State Minimum Wage Changes and the Employment of Low-Wage Workers: New Evidence from 2011-2014

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Abstract: Although the Federal minimum wage has been constant since July 2009, many states have increased their own minimum wages since then. We use those increases to compare employment changes across the two groups of states, using a variety of difference methods. Our data come from the Current Population Survey for March through May of 2011 and 2014. We find no evidence that these minimum wage increases had an adverse effect on the employment of two groups heavily represented among minimum wage workers—teens not in college and adults with less than a high school education. We speculate that the findings may reflect a small decrease in unfilled job slots and in the number of workers engaged in full-time job search, so that the observed wage-employment combination lies closer to the maximum employment potentially available at that wage.

The U.S. Federal minimum wage has been constant at $7.25 since July 2009, during which time it has lost 11% of its purchasing power. During this time period, however, changes in the minimum wage have occurred at the state level, with 20 states having increased their own minimum between July 2009 and July 2014. These increases have been modest in size, with a median change of $0.68 or about 9.3%. These changes provide another timely opportunity to examine the impact of higher minimum wages on employment of low-wage workers by comparing employment changes in these states with the corresponding employment changes in states with an unchanging minimum wage.

A recent estimate by CEPR, based on an approach first developed by Goldman Sachs, compared overall employment growth in the two sets of states (Wolcott 2014). That research focused on 13 states that increased their minimum wage as of January 1, 2014 and compared employment changes between August-December, 2013 and January-May, 2014. Twelve of the 13 states had increases in employment and nine of the 12 had employment gains above the median. Employment growth was higher in the states with an increase in the minimum—0.99% vs. 0.68%. But, as CEPR acknowledges, this approach, which looks at overall employment growth, is too broad to be anything more than suggestive. Minimum wage workers are a small fraction of total employment and changes in other factors could easily drive these results.

In this paper, we adopt a more focused approach, using difference methods to identify employment changes for individuals who are more heavily represented among minimum wage workers. We focus on two such groups: teenagers who are not college students and adults, age 20-59, who are not high school graduates. We also focus on a longer time period, running from 2011 to 2014, and use CPS data for three months of each year, through the most recent available data. Our general approach compares employment changes for these workers in states with an increase in the minimum wage to two other groups of workers—similar workers in states without an increase in the minimum and

workers in the same state who are almost certainly unaffected by an increase in the minimum because their earnings are well above it. To provide further control for other unmeasured factors, we also utilize a difference-in-difference-in-difference model.

In all comparisons and methodologies, we consistently find employment effects that are positive, but small and typically statistically insignificant. We find no evidence of negative impacts on employment for these two groups of workers.

The next section briefly reviews the more recent literature in this crowded area. Section III contains a description of our methods and the data we use. Our analysis is presented in Section IV. Section V presents a discussion that attempts to reconcile and rationalize the findings of the recent literature.

II. LITERATURE REVIEW

The literature on the employment effects of the minimum wage is one of the longest in applied labor economics, dating back to Stigler (1946) and including well-known earlier contributions from Brown, Gilroy, and Kohen (1983), Card (1992), and Card and Krueger (1994). Because the literature has been reviewed so many times (see Neumark and Wascher (2008) and Belman and Wolfson (2014)), we focus only on more recent contributions.

As most observers of this recent literature appreciate, the simple textbook prediction–that a downward-sloping demand curve for labor implies a negative impact of a minimum wage on the employment of workers whose equilibrium wage is less than the new minimum–has been difficult to confirm consistently in practice. There are formidable empirical and econometric hurdles, especially controlling for other labor market changes over a period long enough that firms might reasonably have time to react to the change in the minimum wage. The more recent response to that problem has been

