MINIMUM WAGE INCREASES BY BALLOT INITIATIVE: EFFECT ON RESTAURANT EMPLOYMENT AND EARNINGS

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Abstract

Fourteen states increased their minimum wages by law or by ballot at the start of 2020. In a perfectly competitive labor market, price floors like the minimum wage generate unemployment, but empirical evidence suggests a mixed effect, finding often that minimum wage increases have no significant effect on employment. One explanation for this disconnect could be that legislators avoid unemployment by raising minimum wages at times when the labor market is unlikely to respond with more unemployment. This paper examines this explanation by studying minimum wage increases by ballot initiative, a process that avoids any legislative input. Using a difference-in-differences research design on a 20% increase in the minimum wage in Maine by ballot in 2016, this paper finds that the increase had no significant effect on restaurant industry employment or earnings. These results suggest that minimum wage increases passed by ballot may be inferior to those passed by state legislatures, which similarly tend not to cut employment but generate significant increases in earnings for workers. (JEL Classification Codes: J30, J33, J38)

1 Introduction

The federal minimum wage currently lies at $7.25 an hour, unchanged since its increase to that amount in 2009. Viewing that wage as an insufficient floor, many states and localities have taken to increasing their local minimum wage for a variety of reasons, including to adjust for increases in inflation and costs of living over the years and to set a price for labor deemed high enough for a worker to earn a "fair" or "living" wage. According to the National Conference of State Legislatures, 14 states increased their minimum wage via legislation or ballot initiative this year, up from 10 in 2019 and 11 in 2018 (National Conference of State Legislatures, 2020). The textbook view of the imposition of a price floor like a minimum wage in the labor market is that such a control drives a wedge between demand and supply, creating some deadweight loss. In the labor market, an increase in the minimum wage, according to theory, drives perfectly competitive firms to demand fewer employees, increasing unemployment.

But labor markets are not perfectly competitive, and in spite of the theoretical underpinnings, empirical evidence on the impact of minimum wage increases on employment is mixed. Some studies bear out the effect predicted by theory, while others find inconclusive or negative effects on unemployment resulting from minimum wage increases. Card and Krueger (1994) and Neumark and Wascher (1995), two early studies in modern minimum wage literature, make use of a difference-in-differences research design and reach differing conclusions about the direction and size of the elasticity of employment with respect to minimum wage using different datasets related to the same event study, a minimum wage increase in New Jersey in 1993. A third replication study using a changes-in-changes research design found CK's conclusion held for small fast-food restaurants, but reversed for large fast-food chains

(Ropponen, 2011). Clemens and Strain (2018), using American Community Survey data, found that relatively large increases in the minimum wage generate a small but negative elasticity of employment with respect to minimum wage. What might explain this divergence from theory? A few explanations come to mind. The "real world" labor market is not perfectly competitive, and firms enjoy some monopsony power, meaning they are able to pay employees below their marginal productivity, with the remaining revenue accruing to the firm as profit (Caldwell and Naidu, 2020). A minimum wage increase under these conditions could result in higher earnings per worker with no adjustment in overall

employment, vindicating the results found in minimum wage literature. Another explanation is that firms push the costs of minimum wage increases onto consumers by increasing prices (Basker and Khan, 2016). Finally, one last explanation could be that legislators, observing inelasticity in the demand for labor in an imperfectly competitive market and expressing a preference for greater equity, increase the minimum wage at opportune times – e.g., during a tight labor market – to avoid any adverse effect on employment and subsequent political backlash, creating the results observed in some studies.

But state legislatures are not the only driving factor behind minimum wage hikes. Some state constitutions allow their citizens to introduce ballot initiatives ushering in minimum wage increases, and they have done so roughly 20 times at the statewide level over the past two decades. This occurred most recently in Florida during the 2020 general election, where state residents voted to raise the hourly minimum wage to $15 an hour. State minimum wage increases enacted via ballot bypass the deliberative process of the state legislature and are instead approved by voters, who often "substitute a variety of cues for detailed policy information" like elite endorsement and identity of initiative sponsors when casting a ballot (Boehmke and Patty, 2007, p. 98). As a result, minimum wage increases passed via the initiative process may not be as carefully timed or coordinated to coincide with appropriate market conditions as are legislatively approved increases.

