The Minimum Wage and Search Effort

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Abstract

Labor market search-and-matching models posit supply-side responses to minimum wage increases that may lead to improved matches and lessen or even reverse negative employment effects. Using event study analysis of recent minimum wage increases, we find that these changes do not affect the likelihood of searching, but do lead to large yet very transitory spikes in search effort by individuals already looking for work. These results are not driven by changes in the composition of searchers.

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1 Introduction

Do minimum wage increases affect search effort by job seekers? Predictions of the impact of the minimum wage in search-and-matching models of the labor market depend heavily on endogenous search effort responses (Acemoglu, 2001; Flinn, 2006; Ahn et al., 2011). In these models, the increased cost of hiring can be offset by the supply side: workers enter the labor force and search more intensely, leading to better job matches. Indeed, this is one of the primary reasons posited for the lack of employment response to the minimum wage sometimes seen in the empirical literature (e.g. Allegretto et al., 2011).

We investigate the effect of minimum wage increases on job search effort utilizing data from the American Time Use Survey (ATUS) (U.S. Bureau of Labor Statistics, 2016) using an event-study approach. Intuitively, we compare the outcomes in each month near the treatment date to the outcomes for otherwise-identical individuals in the same state and year whose survey period was not near a treatment date.

We find no evidence that the minimum wage has persistent effects on search effort; the likelihood of searching does not increase in the aftermath of minimum wage increases. There is a large yet transitory increase in the intensive margin of search effort in the month of the minimum wage increase that fades almost immediately. This type of quick response to a policy change that affects the returns to searching can be seen in other contexts, such as extensions to unemployment insurance benefits (see, for example, (Krueger and Mueller, 2010; DellaVigna et al., 2020)).

There is no short-run increase in the employment rate nor changes in observable characteristics of searchers, suggesting that our results are not driven by changes in the composition of

job seekers. These findings are robust to the inclusion of demographic controls, the duration of unemployment benefits, and month-by-year fixed effects. We also conduct a permutation test for our search duration results in which we randomly assign minimum wage increases across time periods and show that these results do not appear to be due to chance.

Our results call into question the assumption underpinning search-and-matching models as applied to analysis of the minimum wage – namely, that more workers will enter the labor market and search harder, increasing the returns to firm vacancy postings.

We provide the first direct evidence of an important input into search-and-matching models as applied to the minimum wage. We also add to the empirical literature on job search behavior. These studies consider the role of macroeconomics conditions (e.g. Aguiar et al., 2013; Mukoyama et al., 2018), safety net programs including unemployment benefits (e.g. Clemens et al., 2015; Krueger and Mueller, 2010; Krueger and Meyer, 2002), and the impact of wage dispersion (Mueller, 2010).

2 Data

We use the 2003-2016 waves of the American Time Use Survey. Individuals are sampled for the ATUS from the Current Population Survey (CPS), and are surveyed approximately three months after their final CPS survey. The ATUS includes a time diary detailing activities in 400 categories.[1]

We consider an individual to be searching for work if they report non-zero time searching

[1]Unfortunately, the ATUS lacks the sample size to examine effects by subgroups of interest when conditioning on positive search effort. This is a limitation, as effects may be larger for groups like those without high school degrees. Regardless, the ATUS is the only data source in the United States that collects information on time use in this manner.

for work on the day of their time diary. An individual can be considered searching even if they are categorized as not being in the labor force by the Bureau of Labor Statistics definition.

We include all activities that are categorized as related to job search as time spent on job search. Table 1 provides summary statistics on respondents, job searchers, and the unemployed. About one percent of the entire sample reports engaging in search-related activities, with about 15 percent of the unemployed doing so. The unconditional mean time spent searching by all individuals in the sample search is 1.5 minutes a day; the unemployed and those who report non-zero search (including those concurrently employed and searching) do so for 21 and 133 minutes, respectively.

2.1 Minimum Wage

Our minimum wage data is compiled from the Bureau of Labor Statistics website, supplemented with corrections and additions from Meer and West (2016) and Clemens et al. (2018). There are 259 state-level minimum wage changes across 2003-2016, taking the most expansive definition of such changes, including those induced by increases in the federal minimum wages and those linked to inflation indexing. We define the minimum wage as its value on the first of each month.

