Impacts of Minimum Wage Increases in the US Retail Sector: Full-time versus Part-time

Employment

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Abstract

State and federal minimum wage hikes are likely to impact the retail industry employing a great number of less well-compensated part-time workers. Despite the relevance of this issue, it is not clear how minimum wage increases affect full-time and part-time retail employees differentially. In this study, using state-level monthly data from the Current Population Survey (CPS), we find that minimum wage hikes lead to rising part-time wages, but not to declining part-time employment. Instead, retailers reduce their full-time employment and hours of full-time workers in order to stay within a labor budget and keep serving their customers.

Keywords: employment, full-time labor, human resources, minimum wage, part-time labor, retailing

JEL Codes: J23, J30, L81

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1. Introduction

The retail sector employs a great number of US workers. According to Dorfman (2014) and Hortaçsu and Syverson (2015), this industry accounts for nearly 11 percent of total nonfarm US employment in 2014 while employing a higher proportion of part-time workers (31 percent) in comparison to non-retail sectors (17 percent) in 2013. Because retail stores are almost everywhere across the US, retail employment is critical to regional economic growth. Full-time workers tend to have lower turnover rates and are therefore believed to accumulate higher occupational skills over time (Thurik and Van der Wijst 1984; Hirsch 2005). On the other hand, part-time workers tend to be less skilled and less well-compensated than their full-time counterparts, often with low or no employee benefits. Nevertheless, part-timers are a major source of flexible labor, particularly to fill in the gaps between “normal” full-time working hours and relatively longer store hours—often 24 hours a day in the case of the US retail grocery sector—and to serve customers during periods of high demand (Thurik and Van der Wijst 1984; Tilly 1991; Künn-Nelen et al. 2013; Owen 2015).

A number of US states have enacted policies to increase minimum wages in recent years. Hourly minimum wage rates are increasing annually to reach $15 in California by 2022, $15 in New York by 2018, $13.50 in Washington by 2020 and $12 in Arizona by 2020, to name a few (Jennings 2017). These changes may have either positive or negative impacts on retail workers. Therefore, current policy discussions for implementing minimum wage changes have been debated extensively in state legislatures, trade publications, and the popular press. Advocates of these policies posit that minimum wage hikes increase the welfare of workers and are unlikely to cause adverse effects on retail employment (Seitz-Wald 2016; Dance 2018). Critics claim the opposite, that rising minimum wages hurt employment, particularly for the retail trade (Bose 2018;
Mourdoukoutas 2018). Given that full-time and part-time workers play different roles in retail businesses, it is reasonable to expect that minimum wage changes may affect them differently. The purpose of this paper is to provide empirical evidence on how state and federal minimum wage hikes influence 1) wages, 2) employment and 3) hours of work for part-time and full-time retail workers, respectively.

Retailers spend substantial resources on personnel. For example, grocers’ labor costs account for about 14 percent of their total revenue, larger than any other component of total costs other than the cost of goods sold (Progressive Grocer 2017). This indicates that adjustment of wage rates upwards caused by minimum wage hikes are likely to have a profound effect on retail businesses. To address such cost increases, retailers may respond by adjusting their employment, hours of work, or both. Further, retailers may respond by substituting full-time workers for less expensive part-time workers. This may affect the composition of the retail labor force, or the part-time to full-time workers ratio. At the same time, this may decrease retail performance further because part-time workers are arguably less well-equipped to deliver desired customer service levels, a key driver of store profitability, in comparison to full-time workers (Lam 1998; Grewal et al. 2003; Gómez et al. 2004; Kumar 2005; Kumar et al. 2013).

Despite the importance of minimum wage policies on retail full-time and part-time employment, the academic literature on this topic is scarce and the evidence has remained inconclusive. Gramlich et al. (1976) and Ressler et al. (1996) use aggregated data across all industries and find that minimum wage increases lead to a rise in part-time employment. On the other hand, McKee and West (1984) and Hsing (2000) report a negative relationship between minimum wages and the part-time/full-time worker ratio. Nevertheless, no studies have investigated which type of employment (i.e. full- and part-time) is more affected by minimum
wage increases in the retail trade sector. Moreover, the literature has not investigated minimum wage effects on hours of work for full-time and part-time employees separately. Our study fills these gaps by investigating how state and federal minimum wage hikes impact wage rates, employment, and hours of work for full-time and part-time retail workers. If increases in state and federal minimum wages result in decreases in full-time workers, retailers may fail to accumulate human capital in the long run. On the other hand, if they lead to reduction in part-time employment, retailers may find it difficult to maintain previously desired levels of customer service, possibly leading to lower customer satisfaction levels and sales performance. It is an empirical question how minimum wage increases impact full- and part-time workers differentially.

Our study is also related to the more general discussion on minimum wage hikes in which evidence on employment effects of minimum wages is mixed. Neumark and Wascher (1992, 2000), Neumark et al. (2004), Neumark et al. (2014), Neumark and Wascher (2017), and Jardim et al. (2017, 2018) find that minimum wage hikes lead to a reduction in employment, while Card (1992a, 1992b), Katz and Krueger (1992), Card and Krueger (1994, 1995 and 2000), Dube et al. (2010), and Allegretto et al. (2011) report a zero or positive impact of minimum wage increases on employment. There has been relatively limited research focusing on the retail trade sector. Addison et al. (2009) and Giuliano (2013) report a zero or no impact of minimum wage increases on retail employment. In contrast, Kim and Taylor (1995) find a negative impact on employment, and further, Sabia (2009) finds a positive impact on hours of work for retail employees, implying that if minimum wages increase, retailers tend to reduce their workforce and encouraging the remaining employees to work more hours to compensate for the eliminated positions. Nevertheless, no studies on the retail sector have examined possible differential effects among full-time and part-time retail
workers. Our study is the first to provide empirical evidences of how state and federal minimum wage hikes influence part-time and full-time workers in the retail sector differentially.

To evaluate impacts of state and federal minimum wage increases on retail employment, hours of work and wage rates for full-time and part-time retail workers, we employ state-level monthly data from the Current Population Survey (CPS) of the US Census Bureau for the period April 2008 – March 2018 (Card and Krueger 1995; Burkhauser et al. 2000; Sabia 2009). We find a positive and statistically significant relationship between state and federal minimum wages and wage rates for part-time workers, but only a modest impact on wage rates for full-time workers. Further, our results indicate that despite of the rising wage for part-time workers, retailers tend to reduce the number of full-time workers instead of part-time workers, while shortening hours of full-time work. Taken together, our results suggest that full-time workers are disproportionally hurt by state and federal minimum wage increases in the retail sector.