To investigate whether the results of minimum wage increases by initiative differ from those by legislative statute, I follow in the footsteps of Card and Krueger (1994) and use a difference-in-differences approach to study a similar event. Maine voters approved an hourly minimum wage increase from $7.50 to $9.00 (with subsequent $1.00 annual increases to $12.00) in 2016, and this study examines the effect of that event using New Hampshire counties bordering Maine – which have a state minimum hourly wage set at $7.25 – as a control group. My study focuses on restaurant workers, identified in literature as disproportionately minimum wage earners. I found statistically insignificant evidence that the Maine minimum wage hike had a negative effect on full-service employment and insignificant evidence for a positive effect on partial-service restaurant employment and earnings and full-service restaurant employment in Oxford County, Maine. The data show statistically insignificant evidence that the wage hike had a negative effect on partial-service restaurant employment and insignificant evidence for a positive effect on full-service restaurant employment and earnings and partial-service restaurant earnings in York County, Maine. Thus, Maine voters' attempts to increase the minimum wage led to neither an appreciable uptick in earnings for restaurant workers nor a discernable change in employment for restaurant workers, when comparing against earnings and employment changes in New Hampshire restaurants along the border with Maine in the same time period.

The result merits further investigation before a conclusion can be drawn about the efficacy of ballot-initiated minimum wage increases relative to ones passed by state legislatures. Further data on hours worked or on the distribution of restaurant jobs by earnings would enable a thorough inquiry on what effect, if any, the minimum wage increase had on the labor market by revealing the relevant adjustment mechanism in the labor market for restaurant workers. Given the values for average hourly earnings pre- and post-treatment in Maine counties for restaurant employees and prior literature, it seems plausible that the firm response to an increase in the minimum wage, provided it was an effective price floor, was a change in payroll hours, but more investigation is needed to make a conclusion.

The rest of this article is structured as follows. Section III reviews the literature on the effect of minimum wages on employment and earnings. Section IV discusses the process to determine the treatment and control groups used in this study and provides a summary of the data. Section V lays out the difference-in-differences model used in this study. Section VI discusses the results of the regression and includes a discussion on the results and robustness checks. Finally, Section VII concludes with further lines of inquiry.

2 Literature Review

Modern minimum wage studies begin with Card and Krueger (CK, 1994), who conducted surveys of fast-food restaurants in western New Jersey and eastern Pennsylvania and employed a difference-in-differences research design to quantify the effect on employment of New Jersey's 1993 increase in the state hourly minimum wage from $4.25 to $5.05. CK reasoned that Pennsylvania's border counties with New Jersey could serve as a control group, since they remained at a $4.25 hourly minimum wage. They used New Jersey's border counties with Pennsylvania as the treatment group to isolate the effect of the minimum wage specifically by modeling potential outcomes in New Jersey in the absence of the

wage increase using Pennsylvania's trends. They ultimately found that average starting earnings in New Jersey fast- food restaurants jumped a statistically significant 10%, while employment in those restaurants increased relative to Pennsylvania's – but not to a statistically significant degree. CK checked the validity of Pennsylvania's counties acting as a control group by examining trends among higher-paying restaurants in the sample counties. They found that those restaurants, largely unaffected by the minimum wage hike, experienced changes in employment in roughly the same size and direction, supporting the idea that the sample counties had similar underlying conditions. This paper uses CK's difference-in-differences methodology to study minimum wage differentials.

