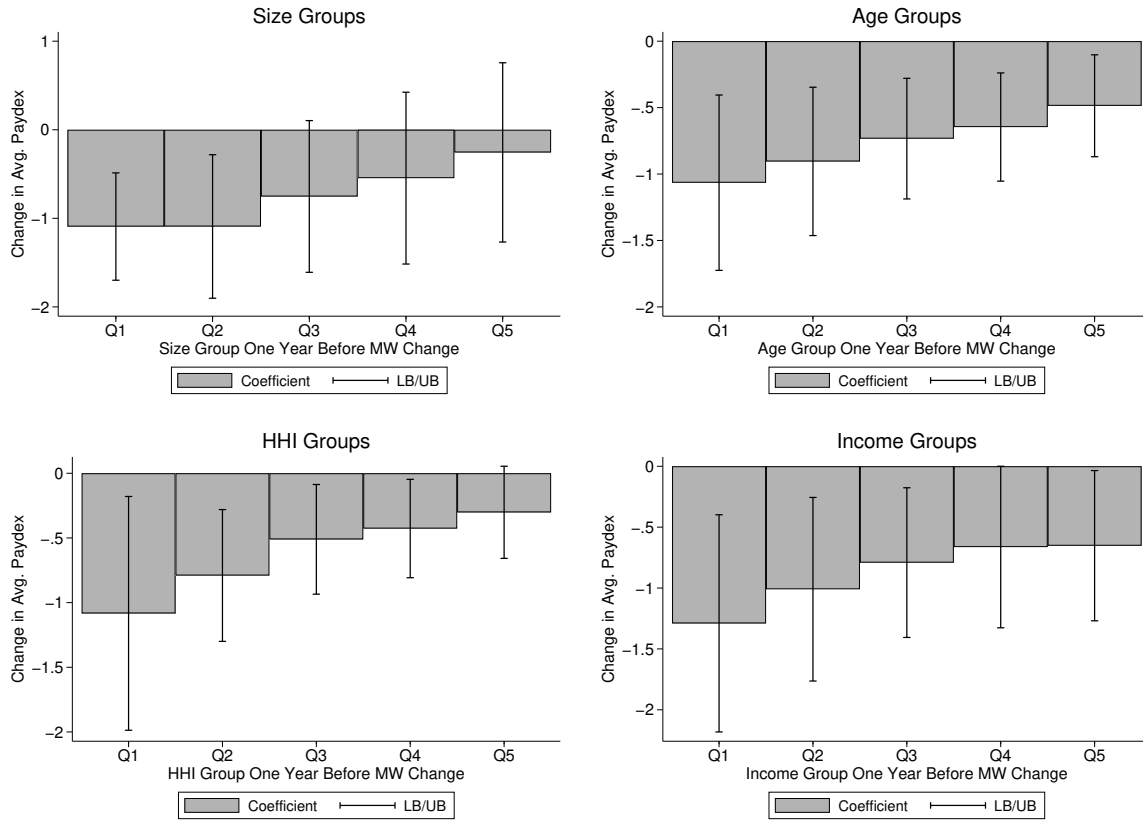
Figure 9: Paydex Score–Heterogeneity: We test the differential effect of the federal minimum wage on Paydex scores for establishments located in bounded versus unbounded states based on establishment's (a) size, (b) age, (c) local competition, and (d) local personal income. These figures plot the regression coefficients of Equation (1) with a 95% confidence interval, where we interact the equation with each quintile group based on the above measures one year before the federal minimum wage change.
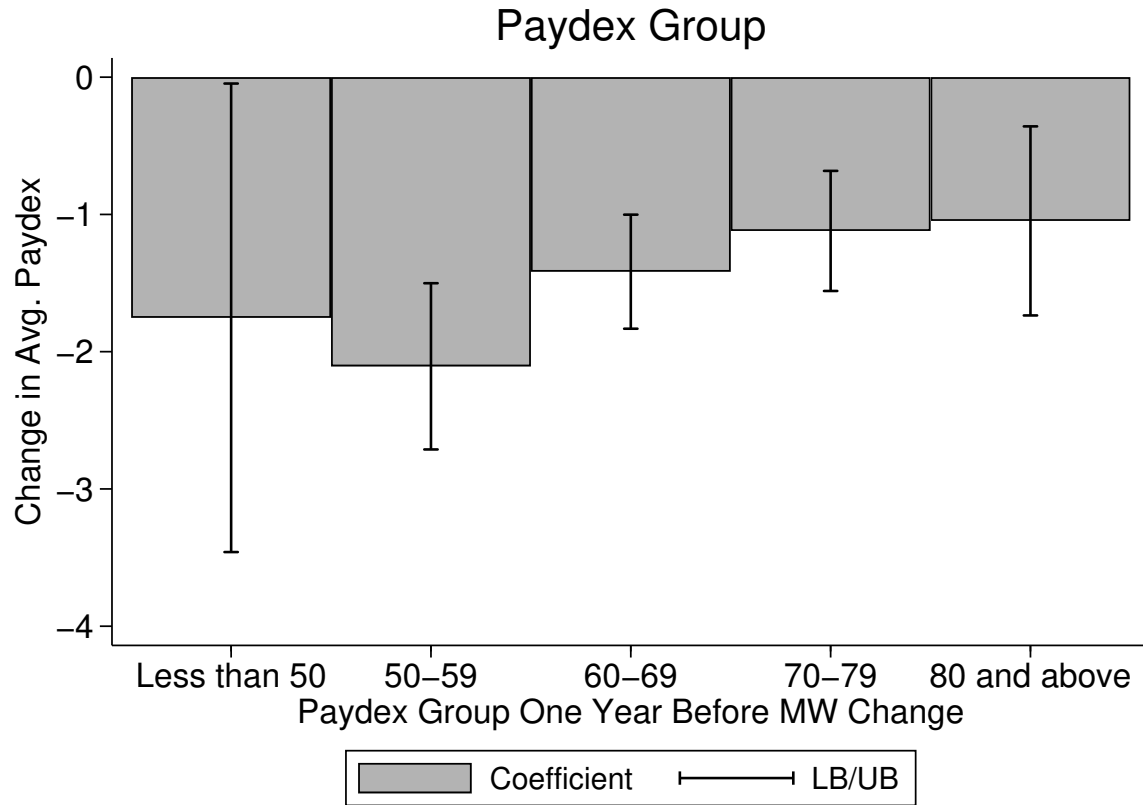
Figure 10: Paydex Group: The figure plots the regression coefficients of Equation (1) with 95% confidence interval for different Paydex groups defined one year before the federal minimum wage change for bounded and unbounded states.