3 Specification

We estimate the following equation to explore the likelihood of searching and daily time spent searching:

$$Y_{i,s,t,m,p} = \sum_{p=-5}^{5} \beta_p I(MonthOfTreatment)_p + \beta_c I(AllOtherMonths)_c + \alpha_1 StateYear_{s,t} + \alpha_2 Month_m + \tau IndividualControls_{i,s,t,m} + \gamma X_{s,t} + \epsilon_{i,s,t,m,p} \quad (1)$$

β_p represents a different coefficient for each of the eleven months, five months before through five months after, centered on the month of minimum wage change. All observations that do not fall in this eleven-month window around a treatment are grouped into the excluded category.

We include state-by-year and month fixed effects, age and its quadratic, gender, race, indicators for education, whether the diary was on the weekend, and the duration of unemployment benefits measured in weeks. Standard errors are multi-way clustered at the state and year-by-quarter level. We also try adding month-by-year effects that account for national-level time shocks; the results are nearly identical. After accounting for individual characteristics, length of unemployment benefits, seasonality, and state-year effects, it is difficult to imagine a shock to search effort that is uncorrelated with those controls, and coincidental solely with the month of a state-specific minimum wage change.

We find no evidence of pre-trends that could reflect potentially biasing spurious correla-

tion or anticipatory effects by prospective workers.[2]

The composition of respondents may vary in a manner that is correlated with minimum wage changes. We find no statistically significant effects, but the estimates are noisy.[3]

4 Results

4.1 American Time Use Survey

Figure 1 shows no statistically significant changes in the likelihood of searching for work after a minimum wage increase. The results are small and precise, with no positive coefficient larger than 7% of the baseline. There is no impact on the probability of not being in the workforce and the probability of employment, and there are no trends.[4]

We turn to the intensive margin of search effort – the number of minutes spent on job search. Figure 2 shows the dynamic effects on search duration using the entire sample, including those not searching. There is a positive and statistically significant effect of 0.8 minutes, or about 50 percent of the baseline level, but only in the month of the minimum wage increase. The effect in the following months are small and arrayed around zero.

Figure 3 shows that the likelihood of searching by the unemployed does not change around the treatment periods. As with the whole-sample results, time spent searching only increases in the month of the minimum wage change, with an increase of 16 minutes per day, or 8

[2]We also implement the instrumental variable approach suggested in Freyaldenhoven et al. (2018). Although this approach yields noisier estimates, our results remain similar.

[3]A previous version of this paper (Adams et al., 2018) included results from the Current Population Survey and Survey of Income and Program participation, which have larger samples but limited information on the intensive margin of search. There are no patterns in demographic characteristics over time. The inclusion of individual fixed effects in the SIPP, which control for unobserved time-invariant individual characteristics, do not affect the results.

[4]These findings are replicated using the CPS and SIPP in Adams et al. (2018).

hours extrapolated for the month of the minimum wage change; this amount is about 75 percent of the baseline value. The effect is transitory, with coefficients in the following five months being close to zero.

Finally, we show results for those reporting positive search minutes only. Figure 4 shows an increase of 75 minutes a day in the month of the minimum wage change, about 55 percent of the baseline value, and the effect is short-lived. All of the following months have much smaller coefficients that are close to zero.[5]

There is little or no entry into search activity as a result of minimum wage increases, and increases in search effort among searchers are short-lived. It is difficult to pin down the cause of this pattern, though we can reject the possibility that employment increases around the time of the minimum wage change. If that were the case, it could lead to negative selection of those continuing to search; that is, those still searching are less attractive to employers and thus need to put forth more effort to find employment. This type of selection would not be likely to lead to the one-month increase in search effort.

It is still possible that the composition of job-seekers changes in response to the minimum wage in a manner that leaves the overall search rate unaffected, with low-activity searchers exiting and high-activity searchers entering the labor market. If those who begin searching provide more productive matches for employers, this mechanism would be in line with the search-and-matching literature. However, this type of sorting would have to be uncorrelated with the demographic characteristics for which we control; given the size of the response in Figure 4, it seems unlikely and difficult to reconcile with the short-lived spike in search effort.