Shortly after Card and Krueger (1994) published, Neumark and Wascher (NW, 1995) reevaluated their results and found drastically different results. NW observed that the summary statistics from CK's dataset revealed that fast-food chains experienced surprisingly large swings in full-time equivalent employment, leading them to investigate their conclusions by other means. Using payroll records obtained from fast-food restaurants in CK's sample region rather than telephone interviews, which NW found to be a less variable dataset, NW found that, in contrast to an insignificant increase in employment, New Jersey's hourly minimum wage hike of roughly 18.8% led to a statistically significant decline in employment of 4.6%, and elasticity of employment with respect to minimum wage of -0.24. To avoid the issues presented in CK's dataset, this study will rely on data sourced from employers participating in state unemployment insurance programs, a representative sample of employers surveyed by the U.S. Bureau of Labor Statistics, in place of author-designed surveys.

Dube et. al. (2010) is a critical next development in modern minimum wage studies. They attempt to answer why local event studies, like CK, often yield positive or near-zero estimates of the elasticity of employment with respect to minimum wage increases, whereas national-level aggregate studies of all state borders with minimum wage differences yields a clear negative elasticity of employment. Dube et. al. compile hundreds of local event studies, cross-border county pairs with a minimum wage difference, across the nation in a difference-in-differences design using data from the Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW). They ultimately find a small positive elasticity of employment, implying that the overall welfare gain of a minimum wage increase is positive, and minimum wage increases boost total earnings among fast-food employees.

Like Dube et. al., this paper will use QCEW data and analyze the same sub-industries identified as disproportionate employers of minimum wage employees, full- and partial-service restaurants, using North American Industrial Classification System codes, two six-digit subcategories (most specific category) under NAICS's five-digit restaurant classification.

According to the NAICS scheme, full-service restaurants are establishments where patrons receive waiter service and pay after eating, while partial-service restaurants are those where patrons typically pay before eating, whether food is delivered, eaten on the premises, or taken out. This paper excludes the remaining two six-digit NAICS codes under the five-digit restaurant classification – Cafeterias, Grill Buffets, and Buffets and Snack and Nonalcoholic Beverage Bars– because rates of self-service among establishments in this category obscure the effect of an increase in the minimum wage on hired labor. This paper will also replicate the cross-border county pair structure by comparing two cross-border county pairs, one pair in the less densely populated northern side of the border between Maine and New Hampshire, and one pair in the southern, more densely populated border region.

3 Data

As stated earlier, this paper will use earnings and employment data from the Bureau of Labor Statistics' Quarterly Census of Employment and Wages. In selecting states and counties to examine in this study, I looked at minimum wage increases passed by ballot in the last two settled election cycles, 2016 and 2018, which yielded six events in Arkansas and Missouri (2018) and Arizona, Colorado, Maine, and Washington (2016). Of these increases, both Arizona's and Washington's included provisions stipulating that employees are guaranteed paid family leave, which is likely to impact firm decisions on employment and earnings. These states were stricken from the sample.

Of the remaining four states, I selected Maine, with border counties in New Hampshire serving as the control. I made this decision based on data availability – to ensure that BLS does not release identifiable information, the agency chooses not to disclose data for low-population or low-density counties where employment and earnings data could be traced back to particular firms. As a result, I chose Maine's 2016 increase, as it is the state with the greatest population density at its border with

neighboring New Hampshire. I do not anticipate any sample selection concerns resulting from the need to pick a population-dense border for this study. Given that this study uses a difference-in-differences model, an additional concern that could skew results is the presence of another law that enters effect at the same time as the minimum wage increase that could affect earnings and employment. The highest-profile law that entered effect at the same time was a legal marijuana law, which should not have a discernible effect on earnings and employment. I was unable to find any other laws that could interfere with my results.