Our findings have practical implications for both policymakers and retailers. For policymakers, legislation to increase the minimum wage may be counterproductive because full-time work is generally a major source of household income. For retailers, the reduction in full-time employment may mean not only the decline in customer service and sales performance levels but also the loss of a human capital. Compared with part-time workers, full-time workers often have more extensive training opportunities to develop their skills such as leadership and effective communication skills, retail selling skills, and forecasting and sales management skills. Therefore, full-time work reductions may imply lower levels of human capital accumulation in the retail sector.

The remainder of this paper is organized as follows. In the second section, we review the relevant literature on minimum wage and full-time versus part-time workers in the retail trade and develop testable hypotheses associated with state and federal minimum wage changes. In the third
section, we explain the econometric methods, and in the fourth section, we describe the data. In the fifth section, we present the estimation results and interpret our findings, while we conclude, and offer some implications for labor policy and retail business in the sixth section.

2. Conceptual Framework and Hypothesis Development

In this section, we provide a brief overview of prior studies on minimum wages and discuss our hypotheses. We develop three hypotheses as to impacts of minimum wage hikes on wage rates, employment and hours of work for full-time and part-time retail workers.

Literature Review

The economic impacts of minimum wage changes have long been a central issue among policy makers and researchers. The intent of minimum wage legislation is often to improve the welfare of workers by increasing their income. According to the standard theory of competitive labor markets, however, firms are likely to decrease employment in response to minimum wage hikes (Card and Krueger 1995). If a firm is required to offer a wage rate above the market equilibrium, its marginal product of labor must increase in order to maximize profits. Accordingly, firms may substitute away from more expensive labor toward capital. Alternatively, firms may simply reduce output thus labor demand. In both cases, the firm reduces its employment although potential labor supply rises due to the attractiveness of increased minimum wage, so unemployment is likely to rise. If this is the case, policies to increase the minimum wage may be counterproductive.

A number of studies have empirically evaluated impacts of minimum wage increases. Card (1992a, 1992b), Katz and Krueger (1992), Card and Krueger (1994, 1995 and 2000), Dube et al. (2010), and Allegretto et al. (2011) use econometric analyses of panel data and find either zero or,
in other cases, a significant positive impact of minimum wages on employment.\textsuperscript{1} Using similar methods, however, Neumark and Wascher (1992, 2000), Neumark et al. (2004), Neumark et al. (2014), and Neumark and Wascher (2017) report that a 10-percent increase in a minimum wage is associated with approximately a 1–2 percent decrease in employment. Neumark and Wascher (2007) conduct an extensive survey of the minimum wage literature and conclude that nearly two-thirds of studies support a negative association between minimum wage increases and employment, which is consistent with neoclassical economic theory. While in the retail industry, Sabia (2009) finds that a 10 percent increase in the minimum wage causes a 0.7–1.1 percent decrease in retail employment, Addison et al. (2009) and Giuliano (2013) find no significant negative impact of minimum wage hikes on retail employment. Therefore, there is no consensus in the literature and further examination of this relationship is warranted in light of current legislation contemplating new minimum wage laws across the US.

In the minimum wage literature, others with a few exceptions have not examined effects on full-time and part-time workers. Gramlich et al. (1976) and Ressler et al. (1996) find that minimum wage increases lead to a rise in part-time employment. On the other hand, McKee and West (1984) and Hsing (2000) report a negative relationship between minimum wages and the part-time/full-time worker ratio. However, all of them aggregate data across all industries, and thus are unable to offer insight as to how full-time or part-time labor changes in the retail trade sector. In addition, they are silent about how hours of full-time and part-time labors change in response to minimum wage hikes although firms are likely to change hours of work as well as the number of workers (Zavodny 2000; Sabia 2009). Our study addresses these issues by studying wage rates,

\textsuperscript{1} Imperfect competition in the labor market is a cause of the increased employment. If an employer has monopolistic power due to limited mobility of its employees, it is likely to reduce the number of employees and their wage rate to levels that are lower than a competitive equilibrium. Under this situation, the employer is able to increase a profit by hiring more employees and producing more outputs even if a minimum wage increases (monopsony).
employment, and hours of work for full-time and part-time workers respectively in the retail trade sector.

*Retail Wage rates*

In this paper, we first examine the impact of state and federal minimum wage increases on wage of full-time and part-time retail workers. CPS data spanning the period April 2008 – March 2018 (Flood et al. 2017) shows that full-time workers are paid 63 percent higher than part-time workers. Because wage levels of part-time workers are closer to a minimum wage, a change in a minimum wage may have a greater effect on part-time workers than full-time workers. Therefore, we hypothesize that:

**H1.** State and federal minimum wages hikes raise wage rates for part-time retail workers to a greater degree than full-time retail workers.

*Retail employment*

Retailers are likely to decrease their labor demand if they face an increase in labor costs. Further, if H1 holds, the standard economic theory predicts that the number of part-time workers drop more than that of full-time workers. However, this is true only if different units in a retailer independently decide how many workers of each type they employ. Further, in retail operations, part-time workers play a vital role because they provide flexibility in labor scheduling and increase the total labor availability with lower total compensation costs relative to the same complement of full-time workers only (Thurik and Van der Wijst 1984; Wotruba 1990; Tilly 1991; McMenamin 2007; Künn-Nelen et al. 2013; Garnero et al. 2014; Owen 2015). They are often employed to fill in the gap between full-time working hours and relatively longer store hours—approximately 75 percent of retail grocery stores in the US are open 24 hours a day, 7 days a week— or to serve
customers during periods of high demand—over 50 percent of the sales of many US grocery stores are conducted on Saturday and Sunday. If minimum wage increases result in loses of part-time employment, retailers may face difficulties sustaining desired levels of store operation, customer service and customer satisfaction, hurting ultimate sales performance.

That said, full-time workers are expected to fulfill higher-skill tasks such as the procurement of goods and services, planning of promotion or sales strategies, scheduling staff (Thurik and Van der Wijst 1984; Tilly 1991; Hirsch 2005; Owen 2015) and overall management of subordinates, particularly in larger stores. However, these duties are well replaced by a fewer full-time employees, and improved scheduling, inventory-control, and sales-management programs, retailers may have incentive to keep the employment of part-time workers facing their customers and reduce the number of full-time workers in charge of management tasks. Further, if retailers intend to keep their part-time employment level and, the total labor budget remains the same, they benefit from reduce expensive full-time employment to compensate for cost increases caused by an increase in part-time wage rates.2 Taken together, we posit the following hypothesis.

