Journal of Agricultural and Resource Economics 47(2):324–341 ISSN: 1068-5502 (Print); 2327-8285 (Online)

doi: 10.22004/ag.econ.310532

Impacts of Minimum Wage Increases in the U.S. Retail Sector: Full-Time versus Part-Time Employment

Koichi Yonezawa, Miguel I. Gómez, and Edward W. McLaughlin

State and federal minimum wage hikes are likely to impact the retail industry, including grocery stores, which employs a large number of less-well-compensated part-time workers. Despite its relevance, it is not clear whether minimum wage increases affect full- and part-time retail employees differently. We use state-level monthly data from the Current Population Survey (CPS) to show 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 the hours worked by full-time workers in order to stay within a labor budget and continue serving their customers.

Key words: employment, full-time labor, human resources, part-time labor, retailing

Introduction

The retail sector accounts for nearly 11% of total nonfarm U.S. employment in 2014 (Dorfman, 2014; Hortaçsu and Syverson, 2015). Because retail stores are almost everywhere across the United States, retail employment is critical to regional economic growth. Another distinguishing feature of the retail sector is higher proportions of part-time (PT) workers (31% in the retail sector vs. 17% in the nonretail sector). Full-time (FT) 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). PT workers tend to be less skilled and less well-compensated than their FT counterparts, often with low or no employee benefits. Nevertheless, PT workers are a major source of flexible labor, particularly to fill gaps between "normal" FT working hours and relatively longer store hours—often 24 hours a day in the case of the U.S. retail grocery sector—and to serve customers during periods of high demand (Thurik and van der Wijst, 1984; Tilly, 1991; Künn-Nelen, de Grip, and Fouarge, 2013; Owen, 2015).

Some U.S. 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 (Jennings, 2017). 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

Koichi Yonezawa (corresponding author) is a research associate in the Food Industry Management Program, Miguel I. Gómez is the Robert G. Tobin Professor of Food Marketing, and Edward W. McLaughlin is the Robert G. Tobin Emeritus Professor of Marketing in the Charles H. Dyson School of Applied Economics and Management in the SC Johnson College of Business at Cornell University.

The authors thank the editor, Dragan Miljkovic, and two anonymous reviewers for their constructive comments and suggestions. The authors also wish to thank Arnab K. Basu, Nancy H. Chau, James P. Elwell, Oleg Firsin, Gerard F. Hawkes, and Kristen S. Park for their valuable comments on an earlier draft. Funding from the Food Industry Association Executives (FIAE) is gratefully acknowledged. The views expressed in this paper are ours alone and are not necessarily those of the FIAE. All errors are ours.

Review coordinated by Dragan Miljkovic.

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 that rising minimum wages hurt employment, particularly for the retail trade (Bose, 2018; Mourdoukoutas, 2018).

Retailers spend substantial resources on personnel. For example, grocers' labor costs account for about 14% 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 the type of employment they hire (FT vs. PT employment), hours of their work, or both. Further, because PT workers increase the total labor availability with lower total compensation costs relative to the same complement of FT workers only, retailers may respond by substituting FT workers for less expensive PT workers. This may affect the composition of the retail labor force or ratio of the PT to FT workers. This paper provides empirical evidence on how state and federal minimum wage hikes influence (i) wages, (ii) employment, and (iii) hours of work for PT and FT retail workers.

We use state-level monthly data from the Current Population Survey (CPS) of the U.S. Census Bureau for the period April 2008–March 2018 to evaluate impacts of state and federal minimum wage increases on retail employment, hours of work, and wage rates for FT and PT retail workers. We find a positive and statistically significant relationship between state and federal minimum wages and wage rates for PT workers but only a modest impact on wage rates for FT workers. Further, our results indicate that despite of the rising wage for PT workers, retailers tend to reduce the number of FT workers instead of PT workers, while shortening hours of FT work. Taken together, our results suggest that FT workers are disproportionally hurt by state and federal minimum wage increases in the retail sector.

Our study contributes to the literature on the economics of FT and PT retail employment. Research on this topic is scarce and the evidence has remained inconclusive. Gramlich, Flanagan, and Wachter (1976) and Ressler, Watson, and Mixon (1996) use aggregated data across all industries and find that minimum wage increases lead to a rise in PT employment. On the other hand, McKee and West (1984) and Hsing (2000) report a negative relationship between minimum wages and ratios of PT to FT workers. Nevertheless, none of them focus on the retail trade sector, in which PT work is an important labor resource. Moreover, they did not investigate minimum wage effects on hours of work for FT and PT employees separately. Although others have investigated the impacts of minimum wage increases in the retail trade sector (Kim and Taylor, 1995; Addison, Blackburn, and Cotti, 2009; Sabia, 2009; Giuliano, 2013), they do not compare differential effects between FT and PT workers. Our study fills these gaps by investigating how state and federal minimum wage hikes impact wage rates, employment, and hours of work for FT and PT retail workers differentially.

Our findings have practical implications for both policy makers and retailers. For policy makers, legislations to increase the minimum wage are counterproductive because FT work—generally a major source of household income—is more impacted. For retailers, reductions in FT employment mean loss of human capital (Hirsch, 2005). Compared with PT workers, FT workers are generally more productive, as they have better leadership, communication and sales management skills, and so receive higher hourly wages (Baffoe-Bonnie, 2004; Hirsch, 2005).[1] Therefore, fewer FT workers result in lower levels of human capital accumulation. In the short run, retailers can reduce costs by cutting back relatively expensive FT employees. In the long run, however, retailers will lack FT employees, who are often better equipped to serve customers in innovative ways. Further, in food retailing, ensuring food safety practices as well as handling and promoting consumption of healthier option (e.g., fresh produce) often requires highly trained FT workers. Therefore, minimum wage increases may affect the ability of food retailers to ensure food safety and can impact the consumption of healthier food options.

[1] In fact, retailers spend more on training programs for their FT employees. According to anecdotal evidence from a small sample of grocery manager interviews conducted for this study, each new FT entrant requires an investment of approximately $4,000 if search and training costs are included and initial reduction in productivity levels is considered.