Table 1: Minimum Wages in Sample

	State hourly minimum wage ($)				
	2015	2016	2017	2018	2019
New Hampshire	7.25	7.25	7.25	7.25	7.25
Maine	7.5	7.5	9.0	10.0	11.0

Source: U.S. Department of Labor

Data for each county on the border of New Hampshire and Maine (six in total; four in New Hampshire and two in Maine) was obtained by downloading NAICS-Based Data Files By Area for the years 2016 and 2017 and aggregating data labeled with NAICS Codes 722511 and 722513, the six-digit codes for full- and partial-service restaurants respectively. Counties for which employment and weekly earnings data was not available for all quarters – BLS does not disclose data in the event it could compromise anonymity – were discarded from the sample, leaving four counties, two in each state, one pair in the northern part in the state and one in the southern part, remaining in the sample. The remaining employment and earnings data were averaged across the three months of each quarter, and in the case of weekly earnings data, divided by 40 to construct an hourly earnings variable, for ease of comparison to state hourly minimum wages. The data for each county-pair are displayed in Figures 1 and 2 in the Appendix. The data are non-seasonally adjusted, displaying peaks in employment in the third quarter of each year. State hourly minimum wage data was obtained from the St. Louis Federal Reserve Bank's Economic Data.

Table 2: All-County Sample – Descriptive Statistics

Variable	Mean	St. Dev.	Max	Min
estabs	153.64	109.54	21	310
festabs	175.63	107.84	48	310
pestabs	131.66	108.42	21	305
femp	3510.43	2705.54	513	7831.33
pemp	1516.34	1371.1	223.33	3978.67
fearn	10.13	1.51	7.5	13
pearn	8.05	1.21	6	10.98

Descriptive statistics calculated across 8 quarters of data, from Q1 2016 to Q4 2017.

Source: Bureau of Labor Statistics Quarterly Census of Employment and Wages

Table 3: Variable Descriptions

Variable	Description
estabs	Number of restaurants in county
festabs	Number of full-service restaurants in county
pestabs	Number of partial-service restaurants in county
femp	Number of full-service restaurant employees in county, averaged over the three months of each quarter
pemp	Number of partial-service restaurant employees in county,averaged over the three months of each quarter
fearn	Hourly earnings among full-service restaurant employees in nominal dollars, constructed by dividing QCEW weekly earnings data by 40
pearn	Hourly earnings among partial-service restaurant employees in nominal dollars, constructed by dividing QCEW weekly earnings data by 40

4 Model

Following Card and Krueger (1994), I use the difference-in-differences technique to isolate and model the effect of the minimum wage increase passed by ballot in Maine on employment and earnings. This method simulates an experimental research design using observed data by designating a treatment group – two counties on the western border of Maine – and a control group – two counties on the eastern border of New Hampshire. I will compare the change in average employment and earnings from 2016 to 2017, as the minimum wage change entered effect in Maine on January 1, 2017, across both county pairs. By first subtracting the difference in earnings or employment from 2017 to 2016 in the Maine counties and then reducing that amount by the difference in earnings or employment from 2016 to 2017 in the New Hampshire counties, I will isolate the effect of the minimum wage increase on employment and earnings. The regression equation for each cross-border county- pair's partial service restaurant employment is as follows:

$$\ln(pemp_{it}) = \alpha + \beta_1 * time_{it} + \beta_2 * treatment_{it} + \beta_3 * time_{it} * treatment_{it} + \epsilon_{it} \quad (1)$$

Where $time_{it}$ dummy variable that equals 1 for observations after the change in the minimum wage and 0 for all other observations and $treatment_{it}$ is a dummy variable that equals 1 for observations in the treatment group (i.e. counties in Maine) and 0 for observations in the control group (i.e. counties in New Hampshire). In total, I use four regression equations, substituting the $pemp_{it}$ variable above for the variables for partial-service restaurant earnings ($pearn_{it}$) and full-service restaurant employment and earnings ($femp_{it}$ and $fearn_{it}$). These four regressions will be once for the first county-pair, Carroll and Oxford counties, and once for the second pair, Rockingham and York counties. The regression coefficient β_3 is the coefficient of interest, the difference-in-differences estimator, in each of the models. The null hypothesis for this coefficient is H_0: $\beta_3 = 0$, the possibility that the change in employment or earnings resulting from the minimum wage increase is zero, and the alternative hypothesis is H_A: $\beta_3 \neq 0$.