[5]We replicate these results using an inverse hyperbolic sine transformation, Poisson, and negative binomial model. There are no meaningful changes in the pattern of results.

There is very limited evidence that search activity increases in response to the minimum wage in a manner consistent with theoretical search-and-matching models.

4.2 Placebo Tests

We estimate Equation (1) on a series of placebo treatments to test whether our results arise from random chance (Bertrand et al., 2004). We draw an eleven month window centered on a minimum wage change based on the true distribution of monthly changes, from a distribution of potential treatment time periods, with replacement. We assign each state multiple placebo treatment dates and estimate Equation (1) one thousand times.

Figure 6 compares the actual results from Figure 2 to those estimated from the placebo exercise. Each coefficient in this latter estimate, including the month of the minimum wage change, is about zero. We compare each coefficient to the distribution of placebo estimates in Figure 5, which shows that the estimate during the month of the change is greater than 96 percent of the simulated coefficients.[6]

We conclude that our findings in the dynamic event-study specifications are unlikely to have occurred by chance.

5 Conclusion

This paper explores the relationship between minimum wage increases and search effort. Our findings provide robust evidence that minimum wage changes increase search effort on the

[6]We also conducted this exercise for the entire sample and for the sample conditioned on unemployment. In each case, the placebo estimates were close to zero, and the estimated coefficient in the month of the minimum wage change was greater than 91 percent and 96 percent of the simulated coefficients, respectively

intensive margin but only during the month of the minimum wage change. We show that increasing the minimum wage does not induce individuals not already searching to begin doing so.

This transitory effect, although not predicted by standard labor theory, has been documented in a similar setting. Krueger and Mueller (2010) find that job search responses to unemployment benefit exhaustion are transitory. Our findings similarly suggest that the search responses to the increased value of obtaining a job may be short-lived.[7]

Understanding the impact of the minimum wage on different aspects of the labor market, rather than simply equilibrium employment outcomes, is important given its increasing prevalence as a policy instrument. Our findings suggest the need for greater analysis of not only job search behavior after a minimum wage change, but also of other supply side responses.

[7]DellaVigna et al. (2020) also find that "search effort exhibits an increase up to UI exhaustion and a decrease thereafter." Faberman and Kudlyak (2019) use high-frequency data from an online job-finding platform to document that the number of applications sent by job seekers drops significantly after the first week of search, providing further evidence of rapidly fading search effort.

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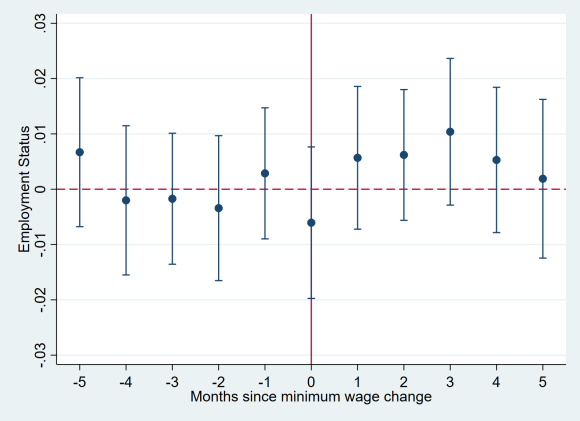
Tables and Figures