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, minimum wage increases are likely to incentivize firms to substitute away from costly labor force in favor of capital. In the food retailing sector, for example, firms facing high operating costs have adopted labor-saving technologies such as barcodes and barcode scanners (Basker, 2012), automated self-checkout systems (Litfin and Wolfram, 2010), and digital price tags (Inman and Nikolova, 2017). Alternatively, firms may simply reduce output (and 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 are counterproductive.

Multiple studies have empirically evaluated impacts of minimum wage increases. Card (1992a,b), Katz and Krueger (1992), Card and Krueger (1994, 1995, 2000), Dube, Lester, and Reich (2010), and Allegretto, Dube, and Reich (2011) use econometric analyses of panel data and find either 0 or, in other cases, significant positive impacts of minimum wages on employment.[2] Using similar methods, however, Neumark and Wascher (1992, 2000, 2017); Neumark, Schweitzer, and Wascher (2004); and Neumark, Salas, and Wascher (2014) report that a 10% increase in a minimum wage is associated with approximately a 1%–2% 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. In the retail industry, Sabia (2009) finds that a 10% increase in the minimum wage causes a 0.7%–1.1% decrease in retail employment, but Addison, Blackburn, and Cotti (2009) and Giuliano (2013) find no significant negative impact of minimum wage hikes on retail employment. Further examination of this relationship is warranted in light of the lack of consensus in the literature and current legislation contemplating new minimum wage laws across the United States.

Other papers in the minimum wage literature have not (with a few exceptions) differentiated between effects on FT and PT workers. Gramlich, Flanagan, and Wachter (1976) and Ressler, Watson, and Mixon (1996) find that minimum wage increases lead to a rise in PT employment, while McKee and West (1984) and Hsing (2000) report a negative relationship between minimum wages and the PT/FT worker ratio. However, all of them aggregate data across all industries and thus are unable to offer insight as to how FT or PT labor changes in the retail trade sector. In addition, they are silent about how hours of FT and PT labor 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, employment, and hours of work for both FT and PT workers in the retail trade sector.

[2] 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 their profit by hiring more employees and producing more outputs even if minimum wage increases (monopsony).

Conceptual Framework and Hypothesis Development

Retail Wage Rates

We first examine the impact of state and federal minimum wage increases on wage of FT and PT retail workers. According to the Current Population Survey (CPS) data, FT workers are paid 63% higher than PT workers during the period from April 2008 to March 2018.[3] Because wage levels of PT workers are closer to a minimum wage, a change in a minimum wage may have a greater effect on PT workers than on FT workers. Therefore, we hypothesize that

HYPOTHESIS 1. *State and federal minimum wage hikes raise wage rates for PT retail workers to a greater degree than for FT retail workers.*

Retail Employment

Retailers are likely to decrease their labor demand if they face an increase in labor costs. Further, if H1 holds, standard economic theory predicts that the number of PT workers will drop more than the number of FT workers. However, this may not be true because retailers are likely to control both types of workers they employ to maximize their profits. Further, PT workers play a vital role in retail operations because they provide flexibility in labor scheduling (Thurik and van der Wijst, 1984; Wotruba, 1990; Tilly, 1991; McMenamin, 2007; Künn-Nelen, de Grip, and Fouarge, 2013; Garnero, Kampelmann, and Rycx, 2014; Owen, 2015). They are often employed to fill in the gap between FT working hours and relatively longer store hours—approximately 75% of retail grocery stores in the United States are open 24 hours a day, 7 days a week—or to serve customers during periods of high demand— many U.S. grocery stores conduct over 50% of their sales on Saturday and Sunday. If minimum wage increases result in losses of PT employment, retailers may face difficulties sustaining desired levels of store operation, customer service, and customer satisfaction, hurting ultimate sales performance.

FT workers are expected to fulfill higher-skill tasks, such as procuring 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 could be covered by fewer FT employees with the addition of improved inventory-control systems and sales-management programs. Meanwhile, PT employees are essential to store operations, as they unload and unpack items, stock shelves, and serve customers during periods of high demand. Therefore, retailers may have incentives to keep PT workers for tasks involving interaction with customers and to reduce the number of FT workers in charge of management tasks. Further, if retailers intend to keep their PT employment level and the total labor budget remains the same, then they benefit from reducing expensive FT employment to compensate for cost increases caused by an increase in PT wage rates.[4] Taken together, we posit the following hypothesis:

HYPOTHESIS 2. *State and federal minimum wage hikes reduce FT employment to a greater degree than they reduce PT employment.*

Hours of Retail Work

In addition to changing employment, retailers facing minimum wage hikes can use hours of work to adjust 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 compensate for positions

[3] The data section describes the CPS data in detail.
[4] In addition to lower hourly wage, retailers do not have to provide health insurance to PT workers.

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 reduced hours of work among teenage workers in all sectors of the economy following a minimum wage hike. 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 differentially influence PT and FT workers' hours. We hypothesize that due to the higher hourly wages of FT workers, retailers reduce hours of work for their FT employees more than for their PT counterparts in the face of increases in minimum wages to cut labor costs quickly. That is

HYPOTHESIS 3. *State and federal minimum wage hikes reduce hours of FT work to a greater degree than they reduce hours of PT work.*

Methods

To test the hypotheses, we specify a cross-state model using monthly state-level data (Card and Krueger, 1995; Burkhauser, Couch, and Wittenburg, 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) for a FT ($j = 0$) and PT ($j = 1$) worker is assumed to be linearly associated with a measure of the minimum wage and other control variables in state i in month m of year t.