5 Results

Table 4: The Effect of Minimum Wage Increases on Employment and Earnings

	ln(pemp)	ln(femp)	ln(pearn)	ln(fearn)
Carroll and Oxford counties	0.0627	0.0496	0.0318	-0.0044
	-0.533	-0.66	-0.832	-0.966
Rockingham and York counties	-0.0478	0.0085	0.0155	0.0304
	-0.681	-0.967	-0.855	-0.752

Robust standard errors in parentheses. Significance levels are ** 0.05 and *** 0.01.

I will begin the analysis by examining the effect on partial-service restaurants hourly earnings and employment of an increase in the minimum wage. According to the difference-in-differences model, the 20% increase in the minimum wage in Maine led to a statistically insignificant 3.18% increase in partial-service worker hourly earnings in Oxford County, Maine and an insignificant 1.55% increase in partial-service restaurant hourly earnings in York County, Maine. In other words, the increase in the minimum wage in Maine had no significant effect on partial-service worker earnings in Maine. The model also shows that the minimum wage increase had a negligible effect on employment – which may be expected given the insignificant elasticity of earnings shown above. According to the model, the 20% increase in the minimum wage affects a statistically insignificant 6.27% increase in employment in Oxford County, Maine, and a statistically insignificant 4.78% decrease in employment in York County, Maine.

Next, I will look at the treatment's effect on full-service restaurant earnings and employment. The model shows that Maine's 20% increase in the minimum wage led to a statistically insignificant 0.44% decrease in earnings and a statistically insignificant 4.96% increase in employment in full-service restaurants in Oxford County. The same increase led to an insignificant 3.04% increase in earnings and a statistically insignificant 0.85% increase in employment in full-service restaurants in York County. For all of these figures, the null hypothesis cannot be rejected – the minimum wage increase did not have a statistically appreciable effect on employment and earnings in full-service restaurants in Maine as well. These figures are less surprising than the previous set of results. Full-service restaurants include more upscale restaurants that offer higher wages than their partial-service counterparts, and one would expect the elasticity of worker earnings with respect to the minimum wage to be lower than that of partial-service restaurants because the minimum wage does not serve as an effective wage floor for a larger subset of full-service restaurants.

5.1 Discussion

The data show that, for partial-service and full-service restaurants in Maine, the increase in the minimum wage had no statistically significant effect on employment and hourly earnings statistically when taking New Hampshire border counties as a control. The employment result is not surprising when considering the negligible elasticity of earnings with respect to minimum wage this paper finds, which implies that firms have not experienced any significant changes in their labor costs (worker earnings), as a result of other potential adjustment mechanisms discussed below. With negligible changes in labor costs as a result of the increase in the minimum wage, firms have no cause to reduce the units of labor employed in the face of a minimum wage increase. While these findings are at odds with Card and Krueger (1994) and others, who find a demonstrable increase in earnings for fast-food workers in New Jersey following a minimum wage increase, other literature, outlined below, suggests that these data are well within the realm of previous findings.

One potential adjustment mechanism this study fails to capture for the minimum wage increase beyond employment and earnings is hours worked. In a minimum wage literature review, Brown (1999) suggests "hours per week fall when minimum wages increase, so the effect on hours worked is more pronounced than the effect on bodies employed." Stewart and Swaffield (2008), using an employer-based survey of employment and earnings in the United Kingdom, found that the introduction of a minimum wage reduced total paid working time by one to two hours. Michl (2000) found that the difference in the result Card and Krueger (1994) and Neumark and Wascher (2000) obtain using the

same data set may be attributable to the fact that the latter study captures adjustment in hours worked, whereas the former does not, a point that Card and Krueger (2000) conceded as a potential driver of differential results.