**H2.** State and federal minimum wages hikes reduce full-time employment to a greater degree than part-time employment.

*Hours of retail work*

In addition to changing employment, retailers facing minimum wage hikes may use hours of work for adjusting the optimal amount of labor. By reducing hours of work for workers remaining employed in the retail trade sector after a wage hike, retailers may be able to further trim overall labor costs. Alternatively, those who stay employed may end up working more hours to

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2 In addition to lower hourly wage, retailers do not have to provide health insurance to part-time workers.
compensate for positions that have been eliminated due to minimum wage hikes thus potentially increasing the total wage bill for retailers. It is an empirical question as to which of these effects dominates in the retail trade sector. Zavodny (2000) finds no evidence of reduction in hours of work among teenage workers in all sectors of the economy. Sabia (2009) finds that hours of work increase in response to minimum wage hikes in the retail trade sector. Yet, no study has investigated how minimum wage hikes influence hours of part-time and full-time works differentially. We hypothesize that due to the higher hourly wages of full-time workers, in the face of increases in minimum wages, retailers shorten more hours of work for their full-time employees than their part-time counterparts to cut labor costs quickly. That is:

H₃. State and federal minimum wages hikes reduce hours of full-time work to a greater degree than those of part-time work.

3. Methods

To test the hypotheses, we specify a cross-state model using monthly state-level data (Card and Krueger 1995; Burkhauser et al. 2000; Sabia 2009). This approach enables us to obtain better estimates by controlling for state-, month- and year-specific variation of each variable included in the empirical model. In our model, each of the variables of interest (wage rate, employment, and hours of work) of full-time workers \((j = 0)\) and part-time worker \((j = 1)\) is assumed to be linearly associated with a measure of the minimum wage and other control variables in state \(i\) in month \(m\) and in year \(t\).

First, we explore how state and federal minimum wage hikes influence full- and part-time retail wages by estimating the following equation:
\[ W_{imt} = \alpha_w^j + \beta_w^j M_{Wimt} + \sum_h \gamma_w^{jh} X_{imt}^h + \sum_i \delta_w^{ji} S^i + \sum_m \eta_w^{jm} M^m + \sum_t \tau_w^{jt} T^t + \epsilon_{imt}, \]  

(1)

where \( W_{imt} \) is the average retail wage rate per hour for 16- to 64-year-old full-time \((j = 0)\) or part-time \((j = 1)\) employees in state \( i \) in month \( m \) and in year \( t \), \( \alpha_w^j, \beta_w^j, \gamma_w^{jh}, \delta_w^{ji}, \eta_w^{jm} \) and \( \tau_w^{jt} \) are parameters to be estimated; \( M_{Wimt} \) is the log of the larger of the state or federal minimum wage; \( X_{imt}^h \) is the \( h \)th variable designed to capture state-specific and time-varying macroeconomic and demographic trends; \( S^i \) is the \( i \)th state dummy variable capturing state-specific factors affecting employment; \( M^m \) is the \( m \)th month dummy variable capturing seasonal effects; and \( T^t \) is the \( t \)th year dummy variable capturing year-specific effects. For the vector of variables \( X_{imt}^h \), we use the log of the hourly wage for prime-aged (25- to 54-year-old) workers across all industries, the proportion of population aged from 16 to 19 years old to population aged from 16 to 64 (proportion of teenagers), and the unemployment rate among male prime-aged (25- to 54-year-old) people across all industries.

Because changes in federal minimum wage is relatively less frequent, most variations in the minimum wage variable are associated with changes in state minimum wages. One may be concerned that state legislatures enacted policies to increase minimum wages depending on state-specific and time-varying characteristics. However, it is well known that variables included in \( X_{imt}^h \) capture state-level economic and demographic trends, allowing us to estimate unbiased impacts of state and federal minimum wage increases. In fact, Card and Krueger (1995), Burkhauser et al. (2000), and Sabia (2009) use this set of controls in their econometric specifications with state-month observations. As mentioned in \( H_1 \), we expect that state and federal minimum wage increases positively affect wage rates, so \( \beta_w^0 \) and \( \beta_w^1 \) are positive and statistically
significant, and further the minimum wage elasticity of part-time wage is greater than that of full-time wage.³

Next, we define full-time \((j = 0)\) and part-time \((j = 1)\) retail employment in state \(i\) in month \(m\) and in year \(t\), \(E_{i m t}^j\), as the ratio of full-time or part-time retail employment to total population aged from 16 to 64 years old, and estimate the following employment equation:

\[
E_{i m t}^j = \alpha_E^j + \beta_E^j MW_{i m t} + \sum_h \gamma_{E h}^j X_{i m t}^h + \sum_i \delta_{E i}^j S_i^j + \sum_m \eta_{E m}^j M^m + \sum_t \tau_{E t}^j T^t + \epsilon_{i m t}^j. \quad (2)
\]

According to H₂, we expect that the minimum wage variable, \(MW_{i m t}\) has a negative and significant impact on employment and that the minimum wage elasticity of full-time employment is greater than that of part-time employment.⁴

While equation (2) allows us to examine the effects of state and federal minimum wage increases on full- and part-time retail employment, it is possible that, in addition to changing employment, retailers may respond to state and federal minimum wage hikes by either increasing or reducing hours of work of their full-time or part-time employees. In order to capture this effect, we estimate the following hours of work equation:

\[
H_{i m t}^j = \alpha_H^j + \beta_H^j MW_{i m t} + \sum_h \gamma_{H h}^j X_{i m t}^h + \sum_i \delta_{H i}^j S_i^j + \sum_m \eta_{H m}^j M^m + \sum_t \tau_{H t}^j T^t + \epsilon_{i m t}^j, \quad (3)
\]

where \(H_{i m t}^j\) is the average hours of work per week for full- \((j = 0)\) or part-time \((j = 1)\) employees aged from 16 to 64 in the retail trade. The hours of work equation allows us to understand how state and federal minimum wage increases influence hours of work in the retail trade. H₃ suggests

³ The minimum wage elasticity of wage is the ratio of the minimum wage estimate to the mean wage rate.
⁴ The minimum wage elasticity of employment is the ratio of the minimum wage estimate to the mean employment.
that increases in state and federal minimum wages lead to greater cuts in hours of full- than part-time work, so we expect that $\beta_H^0$ and $\beta_H^1$ are negative and statistically significant, and the minimum wage elasticity of working hours is greater among full- than part-time workers.\footnote{The minimum wage elasticity is the ratio of the minimum wage estimate to the mean hours of work.}

In equations (1), (2) and (3), dependent variables are subject to a measurement error because in state-month data points, there is not always sufficient number of full- and part-time retail workers.\footnote{For instance, the average number of part-time retail workers is 72.18 and the standard deviation is 46.61.} However, according to Sabia (2009), such a measurement error is not likely to correlate with minimum wage policies, so estimates from equations (1), (2), and (3) are unbiased.