to focus on quasi-experimental evidence from geographically adjacent areas with differing minimum wages, where implicit control for other conditions is provided by the geographic proximity. Card and Krueger's analysis of employment in fast-food restaurants in PA v NJ following the increase in NJ's minimum wage is an early well-known example. Other contributions in this vein include Dube, Naidu, and Reich (2007), who examine the increase in the minimum wage in San Francisco; Hoffman and Trace (2009), who reprise the PA v NJ analysis after the 1996 increase in the federal minimum eliminated the state discrepancy; Dube, Lester, and Reich (2010), who examine employment across contiguous counties across state borders with different minimum wages; and Sabia, Burkhauser, and Hansen (2012), who compare NY state with three adjacent states. Recent contributions in this vein include Addison, Blackburn, and Conti (2013), who extend the contiguous county across state borders approach, and Hoffman (2014b) who examines the impact of the 2009 increase in the federal minimum by comparing employment changes in states where the minimum did and did not increase because of state minimums that already exceeded the federal minimum.

The findings in this literature do vary somewhat depending on the particular group that is the focus of the analysis and the data set used, but most report employment effects that are relatively small and often not significantly different from zero. The older time-series literature found employment elasticities in the −0.1 - −0.3 range, while Card found no negative effects and Card and Krueger reported positive effects of an increase in the minimum wage. The studies by Dube, Naidu, and Reich, Dube, Lester, and Reich, and Hoffman (2014b) all find no negative effects for the comparison groups in their analyses, while Hoffman and Trace, Addison, Blackburn, and Conti and Sabia, Burkhauser, and Hansen find evidence of some negative employment impacts. Sabia, Burkhauser, and Hansen is an outlier, with very large negative employment effects (elasticity =−.7), but Hoffman (2014a) shows that this result is found only in the subset of the CPS files that they use and not in the full CPS.

Virtually none of the empirical studies devote any time or space to explaining the lack of a negative employment effect, typically focusing instead of the putative econometric virtues of their approach. One exception is Card and Krueger, who offer a smorgasbord of possibilities including monopsony and an equilibrium search model in which employees search across jobs with varying wages. The monopsony argument is standard and even appears in Stigler, but typically is thought unlikely to be empirically important in contemporary labor markets. The equilibrium search model also receives little support from Card and Krueger, who ultimately suggest that "these findings are difficult to explain with a standard competitive model or one in which employers face supply constraints (e.g., monopsony or equilibrium search models)" (p. 792).

None of the studies on employment effects of the minimum wage examines the post-2009 period when only state minimum wages have increased. Our analysis focuses on these increases to provide more timely evidence about the current impacts of modest increases in the minimum wage and, in particular, of indexed minimum wage laws.

III. DATA AND METHODS

Since July 2009, 20 states have increased their minimum wage, many as a result of statutory cost-of-living increases that occur automatically, usually effective on January 1. In order to avoid employment changes that are unduly influenced by uneven recovery from the early post-recession years, we focus on the period from January 1, 2011 through June 30, 2014. Over that time period, 13 states increased their minimums—AZ, CO, CT, FL, MO, MT, NJ, NY, OH, OR, RI, VT, and WA.[1] In ten of the states, the increases are quite similar, ranging from $0.55 to $0.75. Missouri and New Jersey are the outliers with increases of $0.25 and $1.00, respectively.

[1] An increase in Delaware was effective June 1, 2014, while increases in California and DC were effective July 1, 2014.

These 13 states serve as the "treatment" states, while the other 37 states, plus the District of Columbia, all of whom had no increase in the state minimum over this time period, serve as "control" states. We make two kinds of difference comparisons, including a between-state comparison and a within-state comparison. The between-state difference-in-difference is $DID_B = (E_{j2}^T - E_{j1}^T) - (E_{j2}^C - E_{j1}^C)$, where E_{jt} is the employment rate in time t of some group j whose employment is likely to be affected by the minimum wage increase and T and C identify residence in a state with a minimum wage increase (T) or with no increase (C) between time 1 and time 2. The within-state comparison is $DID_W = (E_{j2}^T - E_{j1}^T) - (E_{k2}^T - E_{k1}^T)$, where k is some other group of workers whose employment is likely to be unaffected by the minimum wage increase.