The Quarterly Census on Employment and Wages does not provide data on payroll hours, but this variable could explain the discrepancy between my results and other findings in literature.Payroll hours are a compelling explanatory variable, especially considering that the hourly earnings post-treatment in partial-service restaurants in the Maine counties, constructed by dividing the weekly earnings by a fixed 40 hours a week, did not exceed $9.00, the value of the increased minimum wage (and in Oxford County, Maine, the same held true for full-service restaurants). Absent rampant illegal behavior with respect to the minimum wage law on the part of firms, the low hourly earnings indicate an unaccounted change in hours worked. Other explanations, like pushing costs onto consumers through increases in consumer prices, are less compelling. Were that to be the case, one would expect to observe a statistically significant increase in earnings driving the firm to increase prices on consumers to claw back revenue. To test this explanation, one would need to obtain data on payroll hours in the counties used in this analysis and regress it in Equation 1 above.

Another limitation of this study is the inability to examine the distribution of earnings as a result of the limited data available from the QCEW. In addition to payroll hours, a breakdown of employment by earnings would permit a bunching analysis to determine how exactly firms respond to an increase in the minimum wage by adjusting the number of employees working at each level of earnings, from which several more analyses are possible. For example, should this distribution reveal that jobs paying an hourly wage below $9.00 ceased to exist, and assuming restaurants passed on the costs of a higher wage rather than absorbing it, one could determine how the Maine minimum wage increase impacted hours worked.

Finally, demographic data of minimum wage-earners and data on the types of establishments constituting the NAICS codes used in this study, like the data sets used by Cengiz et. al. (2019) and Card and Krueger (1994) contained, may shed light on other adjustment mechanisms for the minimum wage increase. Using a difference-in-differences design on minimum wage increases enacted between January 2013 and January 2015, Clemens and Strain (2018) found that across all low-skilled earners, the effect of the minimum wage increase was statistically insignificant, whereas for teenage workers, the increase led to a statistically significant rise in earnings. Further decomposing the response to the minimum wage increase across several types of partial-service and full-service restaurants – like those in restrictive franchise contracts versus those in mom- and-pop shops – may also yield valuable information (Ropponen, 2012).

5.2 Robustness

Following the discussion above, to check the robustness of these results, data on the distribution of jobs at each income level and on hours worked in the restaurant industry in Maine and New Hampshire would permit an analysis to verify the adjustment mechanism for the minimum wage increase in Maine.

An essential component of any difference-in-differences study is analysis of the parallel or common trend assumption, which holds that in the absence of the treatment (e.g. the minimum wage increase), trends in the variables of interest in the treatment group (e.g. employment and earnings) would match those in the control group. There is no formal statistical test to verify this assumption, but this study uses cross-border county-pairs under the assumption that economic trends in border counties are relatively similar in size and direction to one another. Neumark, Salas, and Wascher (2014) dispute that neighboring areas constitute good controls, but Dube, Lester, and Reich (2010) find that border county pairs are more alike than non-adjacent pairs using the county-level Quarterly Workforce Indicators data set. Another common method to verify the common trend assumption is to visually inspect the data, but the relatively low number of periods over which the data in this experiment are observed and seasonality of the data make it difficult to visibly discern any pattern (data displayed visually in Appendix for each cross-border county pair).

With more employment and earnings data related to the restaurant industry that is unaffected by the minimum wage – e.g., data from high-end restaurants that paid employees well above the minimum wage both before and after the treatment period – we may be able to verify the parallel trend assumption. If it is observed that employment and earnings data at high-end restaurants follow a common trend in both New Hampshire and Maine, I would be more certain that the restaurant industry at large in both states followed the same trend, increasing the robustness of these findings.

6 Conclusion

This paper examines the effect of minimum wage increases passed by ballot initiative on worker earnings and employment through a difference-in-differences design that modeled a minimum wage hike by ballot initiative in Maine in 2016 as a treatment. I construct two cross- border county pairs between Maine and New Hampshire counties to use as a treatment and control group, respectively, while looking specifically at restaurant workers, who disproportionately constitute minimum wage earners. I find that the minimum wage increase in Maine had no statistically significant effect on full- and partial-service restaurant worker hourly earnings or employment, implying no net change in welfare resulting from the minimum wage increase.