Another issue arising from the small number of full- and part-time retail workers in some state-month data points is heteroscedasticity. To overcome this potential problem, we further estimate equations (1), (2), and (3) by applying the weight of the number of observations in each state-month observation.\footnote{An alternative weight employed in the literature is the underlying state population. However, that weight does not help in correcting the effect of small state-month observations in our case because the state population is not proportional to the number of observations in each state-month data point.} By doing so, we minimize potential problems caused by the small number of observations in some state-month data points.

4. Data

To estimate equations (1), (2) and (3), we use the Current Population Survey (CPS) taken from the Integrated Public Use Microdata Series (IPUMS) data extraction tool (Flood et al. 2017). The CPS is suitable for our analysis due to its reliability and national representativeness.

We aggregate individual observations of the CPS data to create state-month observations. In doing so, we use weights to create a nationally representative data set. The sample period is 10 years, spanning from April 2008 to March 2018. As a result, 6,120 state-month observations are
available for the estimation. To define retail employment, we use the 1990 Census Bureau industrial classification code, and we consider those CPS respondents reporting positive working hours in the retail trade as retail workers.\(^8\) To define full-time and part-time status of individual worker, we use the work-status variable available in the CPS. Specifically, we regard those who work more than 35 hours per week as full-time workers, and those who work less as part-time workers. This information allows us to define full-time and part-time retail employment in equation (2), and hours of full-time and part-time work in equation (3). For the wage rate used in equation (1), we aggregate a subset of individuals who reported their wage information and define full-time and part-time wages by using the work-status variable.\(^9\) To capture monthly variations in state- and federal-level minimum wages, we use the database developed by Vaghul and Zipperer (2016). We further supplement recent minimum wage levels (August 2016 – March 2018) reported in websites of State governments.

Table 1 reports the weighted means and standard deviations of variables used for the analysis. All variables exhibit variation over the sample period, so this variation enables us to identify key parameters of the wage, employment, and hours of work equations. The mean hourly wage rate is 16.18 dollars for 16–64 year-old full-time employees, and 9.98 dollars for 16–64 year-old part-time employees. In order to measure relative variability of wage rates between full-time and part-time workers, we calculate their coefficient of variation (CV), or the ratio of the standard

\(^8\) According to the 1990 Census Bureau industrial classification, our data set includes the following retail sectors: Lumber and building material retailing, hardware stores, retail nurseries and garden stores, mobile home dealers, department stores, variety stores, general merchandise stores, grocery stores, dairy products stores, retail bakeries, motor vehicle dealers, auto and home supply stores, gasoline service stations, apparel and accessory stores, shoe stores, furniture and home furnishings stores, household appliance stores, radio, TV, and computer stores, music stores, eating and drinking places, drug stores, liquor stores, sporting goods, bicycles, and hobby stores, book and stationery stores, jewelry stores, gift, novelty, and souvenir shops, sewing, needlework, and piece goods stores, catalog and mail order houses, vending machine operators, direct selling establishments, fuel dealers, retail florists.

\(^9\) This sub-sample is called the CPS Merged Outgoing Rotation Group.
deviations to the mean. The CV is 18.94 percent for full-time workers and is 22.63 percent for part-time workers, suggesting that wage rates differ across time and states more among part-time workers than full-time workers. The mean ratio of 16–64 year-old employees in the retail industry to the 16–64 year-old population is 0.12, for full-time workers is 0.07, and for part-time workers is 0.04, indicating that 62.03 percent of the retail employees are full-time and the rest 37.96 percent are part-time. The CV is 17.15 percent for individuals with part-time employment and is 13.63 percent for full-time employment individuals, suggesting that part-time employment varies more across time and states. Full-time employees work on average 42.55 hours per week, while part-time employees work on average 21.45 hours per week. The CV of hours of work is 2.04 percent for full-time employees, and 5.93 percent for part-time employees, implying hours of work varies more for part-time workers than full-time workers across time and states.

[Table 1 in here]

5. Results

In this section, we present estimation results of the wage equation (equation 1) for testing H1, the employment equation (equation 2) for testing H2, and the hours-of-work equation (equation 3) for testing H3. Each equation investigates impacts of state and federal minimum wage changes among full-time and part-time retail workers respectively, controlling for state-specific and time-varying macro-economic factors and state-, month-, and year-specific effects. In the results reported in each table below, we first show estimates with no control for state, month, or year effect, and then examine the robustness of the result by sequentially adding state, month and year dummies. Finally, we report a result from the weighted least squares regression controlling for effects of small state-month observations. In all specifications, our interest is the magnitude of the coefficients $\beta_w^l, \beta_E^l$,
and $\beta_j^H, j \in \{0, 1\}$, which measure effects of state and federal minimum wage increases on wage rate, employment, and hours of work, among full-time and part-time workers respectively. We further compare the minimum wage elasticities between full- and part-time retail workers to examine which type of worker is more influenced by minimum wage hikes.

**Wage Rates**

We first examine effects of state and federal minimum wages on wage rates (equation 1). Table 2 reports estimation results for the wage equation among full-time workers.

![Table 2 in here]

The coefficients of the minimum wage variable are positive in all five specifications (columns 1–5), and statistically significant in three specifications (columns 1–3). However, the impact is small and not statistically significant if we control time-varying unobservables (column 4) or apply the weight of state-month observations (column 5), implying that we cannot rule out the possibility that state and federal minimum wage hikes have zero impact on wage rates for full-time workers.

We next investigate wage effects among part-time workers. Table 3 indicates that increases in state and federal minimum wages have positive and statistically significant impact on wage rates in any specifications (columns 1–5), implying that state and federal minimum wage hikes lead to rising labor cost through part-time employment. We also find that the minimum wage elasticity of wage rate, after accounting for time-varying unobservables, and small state-month observations is 0.174, suggesting that a 10 percent increase in state and federal minimum wage results in a 1.739 percent increase in part-time wage rates. Therefore, state and federal minimum wage hikes lead to more increases in retail wage rate, among part-time workers than full-time workers, supporting $H_1$. 

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Because part-time workers are less compensated, an increase in minimum wage is likely to raise the wage rate for part-time workers than full-time workers.

[Table 3 in here]

Employment Effects

Tables 2 and 3 show that the minimum wage binds for part-time workers, but this is not always true for full-time workers. Do retailers reduce the number of part-time workers? Does the standard economic theory perfectly predict an outcome of minimum wage increases? To investigate this mechanism, we regress the proportion of 16- to 64-year-old full-time (part-time) employment in the retail trade to 16- to 64-year-old population on the minimum wage variable and other control variables, and report the estimation results in table 4 (table 5).