Figure 11: Bank Loan Default: The figure plots the regression coefficient of the dynamics of the differential effect of the federal minimum wage on Paydex scores for establishments located in bounded versus unbounded states on the defaults of bank loans issued before the minimum wage increase. The figure here plots the regression coefficients of Equation (3) with a 95% confidence interval, where we run the Cox survival model stratified over the loan term and NAICS4 × year after controlling for loan size. The bars plot the regression coefficients of the interaction term identifying bounded states for 5 years before and after the federal minimum wage increase, while the dashed lines plot the 95% confidence interval. The bold dashed line indicates the period immediately before the federal minimum wage change.
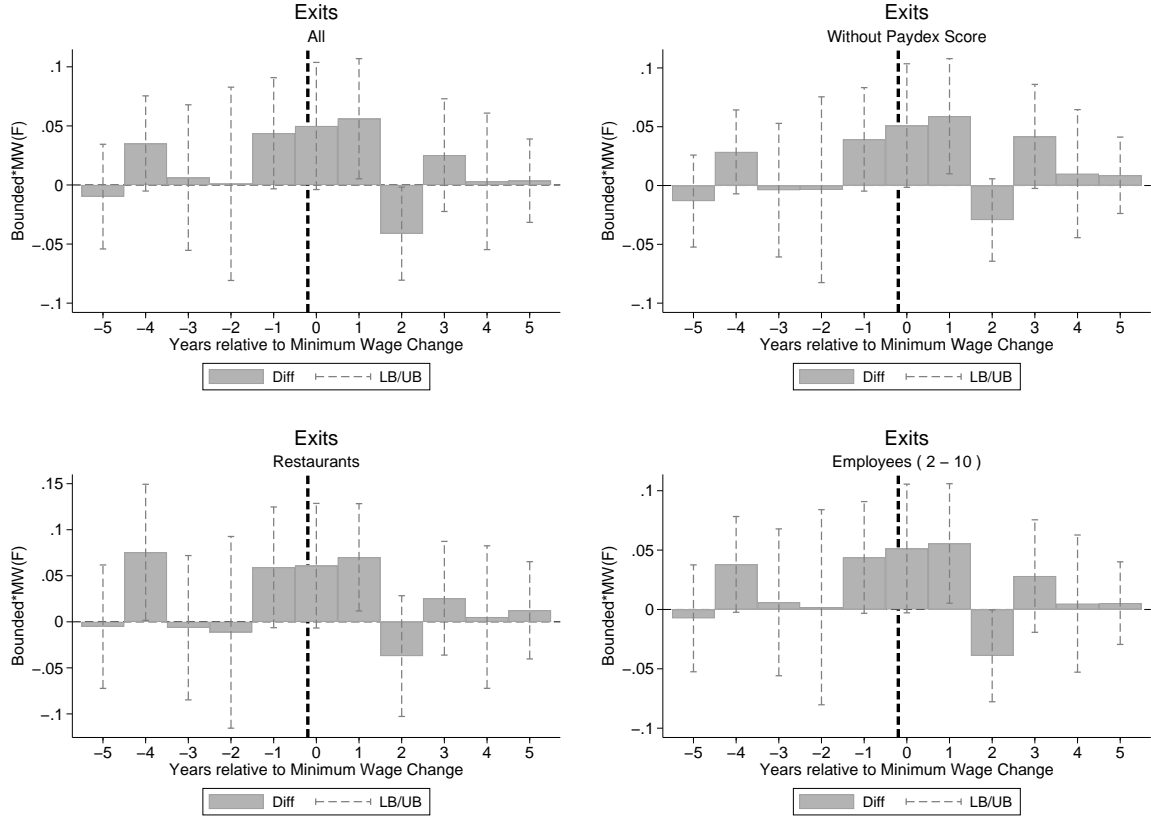
Figure 12: Exits: The figures plot the regression coefficient of the dynamics of the differential effect of the federal minimum wage for establishments located in bounded versus unbounded states on exit rates. We define our dependent variable, *Log(1+exits)* where we count the number of firm exits within each county–NAICS5 industry in a given year for (a) all industries, (b) businesses with no Paydex score, (c) restaurants (NAICS2 72), and (d) businesses with fewer than 10 workers. The figures plot the regression coefficient of the dynamics of the differential effect of the federal minimum wage for establishments located in bounded versus unbounded states on exits. These figures plot the regression coefficients of Equation (3) with a 95% confidence interval, where the exits at the county FIPS-NAICS5 level are calculated using NETS data. In regressions, we include county and NAICS5 × year fixed effects. The bars plot the regression coefficients of the interaction term identifying bounded states for five years before and after the federal minimum wage increase, while the dashed lines plot the 95% confidence interval. The bold dashed line indicates the period immediately before the federal minimum wage change.
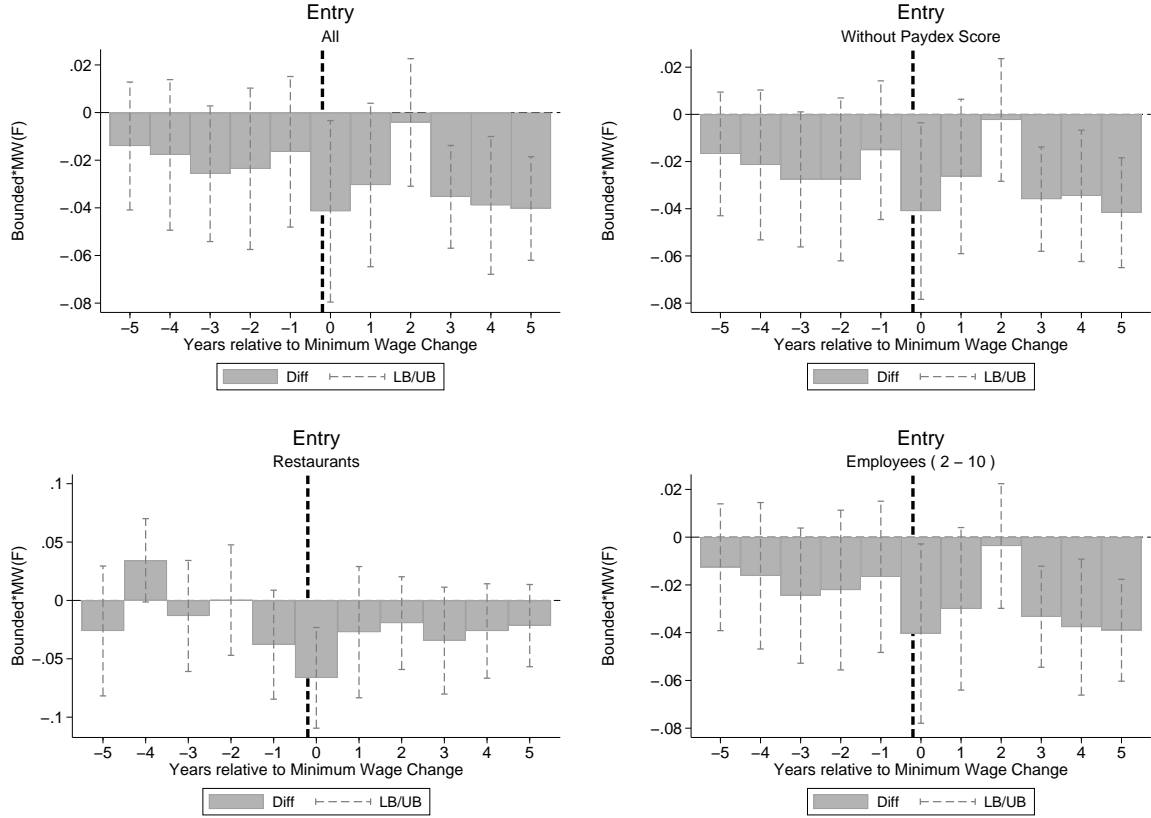