Before making a conclusion about the overall impact of ballot-driven minimum wage increases versus those initiated and passed by lawmakers, further research is necessary to identify where the impact of the minimum wage increase fell. The literature suggests that data on hours worked by restaurant employees is an essential piece of this puzzle – firms often reduce payroll hours to avoid incurring costs imposed by minimum wage hikes, leading a negligible impact on earnings and employment for workers. Examining the distribution of jobs at each level of earnings for evidence of bunching could also provide more information needed to reach a firm conclusion about Maine's minimum wage increase.

Beyond the Maine-New Hampshire data collected in this study, greater availability of data and more time would permit a broader analysis of minimum wage increases passed by ballot. Finding available data on the two remaining New Hampshire counties unavailable through the QCEW data set would permit a comparison across the entire Maine-New Hampshire border, rather than only selected portions of it. Expanding this type of study to other states identified in Section IV as ballot-led minimum wage increasers (Arkansas, Colorado, and Missouri) would enable one to get a broader picture of the impact of these types of minimum wage increases specifically as well.

However, should the results in this paper hold, they imply that minimum wage increases passed by state legislators may be superior to those passed by ballot initiative. In prior case studies examining changes in the minimum wage driven by state legislatures, like Card and Krueger (1994), studies tend to find that such increases had a statistically significant positive effect on worker earnings and a statistically insignificant effect on employment, implying a welfare gain for workers. On the other hand, this paper finds that a ballot-driven minimum wage increase had a significant effect neither on earnings nor employment, implying no real welfare gain for workers. From the perspective of employers, both methods of increasing the minimum wage seem identical, but from the perspective of workers, wage increases passed via state legislatures lead to significant gains in earnings, ergo the superiority of increases ushered through by legislators.

7 Appendix

Figure 1: Employment in the restaurant industry in Carroll County, New Hampshire, and Oxford County,