[Table 4 in here]

[Table 5 in here]

In table 4, the coefficient of minimum wage is negative and statistically significant, even after state, month and year dummies are added (columns 1–4), and the weight of state-month observations is applied (column 5). This means that increases in state and federal minimum wages lead to decreases in full-time employment in the retail trade sector. As shown in column 5, the minimum wage elasticity of retail employment is \(-0.121\), indicating that a 10 percent increase in a minimum wage results in a 1.214 percent decrease in full-time retail employment. These results indicate that even if the full-time wage rate does not significantly increase due to minimum wage hikes, retailers respond by reducing their full-time labor which is relatively expensive.
On the other hand, as shown in table 5, impacts of state and federal minimum wages are less clear among part-time retail workers. The coefficients of the minimum wage variable are positive in all specifications (columns 1–5) although they are all close to zero. Nevertheless, the coefficients are not statistically significant if we control for state, month, and year effects (column 4), or small state-month observations (column 5), so we cannot reject the null hypothesis that state and federal minimum wage hikes have an impact on part-time retail employment.

Personnel managers make a decision as to how many full-time and part-time workers they hire to operate their stores. Our results indicate that retailers respond to minimum wage hikes and subsequent part-time wage increases by reducing the amount of full-time labor and keeping the same level of part-time labor, which supports H2. As shown in the previous subsection, state and federal minimum wage increases affect retailers’ labor budget through part-time wage rates. Because full-time workers tend to be more costly, a cutback in the number of full-time workers allows retailers to easily keep their total labor cost low. Further, retailers are reluctant to decrease the number of part-time workers, whose primary responsibility is to serve their customers and fill in the gaps between full-time working hours and relatively longer store hours. This finding is consistent with Lordan and Neumark (2018), as it is difficult for retailers to substitute this type of work with automated machines. As a result, minimum wage increases may incentivize retailers to substitute away from the full-time labor force to part-time labor force.

**Hours of Work Effects**

In response to state and federal minimum wage increases, retailers may also reduce hours of work of their employees. To examine this possibility, we estimate the hours of work equation (equation 3) among full-time retail workers and part-time retail workers, and report these estimation results in tables 6 and 7.
As shown in table 6, the coefficients of the minimum wage variables are negative and statistically significant in all five specifications (columns 1–5), indicating that state and federal minimum wage increases inversely affect hours of full-time work in the retail trade sector. After controlling for state, month, and year unobservable factors and applying the state-month weight, we find the minimum wage elasticities of hours of full-time work –0.029, signifying that a 10 percent increase in the minimum wage is associated with a 0.292 percent decrease in hours of full-time work (column 5). Therefore, we conclude that retailers tend to reduce the hours of work of their full-time employees after state and federal minimum wage increases.

Table 7 reports estimation results of the hours of work equation (equation 3) among part-time workers. The minimum wage variable is not statistically significant in any specification, suggesting that state or federal minimum wage increases have no impact on hours of part-time retail work. While the reduction in labor costs through hours of expensive full-time work is a quick way for keeping cost low, the reduction in the number of part-time workers may lead to lower quality of retail services. Therefore, retailers facing labor cost increases due to minimum wage hikes may choose to reduce more hours of full-time work than in comparison to part-time work, supporting H3.

Minimum Wage Effects among All Retail Workers

Although our main concern in this study is to compare state and federal minimum wage effects on full- with part-time retail workers, because prior studies concerns impacts of minimum wage increases on retail workers regardless of their full- and part-time status (Kim and Taylor 1995;
Sabia 2009; Addison et al. 2009; Giuliano 2013), in this subsection, we conduct the same analyses as above among all retail workers. Table 8 reports estimation results for the wage equation (equation 1) among all retail workers. The coefficients of the minimum wage variable are positive in all four specifications (columns 1–5), but not statistically significant if the year dummies are included or the state-month weight is applied (column 4–5). The likely reason for this is the small and insignificant impact of state and federal minimum wage increases on full-time wage rates as shown in table 2.

Table 8 shows the modest increase in wage rate for all retail workers. In response to wage increases, retailers may reduce the amount of labor. Table 9 report estimation results for the employment equation (equation 2) among all retail workers. We find that there is a negative correlation between employment of all retail workers and change in state and federal minimum wages in all four specifications (columns 1–5). However, these correlations are not statistically significant. Among studies analyzing effect of minimum wages on retail employment, our result is consistent with Addison et al. (2009) or Giuliano (2013), but not with Sabia (2009).

In table 10, we report estimation results of the hours of work equation (equation 3) among all retail workers. The coefficients of the minimum wage variables are negative and statistically significant in all five specifications (columns 1–5). Therefore, we conclude that state and federal minimum wage increases inversely affect hours of work in the retail trade sector.

5. Conclusions and Implications

Electronic copy available at: https://ssrn.com/abstract=3520915
A number of US states have passed legislation to raise the minimum wage. Understanding how these legislations differentially impact part-time and full-time retail workers is critical because the US retail industry hires a large number of part-time workers and each of them play vital role in retail business. To that end, we use state-level CPS data spanning the period April 2008 – March 2018, and specify a series of econometric models to estimate the impact of changes in state and federal minimum wages on 1) wage rates, 2) employment, and 3) hours of work, emphasizing differences between full-time and part-time worker impacts.

We find a positive impact of state and federal minimum wage hikes on wage rates for part-time workers, but a modestly positive or zero impact on wage rates of full-time workers. Conventional wisdom suggests that an increase in part-time wages leads to a decrease in part-time employment. However, our results indicate that in response to increased labor costs, retailers reduce the number of full-time workers while keeping the number of part-time workers constant. This result implies that part-time workers are essential to keep stores open and serve customers, while full-time workers can be substituted away by part-time workers. Our results also indicate that hours of full-time work are negatively correlated with state and federal minimum wage increases.

Our results provide insights that may be useful for retailers. We find that state and federal minimum wage hikes affect primarily full-time employment. In the short-run, retaining lower cost, part-time workers may allow retailers to continue their day-to-day operations. However, in the long-run, the reduction in full-time workers may well have unfavorable effects on the accumulation of human capital in the retail sector, as full-time workers tend to have lower turnover rates and help retailers accumulate and enhance knowledge and skills essential for their future success (Tilly 1991; Tang et al. 2014). Retailers would be well advised to consider these long- and
short-term effects when they formulate personnel policy and make in-store labor hours decisions in response to minimum wage changes. Although reduction in full-time employees in favor of cheaper part-time workers might appear to be a logical way to save costs quickly, the longer run implication may well be a larger part time work force less motivated, less well-trained and much more difficult to manage.

Our results are also important to state-level policy makers. Their major concern is regional economic development. Our study implies that minimum wage legislations are counterproductive and can harm workers in the retail industry, particularly full-time workers who are generally older, often with families to support, and thus less likely to be able to cope with job or hourly cutbacks compared to generally younger part-time workers. Policy makers should consider both positive and negative effects of minimum wage increases when enacting minimum wage changes in the future as well as the long term consequences on consumer and worker welfare.