Table 1: ATUS Summary Statistics

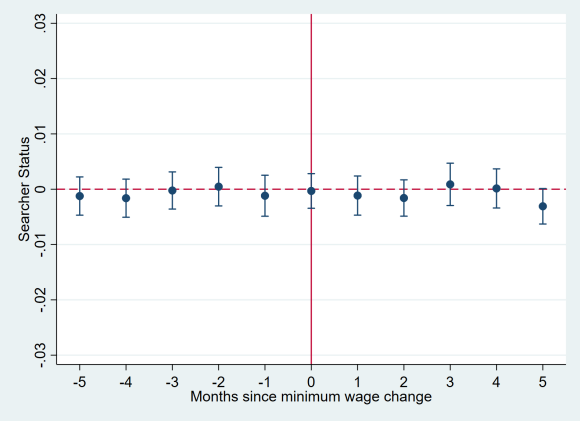
	(1) Entire Sample	(2) Searchers	(3) Non-Searchers	(4) Unemployed	(5) Employed	(6) NILF
Panel A: ATUS						
Probability of employment	0.623	0.271	0.627	0	1	0
	(0.485)	(0.444)	(0.484)	(0)	(0)	(0)
Probability of searching for work	0.0113	1	0	0.150	0.00491	0.00319
	(0.106)	(0)	(0)	(0.357)	(0.0699)	(0.0564)
Daily minutes searching for work	1.498	132.5	0	21.42	0.532	0.416
	(19.48)	(127.3)	(0)	(72.91)	(10.68)	(9.981)
Daily minutes searching (non-zero)	132.5	132.5	0	143.0	108.3	130.5
	(127.3)	(127.3)	(0)	(134.6)	(107.5)	(119.8)
Age of respondent	47.04	39.58	47.13	36.22	42.70	56.84
	(17.74)	(13.36)	(17.76)	(15.96)	(13.36)	(20.79)
Percent high school dropouts	0.158	0.121	0.158	0.305	0.0940	0.257
	(0.365)	(0.327)	(0.365)	(0.460)	(0.292)	(0.437)
Male respondent	0.438	0.535	0.436	0.461	0.489	0.337
	(0.496)	(0.499)	(0.496)	(0.498)	(0.500)	(0.473)
White respondent	0.808	0.710	0.809	0.712	0.822	0.797
	(0.394)	(0.454)	(0.393)	(0.453)	(0.383)	(0.402)
Surveyed on weekend	0.502	0.290	0.504	0.499	0.502	0.502
	(0.500)	(0.454)	(0.500)	(0.500)	(0.500)	(0.500)
Weeks unemployment insurance	45.91	51.84	45.84	51.77	45.39	46.03
	(26.28)	(28.39)	(26.25)	(28.37)	(25.93)	(26.52)
Observations	181335	2051	179284	8720	112996	59619

This table reports the mean and standard deviation for key variables by searching and unemployment status. Data are from the American Time Use Survey. Column (1) includes the entire sample for each dataset. Columns (2) and (3) include summary statistics for those who report non-zero daily search (Searchers) and those who do not report searching (Non-Searchers), respectively. Columns (4), (5) and (6) report summary statistics for the unemployed, employed and not in the labor force. Employment is measured for the entire population (including those not in the work force). As in the CPS, respondents are considered not in the labor force if they are not employed or unemployed. Not in the labor force includes retired persons, students, those taking care of children or other family members, and others who are neither working nor seeking work in the ATUS. Not in the labor force includes retired persons, students, those taking care of children or other family members, and others who are neither working nor seeking work in the ATUS (the same as in the CPS).