We also estimate a difference-in-difference-in-difference comparison, $DIDID = [(\Delta E_J^T - \Delta E_k^T) - (\Delta E_J^C - \Delta E_k^C)]$ or, equivalently by re-arranging terms, $[(\Delta E_J^T - \Delta E_J^C) - (\Delta E_k^T - \Delta E_k^C)]$, where Δ is the change in the associated employment rate. In the first DIDID expression, the first term is the within-state difference (DID_W) for groups j and k presented above and the second term is the corresponding measure for workers in states where the minimum wage did not increase. The second DIDID expression is the difference in the between-state difference for affected group j (the first term) and unaffected group k (the second term). The DIDID comparisons thus examine whether employment changes by minimum wage exposure within states differed across the treatment and control states or, equivalently, whether the between-state impact differs for affected and unaffected groups.

It is useful to think of the DIDID measure as providing additional control for possible omitted variable bias in the other two measures. The between-state difference could be biased if labor demand conditions differed systematically between the two groups of states. That might well arise if most of the minimum wage increases were the result of specific legislation that was influenced by current economic conditions. In this case, most of the increases are exogenous to current conditions because they reflect

prior legislation that indexed the minimum wage to some external wage or price inflation measure. But the possibility cannot be discounted. As can be seen in the second expression for the DIDID above, the DIDID adjusts the between-state difference in employment of the potentially affected group of workers for the corresponding change for the unaffected group of workers, in effect using that change as a measure of differential labor market conditions between the two groups of states.

Similarly, the within-state estimate could be biased if some omitted factor affects the employment of group j relative to group k in the treatment states in period 2, thus confounding the estimation of the minimum wage effect with a non-constant time period effect. The DIDID estimator corrects for this by netting out the comparable difference in the states where the minimum wage did not increase.

Thus, the DIDID estimates are a way to control for otherwise unmeasured effects correlated with treatment status, especially those related to the changing macroeconomic environment either across states or across groups of workers. This is a very important strength of this approach.

Our data come from the Current Population Survey for March, April, and May, 2011 and 2014. Our measure of the state minimum wage increase is the cumulative change over the January 2011–January 2014 period, so that we have a suitably long enough time period after the last increase.[2] We restrict our sample to individuals between ages 16 and 59. Each month's CPS sample includes about 75,000 persons meeting the sample inclusion criteria.

The minimum wage can only have employment effects if is binding for at least some workers, that is, if the new minimum is above what would otherwise be the prevailing market equilibrium for some group of workers. In our implementation, we also need to identify a group for which the minimum

[2] As a consequence, we do not include California, Delaware, and the District of Columbia among the jurisdictions with minimum wage increases. See footnote 1 for further information.

wage is almost certainly not binding. We do this using age and education to classify workers. As potentially at-risk workers, we use 1) workers age 16-19 who are not in college[3] and 2) less-educated adult workers, here defined as persons age 20-59 with less than 12 years of education. We use males age 30-49 with some post-secondary education as a control group that is largely unaffected by an increase in the minimum wage. We present evidence on the appropriateness of these groups in the next section.

In light of the continuing effects of the Great Recession, it is natural to wonder whether changes in economic conditions were reasonably similar in the two groups of states. We computed a weighted-average unemployment rate in the two groups of states for 2011 and 2013, using the state population shares as weights, and average unemployment rates from the BLS. In the states where the minimum wage increased, the average 2011 unemployment rate was 9.1%, compared to 8.9% in the states with no subsequent increase. Between 2001 and 2013, the unemployment rate dropped 1.61 percentage points in the states with minimum wage increases and 1.54 percentage points in the other states. This suggests that overall economic conditions were quite similar for the two groups of states. Note also that the DIDID analysis provides additional control for changes in economic conditions across the two groups of states.