Figure 13: Entry: The figures plot the regression coefficient of the dynamics of the differential effect of federal minimum wage for establishments located in bounded versus unbounded states on entry rates. We define our dependent variable, *Log(1+entry)* where we count the number of firms enters within each county–NAICS5 industry in a given year for (a) all industries, (b) businesses with no Paydex score, (c) restaurants (NAICS2 72), and (d) businesses with fewer than 10 workers. The figures plot the regression coefficient of the dynamics of the differential effect of the federal minimum wage on establishments located in bounded versus unbounded states on entry rates. These figures plot the regression coefficients of Equation (3) with a 95% confidence interval, where the entry at the county FIPS-NAICS5 level are calculated using NETS data. In regressions, we include county and NAICS5×year fixed effects. The bars plot the regression coefficients of the interaction term identifying bounded states for five years before and after the federal minimum wage increase, while the dashed lines plot the 95% confidence interval. The bold dashed line indicates the period immediately before the federal minimum wage change.
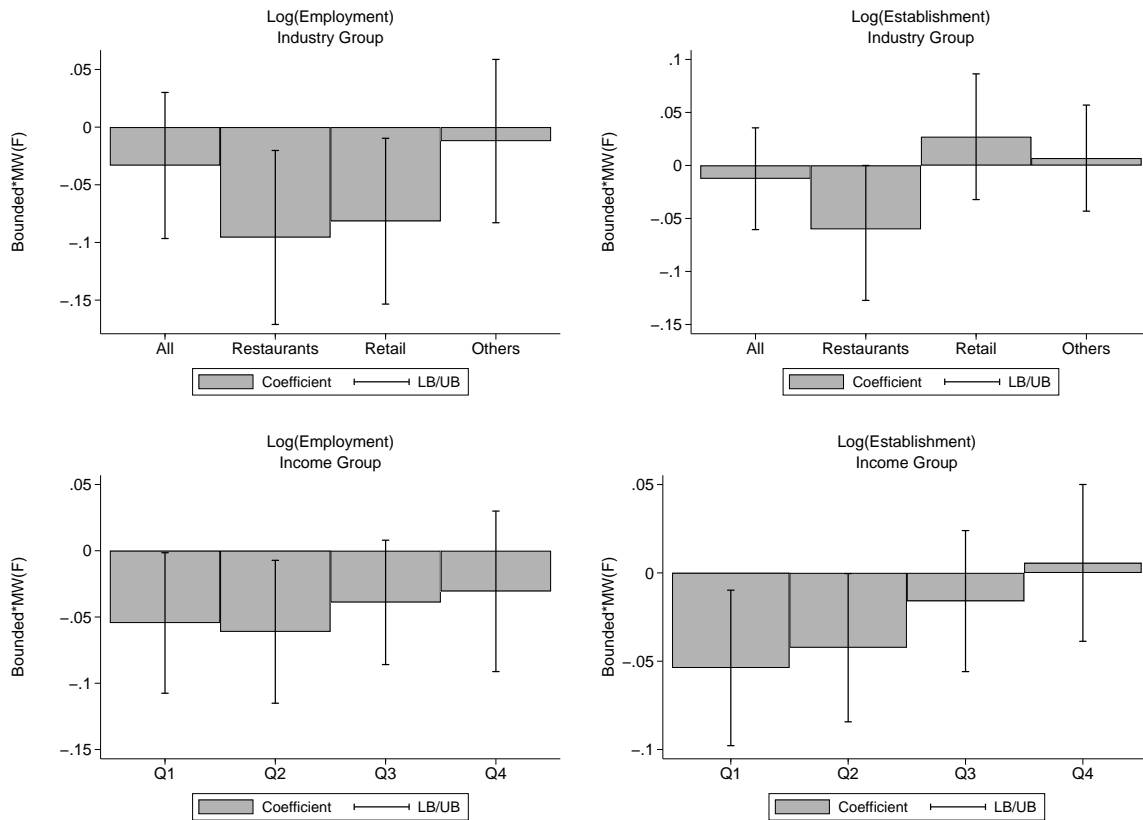
Figure 14: Aggregate Employment and Establishments: We test the differential effect of the federal minimum wage on (a) aggregate employment and (b) aggregate number of establishments in bounded versus unbounded states based on (a) industry and (b) local personal income. We utilize annual frequency of BLS Quarterly Census of Employment and Wages (QCEW) database for each county-NAICS2 for 1990-2013 and define our dependent variables as *Log(1+Employment)* and *Log(1+Establishment)*. These figures plot the regression coefficients of Equation (1) with a 95% confidence interval, where we interact the equation by each industry group and quartile group based on local personal income one year before the federal minimum wage change. In regressions, we include county and year fixed effects. The bars plots the regression coefficients of interaction term identifying bounded states and the federal minimum wage increase, while lines plot the 95% confidence interval.