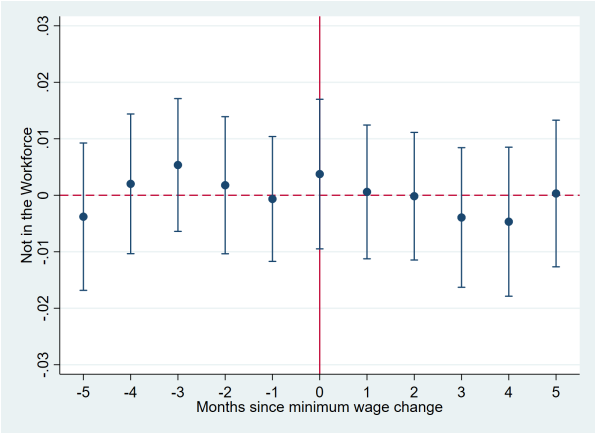
Figure 1: Employment and Search



(a) Employment Status



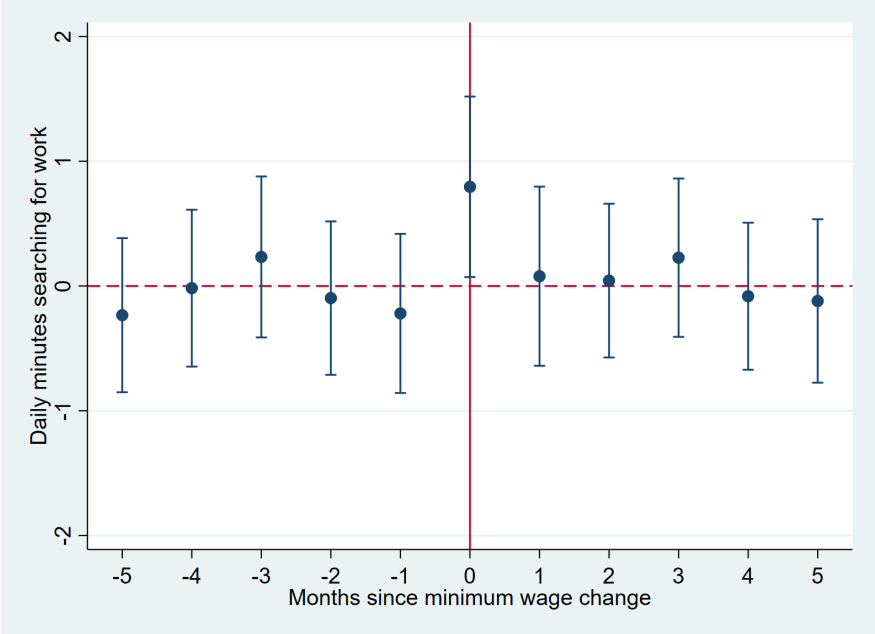
(b) Searching Status



(c) Not in the Workforce

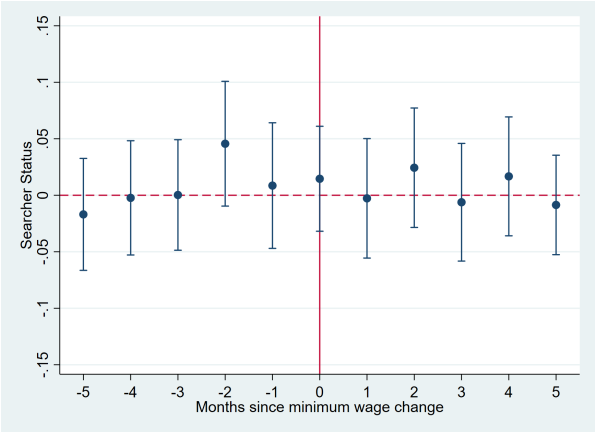
This figure plots coefficients from the regression of employment or searching probability on months before/after treatment, accounting for state-by-year and month fixed effects. An indicator for week or weekend interview and controls for age (age and age^2), education level (indicators for less than a high school degree, high school degree, some college and college graduate or more), race (indicator for white or not), gender (indicator for female or not), and unemployment benefits (week duration of benefits available) are included. The omitted group is all observations not in the 5 months before/after treatment. Standard errors are multi-way clustered for state and year/quarter. Ninety-five percent confidence intervals are presented. Employment status equals one if the respondent is employed and zero if they are unemployed or not in the workforce. Probability of searching is one if the individual reports searching, regardless of employment status, and zero if they do not. Not in the work force is equal to one if an individuals is not employed or unemployed. All panels use 181,335 observations from the American Time Survey.

Figure 2: Minutes Searching for Work: Whole Sample (ATUS)

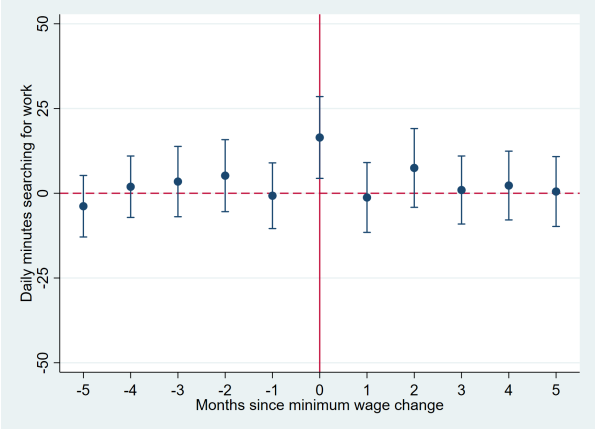


This figure plots coefficients from the regression of minutes searching for work on months before/after treatment dummies, controlling for state-by-year and month fixed effects. The omitted group is all observations not in the 5 months before/after treatment. An indicator for week or weekend interview and controls for age (age and age^2), education level (indicators for less than a high school degree, high school degree, some college and college graduate or more), race (indicator for white or not), gender (indicator for female or not), and unemployment benefits (week duration of benefits available) are included. Standard errors are multi-way clustered for state and year/quarter. Ninety-five percent confidence intervals are presented. Results are estimated using 181,335 observations from the American Time Use Survey.