IV. FINDINGS

All estimates are based on microdata on individual employment and other characteristics computed from the 2011 and 2014 CPS. We use sample weights that enable us to reproduce exactly the official BLS reported employment rates for the civilian labor force for the months analyzed. This means that our estimates of employment rates for subgroups are exactly what the BLS would report for these groups if it presented data for them.

[3] This education restriction eliminates some 18 and 19 year olds who are college students and thus results in a less skilled and younger group of teen workers that are more likely to be affected by a minimum wage increase.

Weighted means for the 2011 samples are shown in Table 1, separately for persons age 16-59 in the two groups of states. On almost all measures, the samples are very similar. Average age, gender, and importantly, the employment rate are virtually identical. Educational attainment and racial composition differ very slightly; persons in the states with a minimum wage increase are more educated and less likely to be black, but the differences are quite small.

The distribution of employment across industries is also very similar in the two groups of states. Table 2 shows employment shares for a single representative month, April 2011, for a two-digit industrial classification. As can be seen in the table, the employment distributions differ very little, usually by 0.5% or less. An overall index of dissimilarity, ranging from 0 for no difference to 100 for complete non-overlap, is just 5.3.[4]

Before turning to the employment analysis, we examine whether the state minimum wage changes had any effect on wages in the first place. To examine this, we use the 2011 and 2013 CPS Merged Outgoing Rotation Group files (CPS-MORG) because only these files contain hourly wage information for workers paid by the hour. This file is the basis for the annual tabulations the Bureau of Labor Statistics provides on characteristics of minimum wage workers (BLS, 2014). The CPS-MORG files are based on the one-quarter of the regular CPS file that rotates out of the sample in its fourth and eighth months. The annual merged file contains these files for the entire calendar year; the total sample is three times as large as any single monthly CPS file, although for any single month it is only one-quarter as large.[5] We use 2013 instead of 2014 because the 2014 MORG files are not yet available. As a

[4] The measure of dissimilarity is the Duncan Index computed as $\Sigma|M_j - F_j|/2$, where M_j and F_j are the percentage of working males and females in the labor force who work in industry j. As a comparison, the gender difference in occupations for a similar classification is in the 0.3-0.4 range.

[5] Addison, Blackburn, and Conti (2013) strongly suggest not using the MORG files for employment analyses because of their smaller sample size relative to the full CPS; see their footnote 12.

consequence, CT, NJ, and NY drop out of the group with a minimum wage increase, because each of these states had only a single increase, effective in 2014, over the 2011-2014 time period.

Table 3 shows how the wage distribution changed for the two at-risk groups. The top panel shows the wage distribution in the states where the minimum wage increased. For each state in each year, we compute the fraction earning less than the 2011 minimum, exactly the 2011 minimum, between the 2011 and 2013 minimum, exactly the 2013 minimum, and more than the 2013 minimum. The 2011 and 2013 minimums differ among these states, but this classification allows us to see how each state's wage distribution changed when the minimum increased. The below-minimum wage group reflects the tipped-employee sub-minimum. If the minimum wage increase had an effect on wages in these states, we should see relatively little change in the proportion below the 2011 minimum because the sub-minimum provision remained in force for all of these states. The proportions of workers at the 2011 minimum and between the two minimums would likely both decrease and the proportion at the new minimum would increase.

As the table shows, that is exactly what occurred, especially for the teen sample. In 2011, 22% of the teens earned less than the 2011 minimum and about 11% earned exactly the minimum. Another 17 percent earned an hourly wage between the 2011 and 2013 minimum and just 2.4% earned the 2013 minimum. By 2013, the proportion earning less than the old minimum fell by about 25%, the proportion earning exactly the old minimum fell by two-thirds, and the proportion earning exactly the new minimum increased by a factor of almost four. The data also suggest some spillover to workers at the higher end of this wage distribution, as the proportion earning more than the 2013 minimum increased by about a quarter.