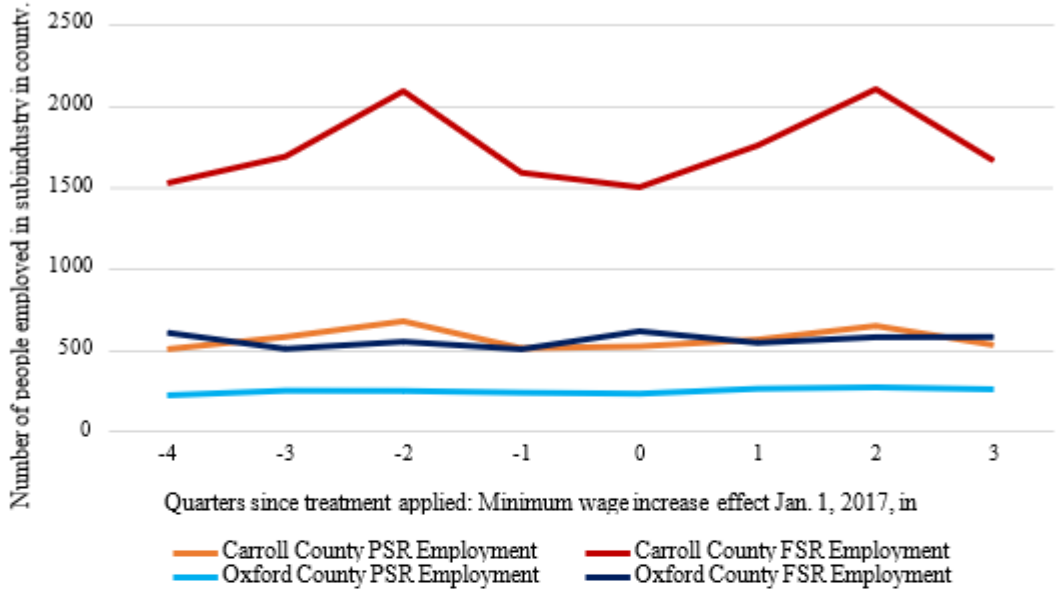
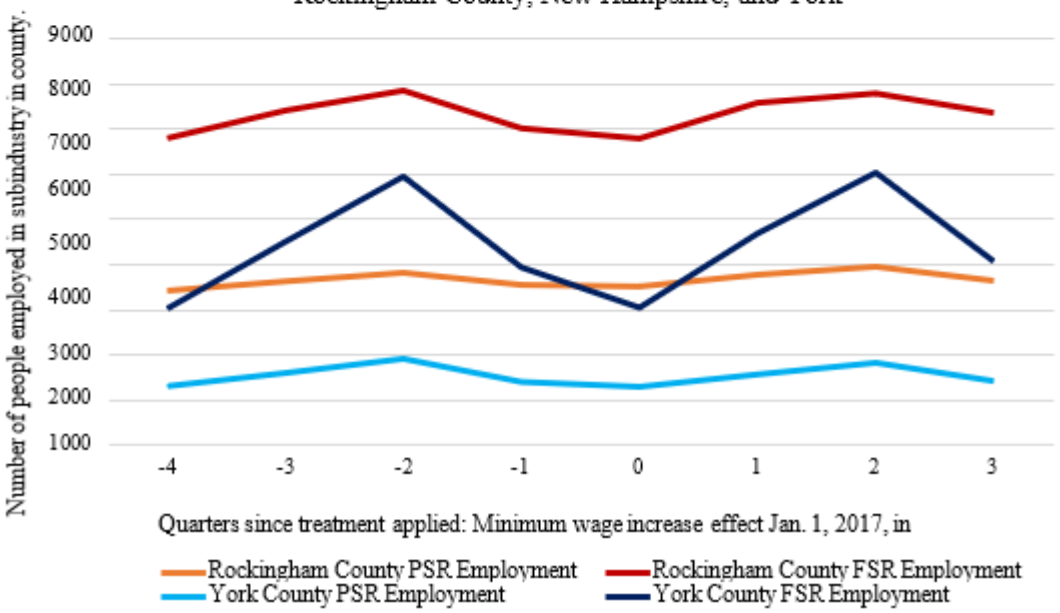


Figure 2: Employment in the restaurant industry in Rockingham County, New Hampshire, and York



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7 Appendices

7.1 Appendix A: Stata Output

```
. xtreg lnrloan popd lnsgdpt pdsgdp hhi bfr sue lnrlf, fe vce(robust)

Fixed-effects (within) regression               Number of obs      =       408
Group variable: st                              Number of groups   =        51

R-sq:                                           Obs per group:
     within  = 0.2242                                         min =         8
     between = 0.8925                                         avg =       8.0
     overall = 0.7332                                         max =         8

                                                F(7,50)            =     15.34
corr(u_i, Xb)  = -0.9657                        Prob > F           =    0.0000

                                  (Std. Err. adjusted for 51 clusters in st)
------------------------------------------------------------------------------
             |               Robust
    lnrloan |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------+----------------------------------------------------------------
       popd |   .0002151   .0000472     4.56   0.000     .0001203    .0003098
    lnsgdpt |  -.6317271   .1452397    -4.35   0.000    -.9234497   -.3400045
     pdsgdp |  -.0018497   .0055035    -0.34   0.738    -.0129039    .0092045
        hhi |   -.000065   .0000298    -2.18   0.034    -.0001248   -5.25e-06
        bfr |   .0101588   .0054033     1.88   0.066    -.0006941    .0210118
        sue |    -.01087   .0108505    -1.00   0.321    -.0326639    .0109239
      lnrlf |  -.0657994   .0289632    -2.27   0.027    -.1239737    -.007625
      _cons |   22.65695   1.696696    13.35   0.000     19.24903    26.06486
------------+----------------------------------------------------------------
    sigma_u |  1.7315156
    sigma_e |  .29543002
        rho |  .97171252   (fraction of variance due to u_i)
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