First, we explore how state and federal minimum wage hikes influence FT and PT retail wages by estimating the following equation:

$$(1) \qquad \boldsymbol{W}^{j}_{imt} = \alpha^{j}_{W} + \beta^{j}_{W}\boldsymbol{MW}_{imt} + \sum_{h}\gamma^{jh}_{W}\boldsymbol{X}^{h}_{imt} + \sum_{i}\delta^{ji}_{W}\boldsymbol{S}^{i} + \sum_{m}\eta^{jm}_{W}\boldsymbol{M}^{m} + \sum_{t}\tau^{jt}_{W}\boldsymbol{T}^{t} + \boldsymbol{\varepsilon}^{j}_{imt},$$

where $\boldsymbol{W}^{j}_{imt}$ is the average retail wage rate per hour for a 16- to 64-year-old FT ($j = 0$) and PT ($j = 1$) employee in state$i$ in month m of year t; α^{j}_{W}, β^{j}_{W}, γ^{jh}_{W}, δ^{ji}_{W}, η^{jm}_{W}, and τ^{jt}_{W} are parameters to be estimated; $\boldsymbol{MW}_{imt}$ is the log of the larger of the state or federal minimum wage; $\boldsymbol{X}^{h}_{imt}$ is the hth variable designed to capture state-specific and time-varying macroeconomic and demographic trends; $\boldsymbol{MW}^{i}$ is the ith state dummy variable capturing state-specific factors affecting employment; $\boldsymbol{M}^{m}$ is the mth month dummy variable capturing seasonal effects; and $\boldsymbol{T}^{t}$ is the tth year dummy variable capturing year-specific effects. For the vector of variables $\boldsymbol{X}^{h}_{imt}$, we use the log of the hourly wage for prime age (25–54 years old) workers across all industries, the proportion of the population between 16 and 19 years of age to the population between 16 and 64 (i.e., the proportion of teenagers), and the unemployment rate among male, prime age (25–54 years old) people across all industries.

Because changes in federal minimum wage are 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 $\boldsymbol{X}^{h}_{imt}$ 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, Couch, and Wittenburg (2000); and Sabia (2009) use this set of controls in their econometric specifications with state–month observations. As mentioned in H_1, we expect both state and federal minimum wage increases to positively affect wage rates, so β^{0}_{W} and β^{1}_{W} are positive and statistically significant. Further the minimum wage elasticity of wage (i.e., the ratio of the minimum wage estimate to the mean wage rate) is greater for PT than for FT wage.

Next, we define FT ($j = 0$) and PT ($j = 1$) retail employment in state i in month m and year t, $\boldsymbol{E}^{j}_{imt}$, as the ratio of FT or PT retail employment to total population between 16 to 64 years old and

estimate the following employment equation:

$$\boldsymbol{E}^{j}_{imt} = \alpha^{j}_{E} + \beta^{j}_{E}\boldsymbol{MW}_{imt} + \sum_{h}\gamma^{jh}_{E}\boldsymbol{X}^{h}_{imt} + \sum_{i}\delta^{ji}_{E}\boldsymbol{S}^{i} + \sum_{m}\eta^{jm}_{E}\boldsymbol{M}^{m} + \sum_{t}\tau^{jt}_{E}\boldsymbol{T}^{t} + \boldsymbol{\varepsilon}^{j}_{imt}. \tag{2}$$

According to H_2, we expect that the minimum wage variable, $\boldsymbol{MW}_{imt}$ has a negative and significant impact on the employment ratio and that the minimum wage elasticity (i.e., the ratio of the minimum wage estimate to the mean employment) of FT employment is greater than that of PT employment.

While equation (2) allows us to examine the effects of state and federal minimum wage increases on FT and PT 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 for their FT or PT employees. To capture this effect, we estimate the following hours-of-work equation:

$$\boldsymbol{H}^{j}_{imt} = \alpha^{j}_{H} + \beta^{j}_{H}\boldsymbol{MW}_{imt} + \sum_{h}\gamma^{jh}_{H}\boldsymbol{X}^{h}_{imt} + \sum_{i}\delta^{ji}_{H}\boldsymbol{S}^{i} + \sum_{m}\eta^{jm}_{H}\boldsymbol{M}^{m} + \sum_{t}\tau^{jt}_{H}\boldsymbol{T}^{t} + \boldsymbol{\varepsilon}^{j}_{imt}, \tag{3}$$

where $\boldsymbol{H}^{j}_{imt}$ is the average hours of work per week for FT ($j = 0$) and PT ($j = 1$) retail employees between the ages of 16 and 64. Equation (3) allows us to understand how state and federal minimum wage increases influence hours of work in the retail trade. H3 suggests that increases in state and federal minimum wages lead to greater cuts in hours of FT work than of PT work, so we expect that β^{0}_{H} and β^{1}_{H} are negative and statistically significant and that the minimum wage elasticity of working hours (i.e., the ratio of the minimum wage estimate to the mean hours of work) is greater among FT workers than among PT workers.

In equations (1)–(3), dependent variables are subject to a measurement error because state–month data points do not always include sufficient numbers of FT and PT retail workers.[5] However, according to Sabia (2009), such a measurement error is not likely to correlate with minimum wage policies, so estimates from equations (1)–(3) are unbiased. Another issue arising from the small number of FT and PT retail workers in some state–month data points is heteroskedasticity. To overcome this potential problem, we further estimate equations (1)–(3) by applying the weight of the number of observations in each state–month observation,[6] minimizing potential problems caused by the small number of observations in some state–month data points.

Data

To estimate equations (1)–(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 a nationally representative survey of U.S. households conducted by the U.S. Census Bureau for the Bureau of Labor Statistics, providing information about labor force and demographic characteristics. 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 dataset. From the 10-year sample period (April 2008–March 2018), 6,120 state–month observations are available for the estimation. To define retail employment, we use the 1990 Census Bureau industrial classification code and

[5] For instance, the average number of PT retail workers is 72.18 and the standard deviation is 46.61.

[6] 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.

Table 1. Means and Standard Deviations of Variables Used in the Analysis, April 2008–March 2018 (N = 6, 120)

Variable	Definition	Mean[a]
Dependent variable		
Wage[a]	Hourly wage rate for 16- to 64-year-old employees in the retail trade	14.014 (2.222)
Full-time wage[a]	Hourly wage rate for 16- to 64-year-old full-time employees in the retail trade	16.183 (3.065)
Part-time wage[a]	Hourly wage rate 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 age (25- to 54-year-old) people	0.055 (0.024)
No. of states	Includes the District of Columbia.	51
No. of months		120

Notes: Means are weighted mean using the state populations from the CPS survey. Values in parentheses are weighted standard deviations using the state populations from the CPS survey.
[a]Calculated among the outgoing rotation group.

consider CPS respondents reporting positive working hours in the retail trade as retail workers.[7] To define FT and PT status of individual workers, we use the CPS work-status variable (WKSTAT). This information allows us to define FT and PT retail employment in equation (2) and hours of

[7] According to the 1990 Census Bureau industrial classification, our dataset 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; and retail florists.