Public policy makers too need to be made aware of the predictable consequences of raising minimum wages on consumer experience. For example, at the same time that most state and federal government programs are attempting to invest in and promote healthier eating, our study suggests that minimum wage hikes may reduce the numbers of the more highly skilled and highly trained full-time workers required to staff the service departments in a supermarket that provide much of that healthier fresh food (e.g., produce, seafood, salad bars). Such staff reductions may lead to frustrated consumers, longer wait times, suboptimal packaging and perhaps even less expertise in proper food handling procedures and increased risk for food safety. Basic consumer welfare is at stake.

Although our study is valuable to inform ongoing policy discussions, increases in minimum wages are nearly certain to have other consequences not considered here. These should be
addressed in future research. For example, an increase in the minimum wage without other wage adjustments may cause wage structure compression (i.e., entry-level wages may increase but other, higher level wages may not increase by the proportionate amount). Alternatively, full time wages might not decrease but other non-wage benefits—e.g., life insurance, educational allowances, holiday leaves, stock options, health/dental plans—might be reduced. Three probable consequences follow: employee morale deteriorates, valuable employees seek employment elsewhere and retail performance suffers. Yet employee replacement costs are steep. According to anecdotal evidence from a small sample of retail manager interviews conducted for this study, each new full-time entrant requires approximately a $4,000 investment if search and training costs are included and initial reduction in productivity levels are allowed. Ultimately, more study is needed to gauge the many long-term consequences of minimum wage increases not just on retail operations but on other system practitioners and on overall consumer welfare.
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Table 1: Means and Standard Deviations of Variables Used in the Analysis (April 2008 – March 2018)

| Variable                | Definition                                                                 | Mean\(^a\) (SD\(^b\)) |
|-------------------------|-----------------------------------------------------------------------------|------------------------|
| Dependent variable      |                                                                             |                        |
| Wage\(^c\)              | Wage rate per hour for 16- to 64-year-old employees in the retail trade       | 14.014 (2.222)         |
| Full-time wage\(^c\)    | Wage rate per hour for 16- to 64-year-old full-time employees in the retail trade | 16.183 (3.065)         |
| Part-time wage\(^c\)    | Wage rate per hour for 16- to 64-year-old part-time employees in the retail trade | 9.979 (2.258)          |
| Employment              | Ratio of 16- to 64-year-old employment in the retail trade to 16- to 64-year-old population | 0.117 (0.012)          |
| Full-time employment    | Ratio of 16- to 64-year-old full-time employment in the retail trade to 16- to 64-year-old population | 0.073 (0.010)          |
| Part-time employment    | Ratio of 16- to 64-year-old part-time employment in the retail trade to 16- to 64-year-old population | 0.044 (0.008)          |
| Hours                   | Hours of work per week for 16- to 64-year-old employees in the retail trade  | 34.514 (1.446)         |
| Full-time hours         | Hours of work per week for 16- to 64-year-old full-time employees in the retail trade | 42.550 (0.868)         |
| Part-time hours         | Hours of work per week for 16- to 64-year-old part-time employees in the retail trade | 21.450 (1.272)         |
| Independent variable    |                                                                             |                        |
| Log minimum wage        | Natural log of the larger of the state or federal minimum wage               | 2.040 (0.106)          |
| Log adult wage          | Natural log of the hourly wage for prime age (25- to 54-year-old) workers   | 3.110 (0.133)          |
| Share of teenagers      | Total population aged 16-19 / total population aged 16-64                   | 0.083 (0.008)          |
| Unemployment rate       | Unemployment rate among male prime-aged (25- to 54-year-old) people         | 0.055 (0.024)          |
| Number of states\(^d\)  |                                                                             | 51                     |
| Number of months        |                                                                             | 120                    |
| \(N\)                  |                                                                             | 6,120                  |

Note: \(^a\) Weighted mean using the state populations from the CPS survey. \(^b\) Weighted standard deviation using the state populations from the CPS survey. \(^c\) Calculated among the outgoing rotation group. \(^d\) Includes the District of Columbia.
Table 2: Estimation Results of Minimum Wage Impacts on Full-Time Wage Rate

|                      | 1        | 2        | 3        | 4        | 5        |
|----------------------|----------|----------|----------|----------|----------|
| Constant             | –19.341**| –24.478**| –23.426**| –17.041**| –19.115**|
|                      | (2.889)  | (2.219)  | (2.215)  | (2.556)  | (2.418)  |
| Log minimum wage     | 3.057**  | 2.548**  | 2.334**  | 0.342    | 1.150    |
|                      | (1.058)  | (0.652)  | (0.654)  | (0.739)  | (0.748)  |
| Log adult wage       | 9.170**  | 11.418** | 11.313** | 10.155** | 10.246** |
|                      | (0.972)  | (0.559)  | (0.557)  | (0.640)  | (0.623)  |
| Share of teenagers   | 18.880   | 2.746    | 2.832    | 3.976    | 5.815    |
|                      | (15.186) | (4.164)  | (4.017)  | (4.048)  | (3.861)  |
| Unemployment rate    | –9.704** | –4.705** | –6.351** | 1.022    | 1.970    |
|                      | (2.659)  | (1.806)  | (1.825)  | (2.456)  | (2.630)  |
| State dummy          | No       | Yes      | Yes      | Yes      | Yes      |
| Month dummy          | No       | No       | Yes      | Yes      | Yes      |
| Year dummy           | No       | No       | No       | Yes      | Yes      |
| R-squared            | 0.246    | 0.314    | 0.317    | 0.322    | 0.358    |
| Elasticity           | 0.185    | 0.154    | 0.141    | 0.021    | 0.070    |

Note: Columns 1–4 are unweighted. Column 5 weights by number of state-month cell observations. Robust standard errors clustered on state are in parentheses. A double asterisk indicates significance at a 5-percent level. An asterisk indicates significance at a 10-percent level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.
Table 3: Estimation Results of Minimum Wage Impacts on Part-Time Wage Rate

|                      | 1     | 2     | 3     | 4     | 5     |
|----------------------|-------|-------|-------|-------|-------|
| Constant             | -7.817** | -5.922** | -5.762** | -0.285 | -1.280 |
|                      | (1.533) | (1.464) | (1.507) | (2.016) | (1.761) |
| Log minimum wage     | 4.837** | 3.900** | 3.827** | 2.127** | 1.763** |
|                      | (0.856) | (1.107) | (1.100) | (0.841) | (0.821) |
| Log adult wage       | 2.709** | 2.875** | 2.844** | 1.994** | 2.582** |
|                      | (0.604) | (0.657) | (0.646) | (0.790) | (0.810) |
| Share of teenagers   | -0.017 | -4.756 | -4.824 | -5.658 | -5.275 |
|                      | (5.606) | (4.121) | (4.134) | (3.775) | (3.701) |
| Unemployment rate    | -6.542** | -7.926** | -8.168** | -4.207* | -3.539 |
|                      | (1.788) | (1.807) | (1.914) | (2.499) | (2.639) |
| State dummy          | No    | Yes   | Yes   | Yes   | Yes   |
| Month dummy          | No    | No    | Yes   | Yes   | Yes   |
| Year dummy           | No    | No    | No    | Yes   | Yes   |
| R-squared            | 0.102 | 0.126 | 0.128 | 0.136 | 0.159 |
| Elasticity           | 0.477 | 0.385 | 0.377 | 0.210 | 0.174 |