Figure 3: Searching and Minutes Searching: Unemployed (ATUS)



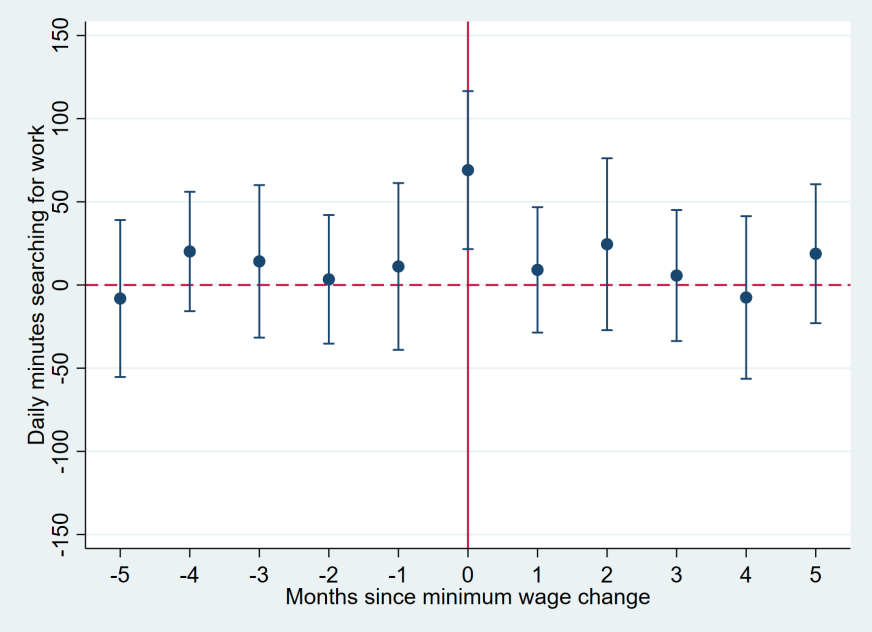
(a) Searching Status



(b) Minutes Searching for Work

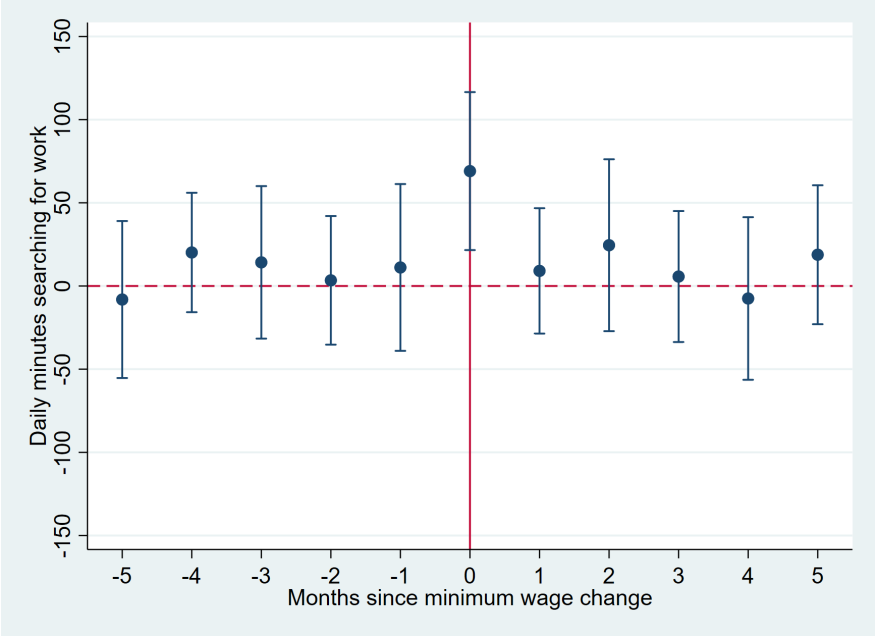
This figure plots coefficients from the regression of searching status or minutes searching for work on months before/after treatment dummies, controlling for state-by-year, and month fixed effects. An indicator for week or weekend interview and controls for age (age and age^2), education level (indicators for less than a high school degree, high school degree, some college and college graduate or more), race (indicator for white or not), gender (indicator for female or not), and unemployment benefits (week duration of benefits available) are included. The omitted group is all observations not in the 5 months before/after treatment. Standard errors are multi-way clustered for state and year/quarter. Unemployment is only measured for those who report being in the workforce. Ninety-five percent confidence intervals are presented. Both results are estimated using 8,720 observations from the American Time Use Survey.