FT and PT 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 FT and PT wages by using the work-status variable.[8] 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 on the 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 equations (1)–(3). The mean hourly wage rate is $16.18 for 16- to 64-year-old FT employees and $9.98 for 16- to 64-year-old PT employees.[9] In order to measure relative variability of wage rates between FT and PT workers, we calculate their coefficient of variation (CV), or the ratio of the standard deviations to the mean. The CV is 18.94% for FT workers and 22.63% for PT workers, suggesting that wage rates differ across time and states more among PT workers than among FT workers. The mean ratio of 16- to 64-year-old employees in the retail industry to the 16- to 64-year-old population is 0.12, 0.07for FT workers, and 0.04 for PT workers, indicating that 62.03% of retail employees are full time and 37.96% are part time; the ratio of FT to PT employees is 1.66:1.[10] The CV is 17.15% for PT workers and 13.63% for FT workers, suggesting that PT employment varies more across time and states. FT employees work an average of 42.55 hours per week, while PT employees work an average of 21.45 hours per week. The CV of hours of work is 2.04% for FT employees and 5.93% for PT employees, implying hours of work vary more for PT workers than for FT workers across time and states.

One objective of this study is to determine whether minimum wage increases differentially influence FT and PT retail employment. Although a formal econometric model is necessary, a descriptive analysis of employment patterns informs this issue. Figure 1 shows the nationwide total, FT, and PT employment rates over the sample period in the retail sector, each of which is the ratio of total, FT, or PT retail employees to total population aged 16–64 years old. While the FT employment rate appears to move inversely to the PT employment rate, variation patterns of FT employment and total employment are similar[11] This observation suggests that FT and PT employees may play different roles in the retail industry, implying that retailers' responses to minimum wage changes can differ by employment status.

Results

Equations (1)–(3) investigate the impacts of state and federal minimum wage changes among FT and PT retail workers while controlling for state-specific and time-varying macroeconomic factors and state-, month-, and year-specific effects. 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 β_W^j, β_E^j, and β_H^j, $j \in \{0, 1\}$, which measure effects of state and federal minimum wage increases on wage rate, employment, and hours of work among FT and PT workers, respectively. We further compare the minimum wage elasticities between FT and PT retail workers to determine which worker type is more influenced by minimum wage hikes.

[8] This subsample is called the CPS Merged Outgoing Rotation Group.

[9] Wages include any overtime pay, commissions, or tips usually received.

[10] The ratio of FT and PT employees in the food retail industry is 1.68:1.

[11] In fact, there is a statically negative correlation between variations of the FT employment and the PT employment and a statistically positive correlation between variations of the FT employment and the total employment.

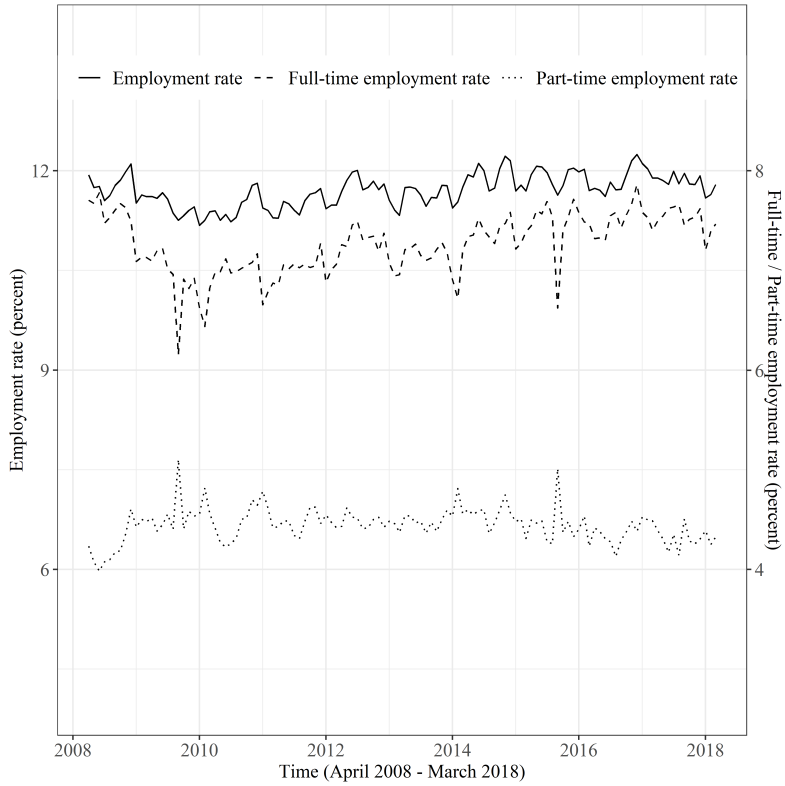

Figure 1. Total, Full-Time, and Part-Time Employment Rates in the U.S. Retail Sector, April 2008–March 2018

Notes: Authors' calculations from Current Population Survey (CPS) data.

Wage Rates

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

Table 3 indicates that increases in state and federal minimum wages have positive and statistically significant impact on wage rates among PT workers in any specifications (columns 1–5), implying that state and federal minimum wage hikes lead to rising labor cost through PT employment. We also find that the minimum wage elasticity of wage rate is 0.174 after accounting for time-varying unobservables and state–month observations. This means that a 10% increase in state and federal minimum wage results in a 1.739% increase in PT wage rates.[12] Therefore, state and federal minimum wage hikes lead to higher retail wage rates among PT workers than among FT workers, supporting H1.

[12] Even though the magnitude of a minimum wage hike is small, its impact is substantial in sectors where average profits are small. In the food retailing industry, for example, the cost of labor accounted for approximately 14% of total revenue (Progressive Grocer, 2017), and the net profit margin was only 1.7% in 2017 (FMI, 2020). Meanwhile, our estimation result indicates that a 10% increase in the minimum wage raises the average wage rate among PT workers by 1.739%. For illustration purposes, if we use these ratios and assume that labor consists of only salaries to FT and PT employees, then a 10% increase in the minimum wage leads to a decrease in a net profit by 3.88%, holding all else constant.