For adults with less than a high school degree, the impact of the change in the minimum wage is similar qualitatively, but of a smaller magnitude. The proportion earning less than or equal to the 2011

minimum falls from 10.3% to 6.7%, with the bigger proportionate drop for those earning exactly the minimum. The proportion earning between the two minimums declines and the proportion at or above the new minimum increases.

The bottom panel of the table shows the corresponding wage distribution changes in the 32 states with a constant minimum wage equal to $7.25, the Federal minimum. The table shows the proportion earning less than the minimum,[6] equal to the minimum, and more than the minimum in the two years. The most interesting result seen here is how little the wage distribution changed: 15.5% of the teen sample reported earning $7.25 in 2011 and 15.9% reported earning that wage in 2013. The same is true for the adult sample, but with a lower incidence of minimum wage work. We interpret the table as suggesting that 1) the state increases in the minimum wage did change the wage distribution for low-wage workers in 2013 relative to 2011 and relative to their peers in states with a constant $7.25 minimum wage; and 2) that absent a change in the state minimum wage, the wage distribution was essentially unchanged for these two groups.

Analysis of the MORG files also confirms that males age 30-49 with at least some college were essentially unaffected by the increases in the minimum wage. Most such workers are, in fact, not paid by the hour and are thus exempt from the minimum wage provisions. In the states where the minimum did increase, only 33% of these workers were paid by the hour. Computed as a fraction of all such workers in the group, whether paid by the hour or not, less than one percent were at or below their respective 2011 state minimum wage; more were below the minimum than at the minimum, so they would have been unaffected by increases. This suggests that they are a valid control group.

Table 4 presents the results of our difference models. The raw data is in the first sets of rows and the various difference calculations are in the bottom three rows. For the teen sample, employment

[6] The Federal subminimum for tipped employees was $2.13 in both 2011 and 2013.

increased in the states with an increase in the minimum wage by 2.32 percentage points (12%). This increase, of course, reflects multiple potential factors, especially the continuing recovery from the recession. In the states with no increase in the minimum wage, the corresponding employment rate increase was a slightly smaller 1.57 percentage points. Assuming for the moment that other conditions were similar across the two groups, this yields a between-state difference-in-difference estimate of 0.75 percentage points, or an increase in employment of 3.7%. The difference is not close to statistical significance (t=0.75), so the appropriate conclusion here is that the increasing minimum wage had no effect, either positive or negative, on teen employment. We see a very similar pattern for the less-educated adults, whose employment increased 3.32 percentage points in the states with a minimum wage increase and 2.97 percentage points in the states with no increase. The between-state DID estimate is .35 percentage points with a t-statistic of 0.30.

The within-state DID estimates are in the following row and are based on a comparison of the employment changes in states with a minimum wage increase for the two at-risk group relative to males age 30-49 with at least some college, whose employment rates are shown in the third column. The employment rate for this group increased 1.1 percentage points in the states with an increase in the minimum wage, so the within-state DID estimate is a somewhat larger 1.22 percentage points. The t-statistic is higher than for the between-state estimate, but it is still well below statistical significance. For the less-educated adult sample, the within-state DID estimate of the impact of an increase in the minimum wage is 2.22 percentage points and this estimate is statistically significant at just under the 5% level.