Figure 4: Minutes Searching for Work: Non-Zero Searchers (ATUS)

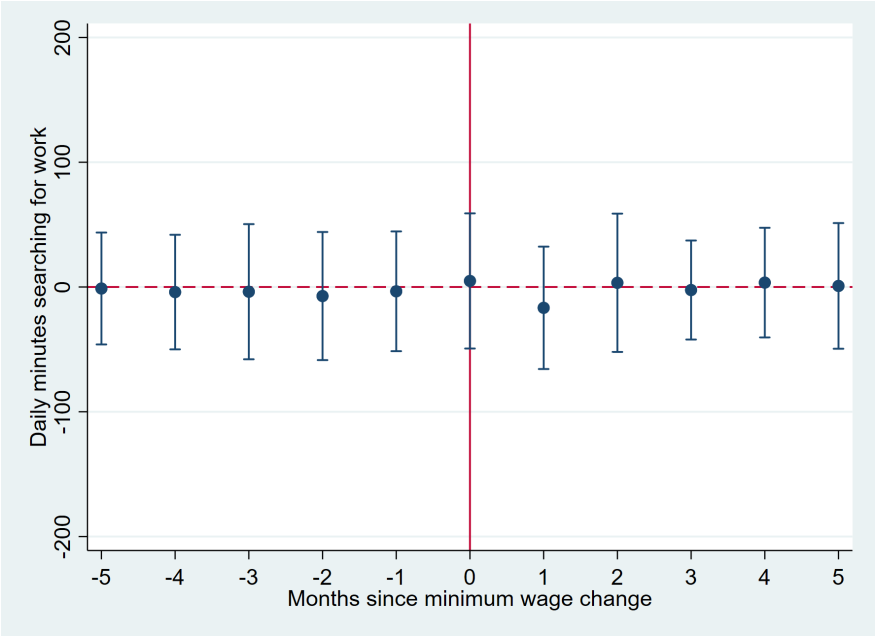


This figure plots coefficients from the regression of minutes searching for work on months before/after treatment dummies, controlling for state-by-year and month fixed effects. The omitted group is all observations not in the 5 months before/after treatment. An indicator for week or weekend interview and controls for age (age and age^2), education level (indicators for less than a high school degree, high school degree, some college and college graduate or more), race (indicator for white or not), gender (indicator for female or not), and unemployment benefits (week duration of benefits available) are included. Standard errors are multi-way clustered for state and year/quarter. Individuals are non-zero searchers if they report any time spent searching (regardless of participation in the workforce). Ninety-five percent confidence intervals are presented. Results are estimated using 2,051 observations from the American Time Use Survey.

Figure 5: Placebo Results: Non-Zero Searchers (ATUS)