Table 2. Estimation Results of Minimum Wage Impacts on Full-Time Wage Rate (equation 1)

	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^2	0.246	0.314	0.317	0.322	0.358
Elasticity	0.185	0.154	0.141	0.021	0.070

Notes: Columns 1–4 are unweighted. Column 5 weights by number of state–month cell observations. Robust standard errors clustered on state are in parentheses. Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% 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 (equation 1)

	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^2	0.102	0.126	0.128	0.136	0.159
Elasticity	0.477	0.385	0.377	0.210	0.174

Notes: 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% level. Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.

Table 4. Estimation Results of Minimum Wage Impacts on Full-Time Employment (equation 2)

	1	2	3	4	5
Constant	0.159***	0.106***	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^2	0.163	0.463	0.473	0.488	0.512
Elasticity	−0.031	−0.118	−0.094	−0.150	−0.121

Notes: Columns 1–4 are unweighted. Column 5 weights by number of state–month cell observations. Robust standard errors clustered on state are in parentheses. Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.

Table 5. Estimation Results of Minimum Wage Impacts on Part-Time Employment (equation 2)

	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^2	0.073	0.482	0.492	0.498	0.509
Elasticity	0.159	0.133	0.119	0.071	0.081

Notes: Columns 1–4 are unweighted. Column 5 weights by number of state–month cell observations. Robust standard errors clustered on state are in parentheses. Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.

Employment Effects

Tables 2 and 3 show that minimum wage increases affect PT wages, but this is not always true for FT workers. Do retailers reduce the number of PT workers? Does the standard economic theory perfectly predict an outcome of minimum wage increases? Tables 4 and 5 report the estimation results of regressions of the proportion of 16- to 64-year-old FT and PT retail employment, respectively, to the 16- to 64-year-old population on the minimum wage variable and other control variables.

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 FT employment in the retail sector. As shown in column 5, the minimum wage elasticity of retail employment is −-0.121, indicating that a 10% increase in minimum wage results in a 1.214% decrease in FT retail employment. These results indicate that even if the FT wage rate does not significantly increase due to minimum wage hikes, retailers respond by reducing their relatively expensive FT labor.

On the other hand, Table 5 indicates that the impacts of state and federal minimum wages are less clear among PT retail workers. The coefficients of the minimum wage variable are positive in all specifications (columns 1–5), although they are all close to 0. 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 no impact on PT retail employment.

Personnel managers decide how many FT and PT workers to hire to operate their stores. Our results indicate that retailers respond to minimum wage hikes and subsequent PT wage increases by reducing the amount of FT labor and keeping the same level of PT labor, which supports H2. As shown previously, state and federal minimum wage increases affect retailers' labor budget through PT wage rates. Because FT workers tend to be more costly, cuts to the number of FT workers allow retailers to easily keep their total labor costs low. Further, retailers are reluctant to decrease the number of PT workers, whose primary responsibility is to serve their customers and fill gaps between FT 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 are likely to incentivize retailers to substitute away from the FT labor force to PT labor.

Hours of Work Effects

In response to state and federal minimum wage increases, retailers may also reduce their employees' hours of work. We estimate equation (3) among FT and PT retail workers and report these estimation results in Tables 6 and 7, respectively.

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 FT 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 FT work is −0.029, signifying that a 10% increase in the minimum wage is associated with a 0.292% decrease in hours of FT work (column 5). Therefore, we conclude that retailers tend to reduce their FT employees' hours of work after state and federal minimum wage increases.

Table 7 reports estimation results of equation (3) among PT 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 PT retail work. While reducing labor costs by reducing hours of expensive FT work is a quick way for keeping costs low, reducing the number of PT

Table 6. Estimation Results of Minimum Wage Impacts on Hours of Full-Time Work (equation 3)

	1	2	3	4	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^2	0.037	0.197	0.202	0.211	0.252
Elasticity	−0.046	−0.049	−0.049	−0.026	−0.029

Notes: Columns 1–4 are unweighted. Column 5 weights by number of state–month cell observations. Robust standard errors clustered on state are in parentheses. Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% 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 (equation 3)

	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	No	Yes	Yes
R^2	0.037	0.339	0.398	0.404	0.450
Elasticity	0.022	−0.001	0.018	−0.004	0.002

Notes: Columns 1–4 are unweighted. Column 5 weights by number of state–month cell observations. Robust standard errors clustered on state are in parentheses. Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.

workers potentially leads to consumers frustrated by small numbers of sales staff and long lines for cash registers. Therefore, retailers facing labor cost increases due to minimum wage hikes tend to choose to reduce hours of FT work more than they reduce hours of PT work, supporting H_3.[13]

Conclusions and Implications

Some U.S. states have passed legislation to raise the minimum wage. Understanding how these legislations differentially impact PT and FT retail workers is critical because the U.S. retail industry hires many PT workers, each of whom plays a vital role in retail business. We use state-level CPS data from April 2008 to March 2018 and specify a series of econometric models to estimate the impact of changes in state and federal minimum wages on (i) wage rates, (ii) employment, and (iii) hours of work, emphasizing differences between FT and PT worker impacts.

We find a positive impact of state and federal minimum wage hikes on wage rates for PT workers but a modestly positive or zero impact on FT workers' wage rates. Conventional wisdom suggests that an increase in PT wages leads to a decrease in PT employment. However, we find that retailers reduce the number of FT workers in response to increased labor costs while keeping the number of PT workers constant; we also find that hours of FT work are negatively correlated with state and federal minimum wage increases. These results suggest that because per employee cost (including other nonwage benefits) is higher among FT workers, retailers more easily achieve necessary cost reductions by cutting employment and hours of FT workers. They also suggest that FT and PT workers are not perfectly substitutable due to the nature of their work and that retailers tend to choose the latter over the former when minimum wages increase. While FT workers fulfill higher-skill tasks such as procuring goods and services, planning sales strategies, scheduling staff, and contributing to store operations, PT workers mainly serve as sales staff members supporting FT workers and supporting longer store hours (Thurik and van der Wijst, 1984; Wotruba, 1990; Tilly, 1991; Hirsch, 2005; Künn-Nelen, de Grip, and Fouarge, 2013; Garnero, Kampelmann, and Rycx, 2014; Owen, 2015). It may be that retailers' major concern is not a long-run decrease in human capital due to fewer FT employees (Hirsch, 2005) but a short-run decrease in sales due to fewer PT employees (Künn-Nelen, de Grip, and Fouarge, 2013). Therefore, retailers reduce FT employees instead of PT employees if they face minimum wage hikes.