Table 1: Summary Statistics

This table reports summary statistics for our sample. Panel A reports the summary statistics of establishment data. Panel B reports summary statistics for federal and state minimum wages during 1989-2013.

Panel A: Establishment Sample

	All			With Paydex Score			Without Paydex Score		
Observations	72,375,466			31,083,694			41,291,772		
	Median	Mean	SD	Median	Mean	SD	Median	Mean	SD
Paydex Score									
Minimum	74	67.35	17.13	74	67.35	17.13	-	-	-
Maximum	80	73.92	12.74	80	73.92	12.74	-	-	-
Average	76.5	70.63	13.12	76.5	70.63	13.12	-	-	-
Exit	0	0.05	0.21	0	0.03	0.16	0	0.06	0.24
Sales ($ millions)	0.25	0.71	1.33	0.49	1.41	3.12	0.17	0.34	0.68
Employees	3	6.8	9.7	5	10.90	17.68	2	4.29	5.82
Age (in years)	12	17.7	17.0	17	22	18.77	9	14.5	14.7
Employee-to-Sales	14.28	18.28	15.39	12.0	15.34	12.99	16.1	20.48	16.30
HHI Index	0.07	0.17	0.24	0.09	0.19	0.25	0.06	0.16	0.23

Panel B: Minimum Wage

	N	Median	Mean	SD
All				
Average Federal Minimum Wage ($ per hour)	1,275	5.15	5.25	1.13
Average State Minimum Wage ($ per hour)	1,275	5.15	5.50	1.29
$Bound_{t-1}$	1,275	1	0.74	0.44
$\Delta MW\,Dummy(F)$	1,275	0.00	0.44	0.50
For $\Delta MW\,Dummy(F)$=1				
$\Delta MW(F)$ ($ per hour)	561	0.34	0.35	0.22
%$\Delta MW(F)$	561	0.06	0.07	0.04
Bounded States				
Average Federal Minimum Wage ($ per hour)	939	5.15	5.14	1.09
Average State Minimum Wage ($ per hour)	939	5.15	5.17	1.10
For $\Delta MW\,Dummy(F)$=1				
$\Delta MW(S)$($ per hour)	399	0.34	0.34	0.26
%$\Delta MW(S)$	399	0.06	0.07	0.05
Unbounded States				
Average Federal Minimum Wage ($ per hour)	336	5.15	5.55	1.18
Average State Minimum Wage ($ per hour)	336	6.75	6.42	1.35
For $\Delta MW\,Dummy(F)$=1				
$\Delta MW(S)$ ($ per hour)	162	0.15	0.24	0.26
%$\Delta MW(S)$	162	0.03	0.04	0.05

Table 2: Effect of One-Size-Fits-All Minimum Wage on Business Credit Scores

This table reports results from our baseline regression Equation (1) estimating the differential effect of the federally mandated minimum wage on an establishment's credit score using the Paydex Score as a dependent variable. In Columns (1)–(3), we estimate the regression equation without establishment controls, while Columns (4)–(6) report results with a full set of establishment-level control variables ($X_{i,t-1}$) in our regressions: size (measured as Log(sales)), age (Log(age)), number of employees (Log(employees)), and sales growth. These variables are winsorized at their 1st and 99th percentiles. Column (1) and Column (4) report results for a minimum Paydex score during the year, while Column (2) and Column (5) report results for a maximum Paydex score during the year. In Column (3) and Column (6), we report results for an average score during the year measured as mean of the minimum and maximum score during the year. $Bound_{s,t-1}$ is a dummy variable equal to 1 if, at the beginning of fiscal year t establishment's state s has a state minimum wage less than or equal to the federal minimum wage. $\Delta MW(F)_t$ measures the nominal dollar increase in the federal minimum wage in year t, otherwise zero. Therefore, the interaction term, $Bound_{s,t-1} \times \Delta MW(F)_t$, identifies the differential effect of the federally mandated minimum wage over and above the effect of state-level variation caused by a change in the state-determined minimum wage and changing status from bound to unbound or vice versa. Standard errors are in brackets and are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent Variable:	Paydex Score					
	(1) Minimum	(2) Maximum	(3) Average	(4) Minimum	(5) Maximum	(6) Average
$Bound_{s,t-1} \times \Delta MW(F)_t$	-0.90***	-0.60**	-0.75***	-0.87***	-0.58***	-0.73***
	[0.30]	[0.23]	[0.24]	[0.30]	[0.21]	[0.23]
$Bound_{s,t-1}$	-0.04	-0.00	-0.02	-0.07	-0.03	-0.05
	[0.16]	[0.13]	[0.14]	[0.16]	[0.12]	[0.14]
Establishment Fixed Effects	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Establishment Controls				✓	✓	✓
Adjusted R^2	0.59	0.56	0.61	0.59	0.56	0.62
No. of Establishments		4,447,312			4,447,312	
Observations		31,031,426			31,031,426	