The DIDID estimates are shown in the last row. These are our preferred estimates, because, as explained above, they introduce control for other labor demand factors that could affect both sets of estimates. As also noted above, the DIDID estimate can be computed either by adjusting the between-

state DID for the affected groups by subtracting the corresponding between-state DID estimate for the unaffected group or by adjusting the within-state DID by the corresponding within-state DID for the states with no minimum wage increase. Using the first approach, the DIDID for teens is .0075 − (.0110 −.0151) = .0116, where the numbers in parentheses are the between-state DID for the 30-49 year old more-educated males. Using the second approach, the DIDID is .0232 – (.0157 – 0.151) = .0116, where the numbers in parentheses are the within-state DID for teens vs. the 30-49 year olds in the states where the minimum wage did not increase. The DIDID estimate has a t-statistic of 1.0, so it is also not statistically significantly different from zero. The 95% confidence interval ranges from –1.15 percentage points to +3.43 percentage points. Applying the same procedures to the less-educated adults, we compute a DIDID of about three-quarters of a percentage point with a t-statistic of 0.58. For this group, the 95% confidence interval ranges from –1.81 to +3.33 percentage points.

To adjust for covariates that could differ across states, we can estimate the various difference models in a regression framework. We control for two additional characteristics beyond the age and educational attainment measures that are included by virtue of the sample definitions. We add dummy variables for race (black =1) and gender (male=1). Our results are shown in the top panel of Table 5.

The top row shows the results without any covariates and it corresponds exactly to the various difference estimates presented in Table 4. Control for race and gender has almost no effect on the results. For teens, the between-state DID estimate is a bit larger, the within-state DID estimate is a bit smaller, and the DIDID estimate is unchanged. For the less-educated adults, all the estimates are slightly larger, but no conclusions are altered. The clear result from the various difference models is of very slight positive effects that are mostly statistically insignificant. We find no evidence that employment was adversely affected.

IV. DISCUSSION

We find that in states where the minimum wage was increased over the 2011-2014 time period employment of young workers and less-educated adults was not adversely affected. All three kinds of difference comparisons—to comparable workers in states where the minimum wage was not increased, to unaffected workers in their own states, and a hybrid of both comparisons—yield this result. Our findings are yet another contribution to the recent literature that finds no negative impact of modestly higher minimum wages on employment. One interesting feature of our results is that many of the states that are in the treatment group in this analysis were in the control group in the analysis of the effect of the 2009 increase in the Federal minimum wage by Hoffman (2014b), which found no negative effects of the increase. If, for instance, those findings were biased because labor markets in the control states performed more poorly, then that might plausibly cause the treatment effects to be too negative in our analysis. In this sense, the consistency of the results across a very substantial change in the composition of the treatment and control groups is reassuring.

We offer here some thoughts about what our results do and do not imply. First, it is important to appreciate that the minimum wage increases analyzed here were relatively modest, averaging about $0.68 or about nine percent of the 2011 average minimum wage in these states. It would be unwise to extrapolate our findings to minimum wage increases that are far larger than this. At some wage rates far higher than the current minimum wage, less-skilled workers might well find themselves competing for employment with workers more skilled and more experienced than they. This is true whether or not the underlying labor demand curves are elastic or inelastic.

Second, the findings do not mean that the underlying labor demand curves are not downward-sloping. Minimum wage studies of employment are not estimates of labor demand curves, but rather of the observed employment and wage combination at two or more points in time or space. In a model of

the labor market emphasizing job search and job creation, that equilibrium typically occurs off the demand curve, to the left of the intersection of supply and demand in a standard diagram, with both simultaneous vacancies and unemployed workers. We think that the most straightforward interpretation of the findings in a simple supply/demand framework is that the observed wage-employment combination moves vertically or with a very slight positive slope, reflecting a decrease in unfilled job slots and in workers engaged in full-time job search. In terms of the standard supply and demand diagram, the new combination lies closer to the demand curve. This is entirely consistent with a reduction in the overall amount of labor demanded, i.e., with a downward-sloping demand curve.