Our results provide insights that may be useful for retailers. We find that state and federal minimum wage hikes affect primarily FT employment. In the short run, retaining lower cost, PT workers allows retailers to continue their day-to-day operations. However, reductions in the number of FT workers have unfavorable effects on the long-run accumulation of human capital in the retail sector, as FT 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). For example, in the food retail industry, without enough experienced FT workers, retailers may fail to practice proper food safety and hygiene procedures, causing increased risk for food safety problems (Hertzman and Barrash, 2007). It is also possible that a shortage of well-trained and experienced FT workers could limit a retailers' ability to use innovative, technology-based cost reduction methods (e.g., automated warehouses, robotic in-store fulfillment, and autonomous floor cleaning robots), which major retail chains have just adopted in stores (Begley et al., 2019). Retailers would be well advised to consider these long- and short-term effects when they formulate personnel policies and make in-store labor hours decisions in response to minimum wage changes.

Our results are also important to state-level policy makers, whose major concern is regional economic development. Our study implies that minimum wage legislations are counterproductive and can harm workers in the retail industry, particularly FT workers who are generally older, often

[13] Although our main concern in this study is to compare state and federal minimum wage effects on FT and PT retail workers, because prior studies consider impacts of minimum wage increases on retail workers regardless of their FT and PT status (Kim and Taylor, 1995; Sabia, 2009; Addison, Blackburn, and Cotti, 2009; Giuliano, 2013), we also conduct the same analyses as above among all retail workers. The online supplement (www.jareonline.org) summarizes these results.

with families to support, and thus less likely to be able to cope with job or hourly cutbacks compared to generally younger PT 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.

Another potential concern of policy makers is related to healthy diets. Many state and federal government programs promote healthier diets (Healthy Food Policy Project, 2020). However, our study suggests that minimum wage hikes lead to reduced numbers of FT workers. If FT grocery workers ensure quality and safety of fresh products, minimum wage policies may be counterproductive to this attempt.

Although our study is valuable to inform ongoing policy discussions, increases in minimum wages are nearly certain to have other consequences not considered here. First, our analysis does not consider labor productivity. If retailers pass minimum wage increases to their customers via increases in retail prices, this is likely to influence their output level as well. Given that labor productivity is an issue of interest to retailers and policy makers, it would be worthwhile to examine impacts of minimum wage increases on labor productivity. Second, considering other wage adjustments will be useful. It is possible that entry-level wages increase but other, higher-level wages do not by a proportionate amount. Alternatively, FT wages might not decrease but other nonwage benefits (e.g., life insurance, education allowances, holiday leaves, stock options, health/dental plans) might be reduced. It would be worthwhile to consider how these changes influence employee morale, productivity, and turnover rates. Finally, although our research focuses on short-run impacts of minimum wage increases on wages, employment, and hours of work, in the long run, it may be the case that retailers seek innovative ways to pass cost increases on to other levels in the distribution channel. In the food retailing industry, for example, retail merchandising displays can often be built by manufacturers, shelves can be stocked by third parties, and meats and cheeses can be presliced and packaged at processing plants, in all cases conserving expensive in-store labor. Such functions can be performed more efficiently, at lower costs, but they generally come with other trade-offs that must be recognized by retailers and manufacturers. System-wide impacts should be analyzed when mandating cost increases (in minimum wages) at one level in a vertical channel.

[First submitted August 2020; accepted for publication March 2021.]

References

Addison, J. T., M. L. Blackburn, and C. D. Cotti. "Do Minimum Wages Raise Employment? Evidence from the US Retail-Trade Sector." *Labour Economics* 16(2009):397–408. doi: 10.1016/j.labeco.2008.12.007.

Allegretto, S. A., A. Dube, and M. Reich. "Do Minimum Wages Really Reduce Teen Employment? Accounting for Heterogeneity and Selectivity in State Panel Data." *Industrial Relations: A Journal of Economy and Society* 50(2011):205–240. doi: 10.1111/j.1468-232X.2011.00634.x.

Baffoe-Bonnie, J. "Interindustry Part-Time and Full-Time Wage Differentials: Regional and National Analysis." *Applied Economics* 36(2004):107–118. doi: 10.1080/0003684042000017401.

Basker, E. "Raising the Barcode Scanner: Technology and Productivity in the Retail Sector." *American Economic Journal: Applied Economics* 4(2012):1–27. doi: 10.1257/app.4.3.1.

Begley, S., B. Hancock, T. Kilroy, and S. Kohli. "Automation in Retail: An Executive Overview for Getting Ready." 2019. Available online at https://www.mckinsey.com/industries/retail/our-insights/automation-in-retail-an-executive-overview-for-getting-ready [Accessed March 28, 2021].

Bose, N. "Walmart Hikes Minimum Wage, Announces Layoffs on Same Day." *Reuters* (2018). Available online at https://www.reuters.com/article/us-walmart-wages-idUSKBN1F01N8 [Accessed March 28, 2021].

Burkhauser, R. V., K. A. Couch, and D. C. Wittenburg. "A Reassessment of the New Economics of the Minimum Wage Literature with Monthly Data from the Current Population Survey." *Journal of Labor Economics* 18(2000):653–680. doi: 10.1086/209972.

Card, D. "Do Minimum Wages Reduce Employment? A Case Study of California, 1987–89." *ILR Review* 46(1992a):38–54. doi: 10.1177/001979399204600104.

———. "Using Regional Variation in Wages to Measure the Effects of the Federal Minimum Wage." *ILR Review* 46(1992b):22–37. doi: 10.1177/001979399204600103.

Card, D., and A. B. Krueger. "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania." *American Economic Review* 84(1994):772–793.

———. *Myth and Measurement: The New Economics of the Minimum Wage*. Princeton, NJ: Princeton University Press, 1995.

———. "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania: Reply." *American Economic Review* 90(2000):1397–1420. doi: 10.1257/aer.90.5.1397.