Note: Columns 1–4 are unweighted. Column 5 weights by number of state-month cell observations. Robust standard errors clustered on state are in parentheses. A double asterisk indicates significance at a 5-percent level. An asterisk indicates significance at a 10-percent level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.
|                          | 1           | 2           | 3           | 4           | 5           |
|--------------------------|-------------|-------------|-------------|-------------|-------------|
| Constant                 | 0.159**     | 0.109**     | 0.098**     | 0.119**     | 0.116**     |
|                          | (0.017)     | (0.009)     | (0.009)     | (0.012)     | (0.011)     |
| Log minimum wage         | –0.002      | –0.009**    | –0.007*     | –0.011**    | –0.009*     |
|                          | (0.005)     | (0.003)     | (0.003)     | (0.005)     | (0.005)     |
| Log adult wage           | –0.022**    | –0.003      | –0.002      | –0.007**    | –0.006**    |
|                          | (0.006)     | (0.002)     | (0.002)     | (0.001)     | (0.002)     |
| Share of teenagers       | –0.050      | –0.068**    | –0.069**    | –0.070**    | –0.091**    |
|                          | (0.087)     | (0.026)     | (0.026)     | (0.025)     | (0.025)     |
| Unemployment rate        | –0.162**    | –0.123**    | –0.114**    | –0.057**    | –0.069**    |
|                          | (0.020)     | (0.009)     | (0.009)     | (0.013)     | (0.012)     |
| State dummy              | No          | Yes         | Yes         | Yes         | Yes         |
| Month dummy              | No          | No          | Yes         | Yes         | Yes         |
| Year dummy               | No          | No          | No          | Yes         | Yes         |
| R-squared                | 0.163       | 0.463       | 0.473       | 0.488       | 0.512       |
| Elasticity               | –0.031      | –0.118      | –0.094      | –0.150      | –0.121      |

Note: Columns 1–4 are unweighted. Column 5 weights by number of state-month cell observations. Robust standard errors clustered on state are in parentheses. A double asterisk indicates significance at a 5-percent level. An asterisk indicates significance at a 10-percent level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.
|                          | 1       | 2       | 3       | 4       | 5       |
|--------------------------|---------|---------|---------|---------|---------|
| **Constant**             | 0.052** | 0.026** | 0.030** | 0.032** | 0.034** |
|                          | (0.014) | (0.007) | (0.007) | (0.007) | (0.006) |
| **Log minimum wage**     | 0.007   | 0.006** | 0.005*  | 0.003   | 0.004   |
|                          | (0.005) | (0.003) | (0.003) | (0.003) | (0.003) |
| **Log adult wage**       | −0.011* | −0.003  | −0.003* | −0.003**| −0.004**|
|                          | (0.006) | (0.002) | (0.002) | (0.002) | (0.001) |
| **Share of teenagers**   | 0.177** | 0.112** | 0.113** | 0.120** | 0.125** |
|                          | (0.075) | (0.018) | (0.017) | (0.017) | (0.017) |
| **Unemployment rate**    | −0.006  | 0.032** | 0.026** | 0.014   | −0.001  |
|                          | (0.018) | (0.006) | (0.006) | (0.008) | (0.009) |
| **State dummy**          | No      | Yes     | Yes     | Yes     | Yes     |
| **Month dummy**          | No      | No      | Yes     | Yes     | Yes     |
| **Year dummy**           | No      | No      | No      | Yes     | Yes     |
| **R-squared**            | 0.073   | 0.482   | 0.492   | 0.498   | 0.509   |
| **Elasticity**           | 0.159   | 0.133   | 0.119   | 0.071   | 0.081   |

Note: Columns 1–4 are unweighted. Column 5 weights by number of state-month cell observations. Robust standard errors clustered on state are in parentheses. A double asterisk indicates significance at a 5-percent level. An asterisk indicates significance at a 10-percent level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.
|                        | Column 1 | Column 2 | Column 3 | Column 4 | Column 5 |
|------------------------|----------|----------|----------|----------|----------|
| **Constant**           | 46.270** | 46.500** | 46.496** | 43.863** | 44.140** |
|                        | (1.454)  | (0.952)  | (0.921)  | (1.157)  | (1.021)  |
| **Log minimum wage**   | −1.947** | −2.079** | −2.099** | −1.087** | −1.241** |
|                        | (0.454)  | (0.341)  | (0.339)  | (0.486)  | (0.418)  |
| **Log adult wage**     | 0.196    | 0.028    | 0.018    | 0.400**  | 0.381**  |
|                        | (0.330)  | (0.181)  | (0.177)  | (0.180)  | (0.151)  |
| **Share of teenagers** | −0.593   | −2.064   | −1.919   | −2.795   | −2.893   |
|                        | (3.535)  | (2.568)  | (2.550)  | (2.494)  | (2.281)  |
| **Unemployment rate**  | −4.036** | −0.729   | −0.775   | −1.500   | −0.830   |
|                        | (1.756)  | (1.038)  | (1.011)  | (1.145)  | (1.118)  |
| **State dummy**        | No       | Yes      | Yes      | Yes      | Yes      |
| **Month dummy**        | No       | No       | Yes      | Yes      | Yes      |
| **Year dummy**         | No       | No       | No       | Yes      | Yes      |
| **R-squared**          | 0.037    | 0.197    | 0.202    | 0.211    | 0.252    |
| **Elasticity**         | −0.046   | −0.049   | −0.049   | −0.026   | −0.029   |