Table 3: Role of Local Economic Conditions

This table report results from our baseline regression Equation (1) where we include additional controls for local economic conditions at the state, county and ZIP code-level to our baseline specification, i.e., Column (6) of Table 2. In Column (1), we control for state-level economic conditions by including both the level and growth in GSP and population. In Column (2), we control for partisanship at the state level. In Column (3), we include the county-level lagged unemployment rate, the labor force, and growth in the unemployment rate. In Columns (4)–(6), we control for aggregate sales growth, personal income (lagged level and growth), and house price (lagged level and growth) at ZIP code level, respectively. In Column (7), we include all the controls at the state, county, and ZIP code level. Standard errors are in brackets and are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent Variable:	Average Paydex Score						
	State-Level		County-Level		Zip-Level		All
	(1) Economic Conditions	(2) Political Conditions	(3) Unemp. Rate	(4) Agg. Sales Growth	(5) Personal Income	(6) House Price	(7) All
$\text{Bound}_{s,t-1} \times \Delta MW(F)_t$	-0.83***	-0.71***	-0.67***	-0.73***	-0.88***	-0.64**	-0.59***
	[0.23]	[0.22]	[0.19]	[0.23]	[0.32]	[0.25]	[0.20]
$\text{Bound}_{s,t-1}$	-0.06	-0.01	-0.04	-0.05	0.12	0.05	0.10
	[0.11]	[0.15]	[0.12]	[0.14]	[0.23]	[0.15]	[0.14]
$\text{Log(GSP)}_{s,t-1}$	1.25***						0.69**
	[0.19]						[0.33]
$\text{GSP Growth }_{s,t-1}$	0.11*						0.01
	[0.06]						[0.07]
$\text{Log(Population)}_{s,t-1}$	-1.12***						-0.47*
	[0.24]						[0.26]
$\text{Population Growth}_{s,t-1}$	0.34***						0.19*
	[0.11]						[0.10]
$\text{Democratic Governor}_{s,t}$		0.03					-0.01
		[0.12]					[0.15]
$\text{Democratic House}_{s,t}$		0.11					0.20*
		[0.11]					[0.12]
$\text{Democratic Senate}_{s,t}$		0.21					0.03
		[0.13]					[0.15]
$\text{Democratic Both}_{s,t}$		-0.08					-0.07
		[0.14]					[0.19]
$\text{Unemployment Rate}_{c,t-1}$			-0.26***				-0.28***
			[0.03]				[0.05]
$\Delta \text{Unemployment Rate}_{c,t}$			-0.12***				-0.16***
			[0.02]				[0.02]
$\text{Log(Labor Force)}_{c,t-1}$			-0.00				0.06
			[0.04]				[0.06]
$\text{Agg. Sales Growth}_{z,t}$				0.05*			0.05
				[0.03]			[0.03]
$\text{Log(Personal Income)}_{z,t-1}$					0.58***		-0.74***
					[0.11]		[0.18]
$\Delta \text{Log(Personal Income)}_{z,t}$					0.16***		-0.10
					[0.06]		[0.12]
$\text{Log(House Price Index)}_{z,t-1}$						1.28***	1.11***
						[0.13]	[0.23]
$\Delta \text{Log(House Price Index)}_{z,t}$						0.35	-0.86**
						[0.33]	[0.38]
Establishment Fixed Effects	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓
Establishment controls	✓	✓	✓	✓	✓	✓	✓
Adjusted R^2	0.62	0.62	0.62	0.62	0.68	0.64	0.68
No. of Establishments	4,420,503	4,447,312	4,419,080	4,447,287	3,692,469	3,503,129	3,131,759
Observations	30,871,118	31,031,426	30,845,366	31,030,782	18,732,437	21,710,331	15,690,130

Table 4: Robustness Tests

In this table, we report results for various robustness tests of our baseline specification, i.e., Column (6) of Table 2. In Column (1), we report results in which we interact the establishment controls with the bound dummy. Column (2) reports regression results in which we include NAICS4 industry $\times$ year fixed effects. In Column (3), we do not omit any data and we report regression results on the full sample. In Column (4), we include all the industries that we omit from our baseline specification. In Column (5), we also include multi-establishment businesses to our baseline specification. In Column (6), we report results for multi-establishment businesses. We replace $\Delta MW(F)_t$ with $\%\Delta MW(F)_t$ and $\Delta MWDummy(F)_t$ and report results in Column (7) and Column (8), respectively. $\Delta MWDummy(F)_t$ is an indicator variable equal to 1 if there is an increase in federal minimum wage in year t, and 0 otherwise. While, $\%\Delta MW(F)_t$ is change measure indicating the percentage increase in the minimum wage by the federal government in year t, and 0 otherwise. In Column (9), we report the dynamics. $\Delta MWDummy(F)_t$ Yr1 is an indicator variable equal to 1 that identifies the years 1990, 1996, and 2007, and 0 in all other years. $\Delta MWDummy(F)_t$ Yr2 identifies the years 1991, 1997, and 2008, and 0 in all other years. $\Delta MWDummy(F)_t$ Yr3 identifies 2009. Standard errors are in brackets and are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent Variable:

	(1) Bound× Controls	(2) NAICS4 × Year FEs	(3) No Drop	(4) All Industries	(5) Include Multi-Est	(6) Only Multi-Est	(7) Percentage Change	(8) Dummy	(9) Series
				Average Paydex Score					
$Bound_{s,t-1} \times \Delta MW(F)_t$	-0.70*** [0.24]	-0.74*** [0.23]	-0.63*** [0.21]	-0.68*** [0.23]	-0.65*** [0.22]	-0.24* [0.13]			
$Bound_{s,t-1} \times \%\Delta MW(F)_t$							-3.85*** [1.33]		
$Bound_{s,t-1} \times \Delta MWDummy(F)_t$								-0.43*** [0.15]	
$Bound_{s,t-1} \times \Delta MWDummy(F)_t$ Yr1									-0.48* [0.25]
$Bound_{s,t-1} \times \Delta MWDummy(F)_t$ Yr2									-0.40** [0.17]
$Bound_{s,t-1} \times \Delta MWDummy(F)_t$ Yr3									-0.42** [0.17]
$Bound_{s,t-1}$	-0.57 [0.55]	-0.03 [0.13]	-0.04 [0.12]	-0.07 [0.13]	-0.07 [0.14]	-0.20 [0.16]	-0.06 [0.13]	-0.07 [0.14]	-0.07 [0.13]
Establishment Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
Establishment Controls	✓	✓		✓	✓	✓	✓	✓	✓
Adjusted R²	0.62	0.62	0.59	0.62	0.60	0.44	0.62	0.62	0.62
No. of Establishments	4,447,312	4,447,312	15,046,496	6,632,327	4,921,821	474,509	4,447,312	4,447,312	4,447,312
Observations	31,031,426	31,031,419	90,291,929	45,172,568	37,235,728	6,204,302	31,031,426	31,031,426	31,031,426

Table 5: Addressing Selection on Levels or Trends in Observable Characteristics: Nearest–Neighbor Matching

This table reports the results for an exact/nearest–neighbor match for our baseline regression Equation (1). For the federally mandated minimum wage increase from 2007–2009, we use matching methods to identify the control group. First, for the establishments in the bounded states (treatment group) in the year 2006, we identify exact matches based on the average Paydex score within the same NAICS4 industry from the unbounded states (control group). For these exact matches, we determine the nearest neighbor based on other covariates using Euclidean distance. In Table IA3, we report the balance for state-, county-, and ZIP code-level observable characteristics. This table reports the results of our baseline regression Equation (1) for 2006 to 2013 for the *matched pairs*. $Bound_{s,t-1}$ is a dummy variable equal to 1 if at the beginning of fiscal year t state s has a state minimum wage less than or equal to the federal minimum wage. $\Delta MW(F)_t$ is the dollar increase in the federal minimum wage in year 2007, 2008, and 2009, otherwise zero. Therefore, the interaction term, $Bound_{s,t-1} \times \Delta MW(F)_t$, identifies the differential effect of a federally mandated minimum wage over and above the effect of state-level variation caused by a change in the state-determined minimum wage and changing status from bound to unbound or vice versa. In Column (2)-Column (8), in addition to establishment-level controls, we also include the matching variables as controls. All regressions are with matched-pair fixed effects and year fixed effects. Standard errors are in brackets and are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent Variable:				Average Paydex Score				
	Establishment-Level	State-Level		County-Level		Zip-Level		All
	(1) Establishment Characteristics	(2) Economic Conditions	(3) Political Conditions	(4) Unemp. Rate	(5) Agg. Sales Growth	(6) Personal Income	(7) House Price	(8) All
$Bound_{s,t-1} \times \Delta MW(F)_t$	-0.79**	-0.76***	-0.65**	-0.56***	-0.75*	-0.65**	-0.38**	-0.75***
	[0.38]	[0.28]	[0.28]	[0.20]	[0.38]	[0.28]	[0.17]	[0.18]
$Bound_{s,t-1}$	0.54**	0.20	0.58***	0.00	0.52**	0.72***	0.27**	0.23*
	[0.24]	[0.17]	[0.18]	[0.11]	[0.23]	[0.18]	[0.11]	[0.12]
Matched-Pair Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Adjusted R^2	0.49	0.50	0.49	0.50	0.49	0.55	0.50	0.51
No. of Pairs	861,804	862,818	861,822	863,184	862,303	837,103	662,299	654,266
Observations	10,699,327	10,809,094	10,664,903	10,770,820	10,683,110	7,120,312	8,234,942	7,780,297