Dance, S. "Democrats, Unions Launch Push for Statewide $15 Minimum Wage." *Baltimore Sun* (2018). Available online at http://www.baltimoresun.com/news/maryland/politics/bs-md-minimum-wage-rally-20180115-story.html [Accessed March 28, 2021].

Dorfman, J. H. *Wages in the Retail Industry: Reality Trumps Perception*. Washington, DC: National Retail Federation Foundation, 2014. Available online at https://cdn.nrf.com/sites/default/files/2019-02/Wages in the Retail Industry.pdf.

Dube, A., T. W. Lester, and M. Reich. "Minimum Wage Effects across State Borders: Estimates Using Contiguous Counties." *Review of Economics and Statistics* 92(2010):945–964. doi: 10.1162/REST_a_00039.

Flood, S., M. King, S. Ruggles, and J. R. Warren. *Integrated Public Use Microdata Series, Current Population Survey: Version 5.0*. [Dataset] [Accessed March 28, 2021]. Minneapolis, MN: University of Minnesota, 2017. doi: 10.18128/D030.V5.0.

FMI. "Grocery Store Chains Net Profit." 2020. Available online at https://www.fmi.org/our-research/supermarket-facts/grocery-store-chains-net-profit [Accessed March 28, 2021].

Garnero, A., S. Kampelmann, and F. Rycx. "Part-Time Work, Wages, and Productivity: Evidence from Belgian Matched Panel Data." *ILR Review* 67(2014):926–954. doi: 10.1177/0019793914537456.

Giuliano, L. "Minimum Wage Effects on Employment, Substitution, and the Teenage Labor Supply: Evidence from Personnel Data." *Journal of Labor Economics* 31(2013):155–194. doi: 10.1086/666921.

Gramlich, E. M., R. J. Flanagan, and M. L. Wachter. "Impact of Minimum Wages on Other Wages, Employment, and Family Incomes." *Brookings Papers on Economic Activity* 1976(1976):409. doi: 10.2307/2534380.

Healthy Food Policy Project. "State Policy Options to Increase Access to Healthy Food." 2020. Available online at https://healthyfoodpolicyproject.org/key-issues/state-policy-options-to-increase-access-to-healthy-food [Accessed March 28, 2021].

Hertzman, J., and D. Barrash. "An Assessment of Food Safety Knowledge and Practices of Catering Employees." *British Food Journal* 109(2007):562–576. doi: 10.1108/00070700710761545.

Hirsch, B. T. "Why Do Part-Time Workers Earn Less? The Role of Worker and Job Skills." *ILR Review* 58(2005):525–551. doi: 10.1177/001979390505800401.

Hortaçsu, A., and C. Syverson. "The Ongoing Evolution of US Retail: A Format Tug-of-War." *Journal of Economic Perspectives* 29(2015):89–112. doi: 10.1257/jep.29.4.89.

Hsing, Y. "On the Substitution Effect of the Minimum Wage Increase: New Evidence." *Applied Economics Letters* 7(2000):225–228. doi: 10.1080/135048500351555.

Inman, J. J., and H. Nikolova. "Shopper-Facing Retail Technology: A Retailer Adoption Decision Framework Incorporating Shopper Attitudes and Privacy Concerns." *Journal of Retailing* 93(2017):7–28. doi: 10.1016/j.jretai.2016.12.006.

Jennings, L. "Minimum Wage to Rise in 18 States in 2018." 2017. Available online at http://www.nrn.com/workforce/minimum-wage-rise-18-states-2018 [Accessed March 28, 2021].

Katz, L. F., and A. B. Krueger. "The Effect of the Minimum Wage on the Fast-Food Industry." *ILR Review* 46(1992):6–21. doi: 10.1177/001979399204600102.

Kim, T., and L. J. Taylor. "The Employment Effect in Retail Trade of California's 1988 Minimum Wage Increase." *Journal of Business & Economic Statistics* 13(1995):175–182. doi: 10.1080/07350015.1995.10524591.

Künn-Nelen, A., A. de Grip, and D. Fouarge. "Is Part-Time Employment Beneficial for Firm Productivity?" *ILR Review* 66(2013):1172–1191. doi: 10.1177/001979391306600507.

Litfin, T., and G. Wolfram. "New Automated Checkout Systems." In M. Krafft and M. K. Mantrala, eds., *Retailing in the 21st Century,* Berlin, Germany: Springer, 2010, 189–203. doi: 10.1007/978-3-540-72003-4_12.

Lordan, G., and D. Neumark. "People versus Machines: The Impact of Minimum Wages on Automatable Jobs." *Labour Economics* 52(2018):40–53. doi: 10.1016/j.labeco.2018.03.006.

McKee, M., and E. G. West. "Minimum Wage Effects on Part-Time Employment." *Economic Inquiry* 22(1984):421–428. doi: 10.1111/j.1465-7295.1984.tb00696.x.

McMenamin, T. M. "A Time to Work: Recent Trends in Shift Work and Flexible Schedules." *Monthly Labor Review* 130(2007):3–15.

Mourdoukoutas, P. "The $15 Minimum Wage Movement Is Winning, and That's Bad News for Cashiers." *Forbes* (2018). Available online at https://www.forbes.com/sites/panos mourdoukoutas/2018/01/01/the-15-minimum-wage-movement-is-winning-and-thats-bad-news-for-cashiers/ [Accessed March 28, 2021].

Neumark, D., J. M. I. Salas, and W. Wascher. "Revisiting the Minimum Wage—Employment Debate: Throwing Out the Baby with the Bathwater?" *ILR Review* 67(2014):608–648. doi: 10.1177/00197939140670S307.

Neumark, D., M. Schweitzer, and W. Wascher. "Minimum Wage Effects throughout the Wage Distribution." *Journal of Human Resources* 39(2004):425–450. doi: 10.3368/jhr.XXXIX.2.425.

Neumark, D., and W. Wascher. "Employment Effects of Minimum and Subminimum Wages: Panel Data on State Minimum Wage Laws." *ILR Review* 46(1992):55–81. doi: 10.1177/001979399204600105.

———. "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania: Comment." *American Economic Review* 90(2000):1362–1396. doi: 10.1257/aer.90.5.1362.