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Table 1. Sample Means (Weighted), Individuals Age 16-59, April-June 2011, by Subsequent Minimum Wage Increase

	Persons in States With No Increase in Minimum Wage	Persons in States With Increase in Minimum Wage
Age	37.27	37.82
Age 16-19	0.094	0.087
Black	0.135	0.120
Male	0.496	0.496
Not HS graduate	0.175	0.144
College graduate	0.264	0.283
Employment rate	0.680	0.681
Number of Observations	170,783	64,689

Source: Current Population Survey, March-May, 2011

Table 2. Distribution of Employment by Industry and Subsequent Increase in State Minimum Wage, April, 2011

Industry	No Increase	Increase
Agricultural, forestry, fishing, and hunting	1.4%	0.9%
Mining	0.7%	0.2%
Construction	7.4%	7.0%
Durable goods mfg.	7.0%	5.7%
Nondurable goods mfg.	4.3%	3.0%
Wholesale trade	2.8%	2.5%
Retail trade	11.3%	12.1%
Trans. and warehousing	4.0%	4.2%
Utilities	0.9%	0.9%
Information	2.3%	2.2%
Finance and insurance	4.3%	5.3%
Real estate and rental and leasing	1.6%	2.3%
Prof. and technical services	6.3%	6.8%
Management, admin. and waste management services	5.0%	5.0%
Educational services	9.1%	8.9%
Health care and social assistance	12.4%	13.9%
Arts, entertainment, and recreation	2.0%	2.3%
Accommodation and food services	7.5%	7.7%
Private households	0.6%	0.5%
Other services, except private households	4.2%	3.9%
Public administration	4.8%	4.5%

Source: CPS, April, 2011; sample is workers, age 16-59.

Table 3. Wage Distribution for Low-Wage Workers Paid by Hour, 2011 and 2013, by Increase in State Minimum Wage

	Teens, Not in College		Adults, 20-59, Not High School Graduate	
Wage Level	2011	2013	2011	2013
In States with Increase in Minimum Wage				
w < 2011 MW	0.222	0.174	0.069	0.054
w = 2011 MW	0.106	0.033	0.034	0.013
2011MW < w < 2013MW	0.170	0.114	0.057	0.038
w = 2013MW	0.024	0.093	0.011	0.024
w > 2013MW	0.479	0.590	0.829	0.870
Sample Size	709	757	1187	1079
In States with Minimum Wage = $7.25				
w < $7.25	0.104	0.078	0.030	0.028
w= $7.25	0.155	0.159	0.037	0.032
w > $7.25	0.741	0.762	0.934	0.940
Sample Size	3351	3214	5994	5424

Source: Author Calculations from 2011 and 2013 CPS MORG files.

Table 4. Effects of 2011-2014 State Minimum Wage Increases on Employment
(t-statistics in parentheses)

	Age 16-19, not in college	Not HS Grad, Age 20-59	Males, Age 30-49, At Least Some College
States with Increase in MW			
2011			
Employment Rate	0.2004	0.5109	0.8765
N	4698	5002	8435
2014			
Employment Rate	0.2236	0.5441	0.8875
N	4415	4438	8021
Change in Employment	0.0232** (2.71)	0.0332** (3.23)	0.0110** (2.19)
States with No Increase in MW			
2011			
Employment Rate	0.2191	0.5431	0.8817
N	13598	16428	21577
2014			
Employment Rate	0.2348	0.5728	0.8968
N	12806	14297	21193
Change in Employment	0.0157** (3.04)	0.0297** (5.23)	0.0151** (4.98)
Diff-in-Diff (Between)	0.0075 (0.75)	0.0035 (0.30)	
Diff-in-Diff (Within)	0.0122 (1.23)	0.0222* (1.94)	
Diff-in-Diff-in-Diff	0.0116 (1.00)	0.0076 (0.58)	

Source: Author calculations from CPS, March-May, 2011 and 2014. States with increase in minimum wage are AZ, CO, CT, FL, MO, MT, NJ, NY, OH, OR, RI, VT, WA. ** = statistically significant at 5% level; * = statistically significant at 10% level.