Table 6: Controlling for Local Economic Conditions: Bordering Counties

This table reports our baseline regression Equation (1) where we control for local economic conditions by analyzing the establishments located in the contiguous counties at the state borders. We keep data for establishments that exist in 2006 and utilize their data for 2004 to 2009. See Section 4.1.5 for more details. In Column (1) to Column (3), we do not include establishment fixed effects, while in Column (4) to Column (6), we include establishment fixed effects. $\mathbb{1}_{Distance\leq25}$ is a dummy variable that identifies the county pairs where the distance between the centroid of the bordering counties is less than 25 miles. Similarly, we define other $\mathbb{1}_{Distance}$ dummies. $\mathbb{1}_{\Delta\leq\$1.5}$ is a dummy variable that identifies the county pairs where the difference between the minimum wage of the bordering counties is less than $1.50. Similarly, we define all other $\mathbb{1}_{\Delta}$ dummies. Standard errors are in brackets and are clustered at the state level. $^{*}\ p < 0.10,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$.

Dependent Variable:	Average Paydex Score					
	All	Distance	Δ MW	All	Distance	Δ MW
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{Bound}_{s,t-1} \times \Delta MW(F)_t$	-0.53**			-0.48***		
	[0.21]			[0.07]		
$\text{Bound}_{s,t-1}$	0.21			0.15*		
	[0.13]			[0.08]		
$\text{Bound}_{s,t-1} \times \Delta MW(F)_t$		-0.93***			-0.49***	
$\times \mathbb{1}_{Distance\leq25}$		[0.17]			[0.11]	
$\text{Bound}_{s,t-1} \times \Delta MW(F)_t$		-0.68**			-0.28*	
$\times \mathbb{1}_{25<Distance\leq50}$		[0.27]			[0.14]	
$\text{Bound}_{s,t-1} \times \Delta MW(F)_t$		-0.19			0.55**	
$\times \mathbb{1}_{Distance>50}$		[0.70]			[0.24]	
$\text{Bound}_{s,t-1} \times \Delta MW(F)_t$			-0.44*			-0.26**
$\times \mathbb{1}_{\Delta<\$1.5}$			[0.26]			[0.12]
$\text{Bound}_{s,t-1} \times \Delta MW(F)_t$			-0.75***			-0.30***
$\times \mathbb{1}_{\Delta\geq\$1.5}$			[0.21]			[0.09]
County-Pair $\times$ Year Fixed Effects	✓	✓	✓	✓	✓	✓
Controls	✓			✓		
Group $\times$ Controls		✓	✓		✓	✓
Interactions		✓	✓	✓	✓	✓
Establishment Fixed Effects				✓	✓	✓
Adjusted R^2	0.03	0.04	0.04	0.75	0.75	0.75
Observations	1,308,996	1,308,996	1,308,996	1,303,823	1,303,823	1,303,823
$\mathbb{1}_{Distance\leq25}$ - $\mathbb{1}_{Distance>50}$		-0.74			-1.03	
p-value		0.31			0.00	
$\mathbb{1}_{\Delta<\$1.5}$ - $\mathbb{1}_{\Delta\geq\$1.5}$			0.31			0.04
p-value			0.39			0.81

Table 7: Heterogeneity: Labor Intensity

This table reports labor heterogeneity for our baseline regression Equation (1). We measure an establishment's labor intensity as the number of employees per $ 1 million in sales. We partition our sample into two groups using the median establishment labor intensity. We define the labor-intensity median one year before the federal minimum wage change, and we define *MoreLabor* as an indicator variable equal to 1 if the establishment's labor intensity exceeds the median labor intensity, and zero otherwise. We define *Less* as 1-*MoreLabor*. For *LessLabor* and *MoreLabor* establishments, we run our baseline model (i.e., Column (6) of Table 2), and we report the results in Column (1) and Column (2), respectively. In Columns (3) and (4), we conduct this analysis using triple interaction. In Column (3), we include establishment controls, establishment fixed effects, and state $\times$ year fixed effects. In Column (4), we further include NAICS4 $\times$ year fixed effects. Standard errors are in brackets and are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent Variable:	Average Paydex Score			
	(1) Less	(2) More	(3) All	(4) All
Bound$_{s,t-1}$ $\times$ $\Delta MW(F)_t$	-0.56**	-0.84***		
	[0.22]	[0.26]		
Bound$_{s,t-1}$	-0.05	-0.03		
	[0.14]	[0.13]		
More Labor $\times$ Bound$_{s,t-1}$ $\times$ $\Delta MW(F)_t$			-0.24***	-0.24***
			[0.08]	[0.08]
More Labor $\times$ Bound$_{s,t-1}$			0.01	-0.01
			[0.04]	[0.03]
More Labor $\times$ $\Delta MW(F)_t$			0.23***	0.27***
			[0.06]	[0.04]
Establishment Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓		
Establishment Controls	✓	✓	✓	✓
State $\times$ Year Fixed Effects			✓	✓
NAICS4 $\times$ Year Fixed Effects				✓
Adjusted R^2	0.59	0.66	0.62	0.62
No. of Establishments	2,073,441	2,829,919	4,420,503	4,420,503
Observations	15,324,301	15,314,557	30,871,118	30,871,111