———. "Reply to 'Credible Research Designs for Minimum Wage Studies'." *ILR Review* 70(2017):593–609. doi: 10.1177/0019793917698429.

Neumark, D., and W. L. Wascher. "Minimum Wages and Employment." *Foundations and Trends in Microeconomics* 3(2007):1–182. doi: 10.1561/0700000015.

Owen, L. J. "The Choice of Part-Time Employment in the United States and Canada, 1955–2000." *Labor History* 56(2015):643–669. doi: 10.1080/0023656X.2015.1116818.

Progressive Grocer. "Rising Labor Costs Inspire Savvy Retailers to Innovate." 2017. Available online at https://progressivegrocer.com/rising-labor-costs-inspire-savvy-retailers-innovate [Accessed March 28, 2021].

Ressler, R. W., J. K. Watson, and F. G. Mixon. "Full Wages, Part-Time Employment and the Minimum Wage." *Applied Economics* 28(1996):1415–1419. doi: 10.1080/000368496327679.

Sabia, J. J. "The Effects of Minimum Wage Increases on Retail Employment and Hours: New Evidence from Monthly CPS Data." *Journal of Labor Research* 30(2009):75–97. doi: 10.1007/s12122-008-9054-1.

Seitz-Wald, A. "Democrats Add $15 Minimum Wage to Platform." *NBC News* (2016). Available online at https://www.nbcnews.com/politics/2016-election/democrats-add-15-minimum-wage-platform-n606351 [Accessed March 28, 2021].

Tang, C., Y. Liu, H. Oh, and B. Weitz. "Socialization Tactics of New Retail Employees: A Pathway to Organizational Commitment." *Journal of Retailing* 90(2014):62–73. doi: 10.1016/j.jretai.2013.11.002.

Thurik, R., and N. van der Wijst. "Part-Time Labour in Retailing." *Journal of Retailing* 60(1984):62–80.

Tilly, C. "Reasons for the Continuing Growth of Part-Time Employment." *Monthly Labor Review* 114(1991):10–18.

Vaghul, K., and B. Zipperer. "Historical State and Sub-State Minimum Wage Data." 2016. Available online at http://www.equitablegrowth.org/working-papers/historical-state-and-sub-state-minimum-wage-data/ [Accessed March 28, 2021].

Wotruba, T. R. "Full-Time vs. Part-Time Salespeople: A Comparison on Job Satisfaction, Performance, and Turnover in Direct Selling." *International Journal of Research in Marketing* 7(1990):97–108. doi: 10.1016/0167-8116(90)90014-E.

Zavodny, M. "The Effect of the Minimum Wage on Employment and Hours." *Labour Economics* 7(2000):729–750. doi: 10.1016/S0927-5371(00)00021-X.

Journal of Agricultural and Resource Economics 47(2):S1–S3
ISSN 1068-5502

doi: 10.22004/ag.econ.310532

Online Supplement: Impacts of Minimum Wage Increases in the U.S. Retail Sector: Full-Time versus Part-Time Employment

Koichi Yonezawa, Miguel I. Gómez, and Edward W. McLaughlin

Minimum Wage Effects among All Retail Workers

Table S1 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 S1 shows the modest increase in wage rate for all retail workers. In response to wage increases, retailers may reduce the amount of labor. Table S2 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, Blackburn, and Cotti (2009) or Giuliano (2013), but not with Sabia (2009).

In Table S3, 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.

[Received August 2020; final revision received March 2021.]

References

Addison, J. T., M. L. Blackburn, and C. D. Cotti. "Do Minimum Wages Raise Employment? Evidence from the US Retail-Trade Sector." *Labour Economics* 16(2009):397–408. doi: 10.1016/j.labeco.2008.12.007.

Giuliano, L. "Minimum Wage Effects on Employment, Substitution, and the Teenage Labor Supply: Evidence from Personnel Data." *Journal of Labor Economics* 31(2013):155–194. doi: 10.1086/666921.

Sabia, J. J. "The Effects of Minimum Wage Increases on Retail Employment and Hours: New Evidence from Monthly CPS Data." *Journal of Labor Research* 30(2009):75–97. doi: 10.1007/s12122-008-9054-1.

Table S1. 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^2	0.288	0.351	0.353	0.362	0.401
Elasticity	0.249	0.202	0.195	0.057	0.074

Notes: Columns 1–4 are unweighted. Column 5 weights by number of state-month cell observations. Robust standard errors clustered on state are in parentheses. Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.

Table S2. Estimation Results of Minimum Wage Impacts on Employment

	1	2	3	4	5
Constant	0.210***	0.132***	0.128***	0.151***	0.148***
	(0.024)	(0.010)	(0.010)	(0.013)	(0.013)
Log minimum wage	0.005	−0.003	−0.002	−0.008	−0.005
	(0.007)	(0.004)	(0.004)	(0.006)	(0.006)
Log adult wage	−0.033***	−0.005**	−0.005**	−0.010***	−0.010***
	(0.010)	(0.002)	(0.002)	(0.002)	(0.002)
Share of teenagers	0.126	0.043	0.044*	0.050*	0.033
	(0.154)	(0.026)	(0.027)	(0.026)	(0.026)
Unemployment rate	−0.168***	−0.092***	−0.088***	−0.043***	−0.065***
	(0.029)	(0.010)	(0.010)	(0.014)	(0.014)
State dummy	No	Yes	Yes	Yes	Yes
Month dummy	No	No	Yes	Yes	Yes
Year dummy	No	No	No	Yes	Yes
R^2	0.156	0.545	0.549	0.555	0.540
Elasticity	0.041	−0.023	−0.013	−0.066	−0.042

Notes: Columns 1–4 are unweighted. Column 5 weights by number of state-month cell observations. Robust standard errors clustered on state are in parentheses. Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.

Table S3. Estimation Results of Minimum Wage Impacts on Hours of Work

	1	2	3	4	5
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^2	0.088	0.394	0.423	0.433	0.481
Elasticity	−0.060	−0.077	−0.067	−0.054	−0.052

Notes: Columns 1–4 are unweighted. Column 5 weights by number of state-month cell observations. Robust standard errors clustered on state are in parentheses. Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% level. The minimum wage elasticity is the ratio of the log minimum wage estimate to the mean wage rate.