Table 6. Regression Estimates of Impact of 2011-2014 State Minimum Wage Increase on Employment (Standard Errors in Parentheses)

	Age 16-19, No College			Not High School Grad., Age 20-59		
Model (Control Variables)	Between-State DID	Within-State DID	DIDID	Between-State DID	Within-State DID	DIDID
All States						
1. No Covariates	.0074 (.0098)	.0122 (.0093)	.0114 (.0105)	.0036 (.0114)	.0222* (.0102)	.0076 (.0117)
2. Race and Gender	.0081 (.0097)	.0115 (.0092)	.0114 (.0105)	.0069 (.0110)	.0237** (.0101)	.0091 (.0114)
Number of Observations	35,517	25,569	93,909	40,165	74,598	98,557

Source: Author calculations from CPS, March-May, 2011 and 2014. Within-State DID sample also includes males age 30-49 with at least some college, residing in states with full minimum wage increase. DIDID model also includes the corresponding sample in states with no increase in minimum wage. ** = statistically significant at 5% level; * = statistically significant at 10% level.

Appendix Table 1. State/Federal Minimum Wage Rates 2011 and 2014

	1/1/2011	1/1/2014	Change
Alabama	$7.25	$7.25	$0.00
Alaska	$7.75	$7.75	$0.00
Arizona	**$7.35**	**$7.90**	**$0.55**
Arkansas	$7.25	$7.25	$0.00
California	$8.00	$8.00	$0.00
Colorado	**$7.36**	**$8.00**	**$0.64**
Connecticut	**$8.25**	**$8.70**	**$0.45**
Delaware	$7.25	$7.25	$0.00
District of Columbia	$8.25	$8.25	$0.00
Florida	**$7.25**	**$7.93**	**$0.68**
Georgia	$7.25	$7.25	$0.00
Hawaii	$7.25	$7.25	$0.00
Idaho	$7.25	$7.25	$0.00
Illinois	$8.25	$8.25	$0.00
Indiana	$7.25	$7.25	$0.00
Iowa	$7.25	$7.25	$0.00
Kansas	$7.25	$7.25	$0.00
Kentucky	$7.25	$7.25	$0.00
Louisiana	$7.25	$7.25	$0.00
Maine	$7.50	$7.50	$0.00
Maryland	$7.25	$7.25	$0.00
Massachusetts	$8.00	$8.00	$0.00
Michigan	$7.40	$7.40	$0.00
Minnesota	$7.25	$7.25	$0.00
Mississippi	$7.25	$7.25	$0.00
Missouri	**$7.25**	**$7.50**	**$0.25**

Montana	**$7.35**	**$7.90**	**$0.55**
Nebraska	$7.25	$7.25	$0.00
Nevada	$8.25	$8.25	$0.00
New Hampshire	$7.25	$7.25	$0.00
New Jersey	**$7.25**	**$8.25**	**$1.00**
New Mexico	$7.50	$7.50	$0.00
New York	**$7.25**	**$8.00**	**$0.75**
North Carolina	$7.25	$7.25	$0.00
North Dakota	$7.25	$7.25	$0.00
Ohio	**$7.40**	**$7.95**	**$0.55**
Oklahoma	$7.25	$7.25	$0.00
Oregon	**$8.50**	**$9.10**	**$0.60**
Pennsylvania	$7.25	$7.25	$0.00
Rhode Island	**$7.40**	**$8.00**	**$0.60**
South Carolina	$7.25	$7.25	$0.00
South Dakota	$7.25	$7.25	$0.00
Tennessee	$7.25	$7.25	$0.00
Texas	$7.25	$7.25	$0.00
Utah	$7.25	$7.25	$0.00
Vermont	**$8.15**	**$8.73**	**$0.58**
Virginia	$7.25	$7.25	$0.00
Washington	**$8.67**	**$9.32**	**$0.65**
West Virginia	$7.25	$7.25	$0.00
Wisconsin	$7.25	$7.25	$0.00
Wyoming	$7.25	$7.25	$0.00

Source: http://www.dol.gov/whd/minwage/america.htm