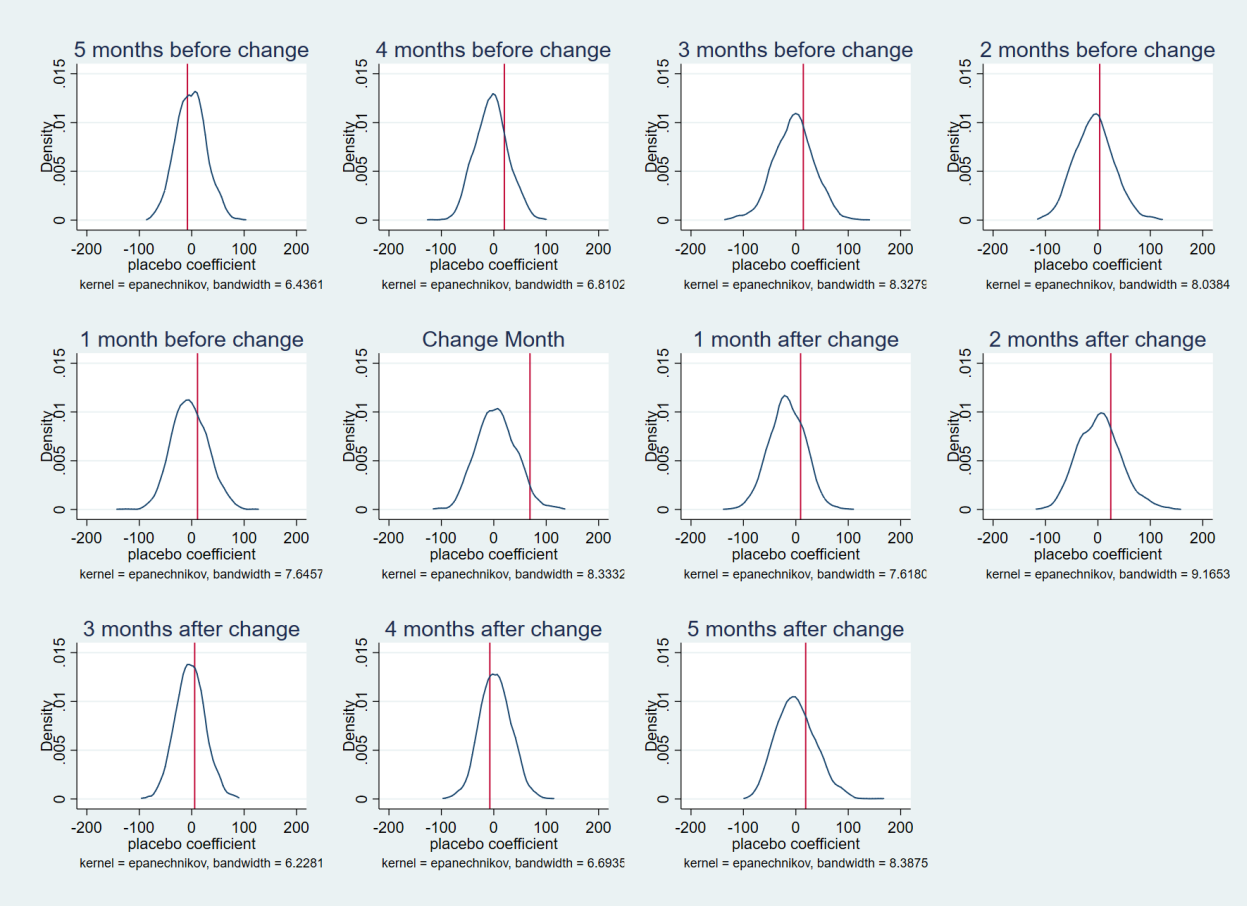
(a) Minutes Searching for Work Results



(b) Placebo Results

This figure plots coefficients from regression of probability of searching or minutes searching for work on months before/after treatment dummies, controlling for state by year and month fixed effects. Standard errors are multi-way clustered for state and year/quarter. An indicator for week or weekend interview and controls for age (age and age^2), education level (indicators for less than a high school degree, high school degree, some college and college graduate or more), race (indicator for white or not), gender (indicator for female or not), and unemployment benefits (week duration of benefits available) are included. The omitted group is all observations not in months before/after treatment. Only those who report non-zero search are included. Panel (a) is replication of Figure 4. Panel (b) shows placebo results from 1000 replications. The mean placebo coefficients and mean 95 percent confidence intervals are plotted for Panel (b).

Figure 6: Density of Placebo Coefficients: Non-Zero Searchers (ATUS)



Above are the resulting distributions of 1,000 placebo coefficient estimates of Equation (1) for minutes searching for work. The lines represent the coefficients estimated in our true data for daily minutes searching for each time period. Only the those who report non-zero search are included.