Table 8: Heterogeneity: Establishment Size

This table reports the size heterogeneity for our baseline regression Equation (1). We partition our sample into two groups using median sales. We define the size median one year before the federal minimum wage change. We define *Small* as an indicator variable equal to 1 if an establishment's sale is below the median sales, otherwise zero. We define *Large* as 1-*Small*. For *Small* and *Large* establishments, we run our baseline model (i.e., Column (6) of Table 2), and we report the results in Column (1) and Column (2), respectively. In Columns (3) and (4), we conduct this analysis using triple interaction. In Column (3), we include establishment controls, establishment fixed effects, and state × year fixed effects. In Column (4), we further include NAICS4 × year fixed effects. Standard errors are in brackets and are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent Variable:	Average Paydex Score			
	(1) Small	(2) Large	(3) All	(4) All
$\text{Bound}_{s,t-1} \times \Delta MW(F)_t$	-1.02***	-0.46**		
	[0.30]	[0.21]		
$\text{Bound}_{s,t-1}$	0.02	-0.09		
	[0.15]	[0.15]		
Small × $\text{Bound}_{s,t-1} \times \Delta MW(F)_t$			-0.54***	-0.50***
			[0.08]	[0.08]
Small × $\text{Bound}_{s,t-1}$			0.12**	0.09**
			[0.05]	[0.04]
Small × $\Delta MW(F)_t$			0.70***	0.62***
			[0.06]	[0.05]
Establishment Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓		
Establishment Controls	✓	✓	✓	✓
State × Year Fixed Effects			✓	✓
NAICS4 × Year Fixed Effects				✓
Adjusted R^2	0.69	0.55	0.62	0.62
No. of Establishments	2,073,441	2,829,919	4,420,503	4,420,503
Observations	15,324,301	15,314,557	30,871,118	30,871,111

Table 9: Heterogeneity: Establishment Age

This table reports age heterogeneity for our baseline regression Equation (1). We partition our sample into two groups using the median establishment age. We define the age median one year before the federal minimum wage change, and we define *Young* as an indicator variable equal to 1 if the establishment's age is below the median age, otherwise zero. We define *Old* as 1-*Young*. For *Young* and *Old* establishments, we run our baseline model (i.e., Column (6) of Table 2), and we report the results in Column (1) and Column (2), respectively. In Columns (3) and (4), we conduct this analysis using triple interaction. In Column (3), we include establishment controls, establishment fixed effects, and state × year fixed effects. In Column (4), we further include NAICS4 × year fixed effects. Standard errors are in brackets and are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent Variable:	Average Paydex Score			
	(1) Young	(2) Old	(3) All	(4) All
$\text{Bound}_{s,t-1} \times \Delta MW(F)_t$	-0.84***	-0.58***		
	[0.29]	[0.21]		
$\text{Bound}_{s,t-1}$	-0.04	-0.05		
	[0.14]	[0.12]		
Young × $\text{Bound}_{s,t-1} \times \Delta MW(F)_t$			-0.28**	-0.25**
			[0.12]	[0.12]
Young × $\text{Bound}_{s,t-1}$			-0.35***	-0.35***
			[0.04]	[0.04]
Young × $\Delta MW(F)_t$			0.62***	0.58***
			[0.08]	[0.09]
Establishment Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓		
Establishment Controls	✓	✓	✓	✓
State × Year Fixed Effects			✓	✓
NAICS4 × Year Fixed Effects				✓
Adjusted R^2	0.69	0.57	0.62	0.62
No. of Establishments	2,073,441	2,829,919	4,420,503	4,420,503
Observations	15,324,301	15,314,557	30,871,118	30,871,111

Table 10: Heterogeneity: Local Competition

This table reports local competition heterogeneity for our baseline regression Equation (1). We measure local product market competition using the HHI index measured at NAICS5–county–year. We partition our sample into two groups. We define the HHI median one year before the federal minimum wage change, and we define *HighCompetition* as an indicator variable equal to 1 if an establishment's NAICS5–county–year HHI measure is below the median HHI, otherwise zero. We define *LowCompetition* as 1-*HighCompetition*. For establishments in *HighCompetition* and *LowCompetition* industry–county–years, we run our baseline model (i.e., Column (6) of Table 2), and we report the results in Column (1) and Column (2), respectively. In Columns (3) and (4), we conduct this analysis using triple interaction. In Column (3), we include establishment controls, establishment fixed effects, and state × year fixed effects. In Column (4), we further include NAICS4 × year fixed effects. Standard errors are in brackets and are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent Variable:	Average Paydex Score			
	(1) High	(2) Low	(3) All	(4) All
$\text{Bound}_{s,t-1} \times \Delta MW(F)_t$	-0.76**	-0.47**		
	[0.29]	[0.19]		
$\text{Bound}_{s,t-1}$	-0.07	-0.07		
	[0.15]	[0.12]		
High Competition × $\text{Bound}_{s,t-1} \times \Delta MW(F)_t$			-0.24**	-0.21**
			[0.10]	[0.10]
High Competition × $\text{Bound}_{s,t-1}$			0.07*	0.03
			[0.04]	[0.03]
High Competition × $\Delta MW(F)_t$			0.39***	0.29***
			[0.07]	[0.08]
Establishment Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓		
Establishment Controls	✓	✓	✓	✓
State × Year Fixed Effects			✓	✓
NAICS4 × Year Fixed Effects				✓
Adjusted R^2	0.63	0.62	0.62	0.62
No. of Establishments	2,073,441	2,829,919	4,420,503	4,420,503
Observations	15,324,301	15,314,557	30,871,118	30,871,111

Table 11: Heterogeneity: Local Personal Income

This table reports local personal income heterogeneity for our baseline regression Equation (1). We measure local personal income using IRS data at ZIP code-level. We partition our sample into two groups. We define the income median one year before the federal minimum wage change, and we define *MoreIncome* as an indicator variable equal to 1 if the personal income in an establishment's ZIP code is above the median income, otherwise zero. We define *LessIncome* as 1-*MoreIncome*. For establishments in *LessIncome* and *MoreIncome* ZIP codes, we run our baseline model (i.e., Column (6) of Table 2), and we report the results in Column (1) and Column (2), respectively. In Columns (3) and (4), we conduct this analysis using triple interaction. In Column (3), we include establishment controls, establishment fixed effects, and county FIPS × year fixed effects. In Column (4), we further include NAICS4 × year fixed effects. Standard errors are in brackets and are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent Variable:	Average Paydex Score			
	(1) Less	(2) More	(3) All	(4) All
$\text{Bound}_{s,t-1} \times \Delta MW(F)_t$	-1.08***	-0.61*		
	[0.37]	[0.31]		
$\text{Bound}_{s,t-1}$	0.21	0.03		
	[0.26]	[0.20]		
Less Income × $\text{Bound}_{s,t-1} \times \Delta MW(F)_t$			-0.23***	-0.23***
			[0.06]	[0.06]
Less Income × $\text{Bound}_{s,t-1}$			0.10***	0.11***
			[0.03]	[0.03]
Less Income × $\Delta MW(F)_t$			0.29***	0.29***
			[0.06]	[0.04]
Establishment Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓		
Establishment Controls	✓	✓	✓	✓
County × Year Fixed Effects			✓	✓
NAICS4 × Year Fixed Effects				✓
Adjusted R^2	0.68	0.67	0.67	0.67
No. of Establishments	2,359,556	1,757,668	3,885,352	3,885,352
Observations	12,278,824	8,511,296	21,151,603	21,151,603