Note: Columns 1–4 are unweighted. Column 5 weights by number of state-month cell observations. Robust standard errors clustered on state are in parentheses. A double asterisk indicates significance at a 5-percent level. An asterisk indicates significance at a 10-percent level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.
Table 7: Estimation Results of Minimum Wage Impacts on Hours of Part-Time Work

|                      | 1       | 2       | 3       | 4       | 5       |
|----------------------|---------|---------|---------|---------|---------|
| Constant             | 27.149* | 25.429* | 22.902**| 23.954**| 23.529**|
|                      | (2.002) | (0.868) | (0.829) | (0.943) | (0.948) |
| Log minimum wage     | 0.477   | –0.032  | 0.383   | –0.088  | 0.036   |
|                      | (0.904) | (0.412) | (0.386) | (0.452) | (0.401) |
| Log adult wage       | –1.720**| –0.677**| –0.290  | –0.489**| –0.381**|
|                      | (0.691) | (0.222) | (0.188) | (0.188) | (0.186) |
| Share of teenagers   | –19.360**| –12.676**| –13.325**| –11.846**| –11.942**|
|                      | (6.122) | (2.689) | (2.530) | (2.504) | (2.336) |
| Unemployment rate    | 1.658   | –5.421**| –1.799* | –0.634  | –1.717  |
|                      | (2.770) | (1.171) | (1.052) | (1.368) | (1.414) |
| State dummy          | No      | Yes     | Yes     | Yes     | Yes     |
| Month dummy          | No      | No      | Yes     | Yes     | Yes     |
| Year dummy           | No      | No      | Yes     | Yes     | Yes     |
| R-squared            | 0.037   | 0.339   | 0.398   | 0.404   | 0.450   |
| Elasticity           | 0.022   | –0.001  | 0.018   | –0.004  | 0.002   |

Note: Columns 1–4 are unweighted. Column 5 weights by number of state-month cell observations. Robust standard errors clustered on state are in parentheses. A double asterisk indicates significance at a 5-percent level. An asterisk indicates significance at a 10-percent level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.
Table 8: Estimation Results of Minimum Wage Impacts on Wage Rate

|                      | 1       | 2       | 3       | 4       | 5       |
|----------------------|---------|---------|---------|---------|---------|
| **Constant**         | –12.997** | –15.662** | –15.225** | –8.768** | –10.352** |
|                      | (2.188)  | (1.745)  | (1.724)  | (2.027)  | (1.940)  |
| **Log minimum wage** | 3.489**  | 2.835**  | 2.730**  | 0.798    | 1.039    |
|                      | (0.840)  | (0.724)  | (0.722)  | (0.746)  | (0.655)  |
| **Log adult wage**   | 6.452**  | 7.915**  | 7.887**  | 6.742**  | 7.085**  |
|                      | (0.652)  | (0.475)  | (0.467)  | (0.526)  | (0.534)  |
| **Share of teenagers** | 4.453    | –4.923   | –4.946   | –4.725   | –3.861   |
|                      | (9.855)  | (3.326)  | (3.292)  | (3.149)  | (2.778)  |
| **Unemployment rate** | –11.527** | –9.535** | –10.286** | –2.853   | –2.187   |
|                      | (2.070)  | (1.543)  | (1.644)  | (2.124)  | (2.057)  |
| **State dummy**      | No      | Yes     | Yes     | Yes     | Yes     |
| **Month dummy**      | No      | No      | Yes     | Yes     | Yes     |
| **Year dummy**       | No      | No      | No      | Yes     | Yes     |
| **R-squared**        | 0.288   | 0.351   | 0.353   | 0.362   | 0.401   |
| **Elasticity**       | 0.249   | 0.202   | 0.195   | 0.057   | 0.074   |

Note: Columns 1–4 are unweighted. Column 5 weights by number of state-month cell observations. Robust standard errors clustered on state are in parentheses. A double asterisk indicates significance at a 5-percent level. An asterisk indicates significance at a 10-percent level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.
|                         | Column 1       | Column 2       | Column 3       | Column 4       | Column 5       |
|-------------------------|----------------|----------------|----------------|----------------|----------------|
| Constant                | 0.210**        | 0.132**        | 0.128**        | 0.151**        | 0.148**        |
| Log minimum wage        | 0.005          | -0.003         | -0.002         | -0.008         | -0.005         |
| Log adult wage          | -0.033**       | -0.005**       | -0.005**       | -0.010**       | -0.010**       |
| Share of teenagers      | 0.126          | 0.043          | 0.044          | 0.050*         | 0.033          |
| Unemployment rate       | -0.168**       | -0.092**       | -0.088**       | -0.043**       | -0.065**       |
| State dummy             | No             | Yes            | Yes            | Yes            | Yes            |
| Month dummy             | No             | No             | Yes            | Yes            | Yes            |
| Year dummy              | No             | No             | No             | Yes            | Yes            |
| R-squared               | 0.156          | 0.545          | 0.549          | 0.555          | 0.540          |
| Elasticity              | 0.041          | -0.023         | -0.013         | -0.066         | -0.042         |

Note: Columns 1–4 are unweighted. Column 5 weights by number of state-month cell observations. Robust standard errors clustered on state are in parentheses. A double asterisk indicates significance at a 5-percent level. An asterisk indicates significance at a 10-percent level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.
| Table 10: Estimation Results of Minimum Wage Impacts on Hours of Work |
|---------------------------------------------------------------|
|                                                              |
| **Constant**        | 44.046** | 43.149** | 41.081** | 41.010** | 40.711** |
|                    | (2.438)  | (1.368)  | (1.437)  | (1.799)  | (1.404)  |
| **Log minimum wage**| –2.069** | –2.642** | –2.303** | –1.876** | –1.812** |
|                    | (0.826)  | (0.536)  | (0.559)  | (0.780)  | (0.610)  |
| **Log adult wage**  | –0.645   | –0.180   | 0.128    | –0.060   | 0.055    |
|                    | (0.678)  | (0.278)  | (0.272)  | (0.230)  | (0.220)  |
| **Share of teenagers** | –33.059** | –22.556** | –22.947** | –23.735** | –25.968** |
|                    | (7.759)  | (3.701)  | (3.576)  | (3.535)  | (3.422)  |
| **Unemployment rate** | –12.379** | –14.958** | –12.309** | –7.119** | –6.501** |
|                    | (2.833)  | (1.472)  | (1.479)  | (1.795)  | (1.778)  |
| **State dummy**     | No       | Yes      | Yes      | Yes      | Yes      |
| **Month dummy**     | No       | No       | Yes      | Yes      | Yes      |
| **Year dummy**      | No       | No       | No       | Yes      | Yes      |
| **R-squared**       | 0.088    | 0.394    | 0.423    | 0.433    | 0.481    |
| **Elasticity**      | –0.060   | –0.077   | –0.067   | –0.054   | –0.052   |

Note: Columns 1–4 are unweighted. Column 5 weights by number of state-month cell observations. Robust standard errors clustered on state are in parentheses. A double asterisk indicates significance at a 5-percent level. An asterisk indicates significance at a 10-percent level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.