Table 12: Impact on Bank Loan Amount

This table reports the results from regression Equation(3) estimating the differential effect of the federally mandated minimum wage on SBA guaranteed bank loans to small businesses. In Column (1), we report results with state and NAICS4 × year fixed effects. In Column(2), we add state-level controls on economic conditions (i.e., GSP and population, both level and growth). In Columns (3) and (4), we replace state fixed effects with borrower ZIP code fixed effects. Standard errors are in brackets and are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent Variable:	Log(Loan Amount)			
	(1)	(2)	(3)	(4)
$Bound_{s,t-1} \times \Delta MWDummy(F)_{t-5}$	0.03	0.03	0.04	0.05
	[0.11]	[0.09]	[0.11]	[0.09]
$Bound_{s,t-1} \times \Delta MWDummy(F)_{t-4}$	0.08	0.07	0.07	0.08
	[0.08]	[0.08]	[0.07]	[0.08]
$Bound_{s,t-1} \times \Delta MWDummy(F)_{t-3}$	-0.01	-0.03	-0.01	-0.01
	[0.07]	[0.08]	[0.07]	[0.08]
$Bound_{s,t-1} \times \Delta MWDummy(F)_{t-2}$	-0.12	-0.15	-0.10	-0.13
	[0.07]	[0.08]	[0.07]	[0.08]
$Bound_{s,t-1} \times \Delta MWDummy(F)_{t-1}$	-0.04	-0.08	-0.04	-0.06
	[0.07]	[0.09]	[0.06]	[0.09]
$Bound_{s,t-1} \times \Delta MWDummy(F)_{t}$	-0.04	-0.07	-0.04	-0.07
	[0.07]	[0.10]	[0.07]	[0.10]
$Bound_{s,t-1} \times \Delta MWDummy(F)_{t+1}$	-0.15**	-0.17*	-0.14**	-0.16*
	[0.07]	[0.09]	[0.06]	[0.09]
$Bound_{s,t-1} \times \Delta MWDummy(F)_{t+2}$	-0.17**	-0.19**	-0.15*	-0.17*
	[0.08]	[0.09]	[0.08]	[0.09]
$Bound_{s,t-1} \times \Delta MWDummy(F)_{t+3}$	-0.14**	-0.17**	-0.13**	-0.16**
	[0.06]	[0.07]	[0.06]	[0.07]
$Bound_{s,t-1} \times \Delta MWDummy(F)_{t+4}$	-0.10*	-0.12**	-0.11*	-0.12**
	[0.06]	[0.05]	[0.06]	[0.05]
$Bound_{s,t-1} \times \Delta MWDummy(F)_{t+5}$	-0.05	-0.08	-0.05	-0.07
	[0.06]	[0.05]	[0.06]	[0.05]
State Fixed Effects	✓	✓		
ZIP code Fixed Effects			✓	✓
State Controls		✓		✓
NAICS4 × Year Fixed Effects	✓	✓	✓	✓
Adjusted R^2	0.21	0.21	0.24	0.24
Observations	909,393	775,772	902,409	768,633

Table 13: Exits After Minimum Wage Increases

This table reports the results from regression Equation (1) estimating the differential effect of the federally mandated minimum wage on the probability of small business exits. We measure *exit* as the last year of the establishment in the NETS database. Thus, $Exit(=1)_{t+1}$, is a dummy variable measuring the probability of exit in year $t+1$. $SameScore_{it}$ (80) is a dummy variable identifying establishment–years in which the establishment does not observe any change in Paydex score (80) from year t-1 to year t. While, $Downgrade_{it}$ (80 to 79) is a dummy variable identifying establishment–years in which the establishment observes a drop in average score from 80 in year t-1 to 79 in year t. All other downgrade variables are similarly defined. In addition to the reported coefficients, in all regressions, we include the dummy for each group and its interaction term with the bound dummy. Standard errors are in brackets and are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent Variable:			$Exit(=1)_{t+1}$			
	(1)	(2)	(3)	(4)	(5)	(6)
$Bound_{s,t-1} \times \Delta MW(F)_t$	-0.016***					-0.016***
$\times SameScore_{it}$ (80)	[0.005]					[0.005]
$Bound_{s,t-1} \times \Delta MW(F)_t$		0.022***				0.018***
$\times Downgrade_{it}$ (80 to 79)		[0.003]				[0.003]
$Bound_{s,t-1} \times \Delta MW(F)_t$			-0.004			-0.006
$\times Downgrade_{it}$ (81 to 80)			[0.005]			[0.004]
$Bound_{s,t-1} \times \Delta MW(F)_t$				0.021**		0.019*
$\times Downgrade_{it}$ (70 to 69)				[0.010]		[0.010]
$Bound_{s,t-1} \times \Delta MW(F)_t$					0.016*	0.014
$\times Downgrade_{it}$ (71 to 70)					[0.009]	[0.009]
$Bound_{s,t-1} \times \Delta MW(F)_t$	-0.007	-0.009**	-0.008*	-0.008*	-0.008*	-0.007
	[0.005]	[0.004]	[0.004]	[0.004]	[0.004]	[0.005]
$Bound_{s,t-1}$	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Interaction terms	✓	✓	✓	✓	✓	✓
Establishment Fixed Effects	✓	✓	✓	✓	✓	✓
Establishment Controls	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Adjusted R^2	0.18	0.18	0.18	0.18	0.18	0.18
No. of Establishments	3,274,815	3,274,815	3,274,815	3,274,815	3,274,815	3,274,815
Observations	22,316,622	22,316,622	22,316,622	22,316,622	22,316,622	22,316,622