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## **I. Introduction**

Earning a bachelor's or associate's degree leads to

prosperity.

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state minimum wage changes. This model will ensure that estimates are not biased. I find that a minimum wage increase leads to a decline in degree attainment of 18 year olds. The decline in degree attainment may be driven by a decline in enrollment because enrollment of 18 year olds remains unchanged. Reduced degree attainment indicates that minimum wages do have an effect on the educational makeup of the workforce. This outcome is likely due to the increase in the opportunity cost of attending college, and given this result it is important to consider the effect on college degree attainment before implementing a minimum wage increase. The following sections first explain how this study fits into existing literature, then explain my data and models, and finally show results and explain the findings and implications of this study.

## II. Literature Review

Research on the relationship between minimum wages and educational outcomes has focused on high school enrollment rates, high school completion and dropout rates, and college enrollment rates. Early papers on the subject focused on high school enrollment rates and found contradicting results, prompting researchers to reexamine the effects of the minimum wage on education using different data sources or empirical methods. The discussion of the impact of minimum wages on education began in

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consensus that higher minimum wages reduce high school enrollment, however, these results may be more pronounced for certain age groups (Neumark and Wascher 1995a, b, 2003; Chaplin, Turner, and Pape 2003). Chaplin, Turner, and Pape (2003) finds that results are only significant when looking at students transitioning from 9th to 10th grade, while Neumark and Wascher (1995a, b) find that minimum wage increases have a negative impact on school enrollment among 16-19 year olds. Higher minimum wages increase the probability that teenagers leave school to become employed, reaffirming the negative impact of minimum wages on school enrollment (Neumark and Wascher 1995b).

Another portion of the literature explores high school dropout and completion rates. These papers either find no effect (Warren and Hamrock 2010) or significant effects only for certain demographic groups (Crofton, Anderson, and Rawe 2009; Smith 2021). Warren and Hamrock (2010) find that state and federal minimum wage changes did not affect high school completion rates for the graduating classes of 1982-2005. Increasing the minimum wage reduces the likelihood that low socioeconomic status teens, defined as teens who have at least one parent who did not graduate high school, will drop out of school but has no effect on dropout likelihood for other students (Smith 2021). Using a case study comparing counties in Maryland, Crofton, Anderson, and Rawe (2009) finds that higher real minimum wages increase dropout rates for Hispanic students but do not affect dropout rates for other groups (Crofton, Anderson, and Rawe 2009). Based on these papers, there is not a clear consensus as to how minimum wage changes affect dropout rates, and it is likely that the effects of minimum wage increases on dropout rates differ based on a person's background. The same disparity in results across population groups may apply when considering college degree completion rather than high school completion.

Prior research has also found that minimum wage increases

the papers

degree. For associate's degree attainment I include ages 20 and older. For bachelor's degree attainment I include ages 22 and older.

***Minimum Wage Data - U.S. Department of Labor***

I use data from the U.S. Department of Labor on minimum wages by state and year from 2000-2019, reported as of January 1st of each year. Figure 1 shows state minimum wage variation from 2000-2019. The lowest point for each year is the federal minimum wage for that year. I apply the minimum wage in a person's state at the beginning of the year they turned



As seen in Figure 1, there are two periods with no federal minimum wage variation, 2000-2007 and 2010-2019. Federal minimum wage increases took effect in 2008, 2009, and 2010. I will first look at the effect of state increases during the two periods with no federal change then look at the effect of federal increases.

### ***State Minimum Wage Variation***

I use two samples to estimate the effect of state minimum wage increases. The first sample is from 2000-2006. During this period, the federal minimum wage remained constant at \$5.15 per hour. This sample uses ACS data from 2000-2006, including only people who are over 18 and turned 18 since 2000. 33 states remained at the federal rate throughout this sample. The second sample uses data from 2010-2019, including only people over 18 who turned 18 since 2010. For this period, the federal minimum wage remained constant at \$7.25 per hour. 22 states remained at the federal minimum wage during this time period. For both samples, I exclude states that are beyond the federal minimum wage rate the first year, ensuring that all states in the sample start with the

## Figure 2

2000-2006

2010-2019



### *Federal Minimum Wage Variation*

I use data from 2000-2019 to identify the effect of federal minimum wage increases that occurred in 2008, 2009, and 2010. Several states implemented a minimum wage increase in 2007, right before the federal increase, but were at the federal rate for all other years. For this reason, I exclude 2007, 2008, and 2009 from the sample, creating two distinct periods before and after the federal increases took effect. Here, I identify states that start with a low minimum wage before the federal increase then estimate the effect of the federal increase for these states compared to states that start with a high wage. These states had a minimum wage of \$5.70 per hour or lower in 2006. Figure 3 shows which states are considered low minimum wage states.



**Table 2**

Variable	Obs	Mean	Std. Dev.	Min	Max
<b>2000-2006</b>					
<i>Treated States</i>					
Started college	91,031	.53	.499	0	1
Currently enrolled	91,031	.413	.492	0	1
Associate's degree	91,031	.055	.229	0	1
Bachelor's degree or higher	91,031	.071	.257	0	1

of Labor Statistics and assign each person the unemployment rate for their state as of January of the year they turned 18. I use data on state tuition prices from the National Center for Education Statistics. This data is only available starting in 2010, so state tuition prices will only be used as a control variable for the 2010-2019 group. Note that including this variable does not have a noteworthy effect on the results. I also include state and year fixed effects in 1

on average are more likely to attend college and have a bachelor's degree but less likely to have an associate's degree. It is possible that the higher average enrollment and bachelor's degree attainment among people who have moved is due to people moving states to attend college. It is unlikely that someone would earn an associate's degree in a different state, so that may account for the lower number of people who move earning associate's degrees. According to this table, there are noteworthy differences in the educational makeup of the entire sample and the sample I use. These differences should not influence how someone responds to a minimum wage change, but it is important to note that people in the sample I use are less likely to have a bachelor's degree or be currently enrolled in college but are more likely to have an associate's degree than the general population.

**Table 4**

Dependent Variable	(1) Started College	(2) In College	(3) Associate's Degree	(4) Bachelor's Degree or Higher
Moved	0.0611*** (0.000365)	0.102*** (0.00123)	-0.0169*** (0.000224)	0.103*** (0.000424)
Observations	7,553,779	721,409	6,157,289	4,960,664
R-squared	0.004	0.009	0.001	0.012

**Notes:** The moved variable equals one if someone reports that the state they

Using this model,  $\beta_1$  captures the effect of a \$1 minimum wage increase in state  $s$  at time  $t$  on the likelihood that a person enrolls in college or earns a degree. The  $\beta_1$  variable is relative to a state's minimum wage in the first year of a given sample and is based on

**Model 2:**  
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**Table 5**

in a given year is between \$0.40 and \$0.60 for states that have an increase. Thus, the actual decline in associate's degree attainment at a given time would typically be half the size indicated by these coefficients. This decline in degree attainment is still meaningful, and many states implement minimum wage increases every year, so they will experience a consistent small decline in the number of people earning associate's degrees.

The results for bachelor's degree attainment are strikingly different for the two time periods. However, the results for the first sample may be less meaningful given the number of years and the age group included. Because I use the minimum wage when someone is 18, I only include people who are 18 within the time period of the sample. I also only include people who are old enough to have a bachelor's degree, ages 22 and up. These restrictions decrease the sample size and only leave years 2004..

**Table 6**

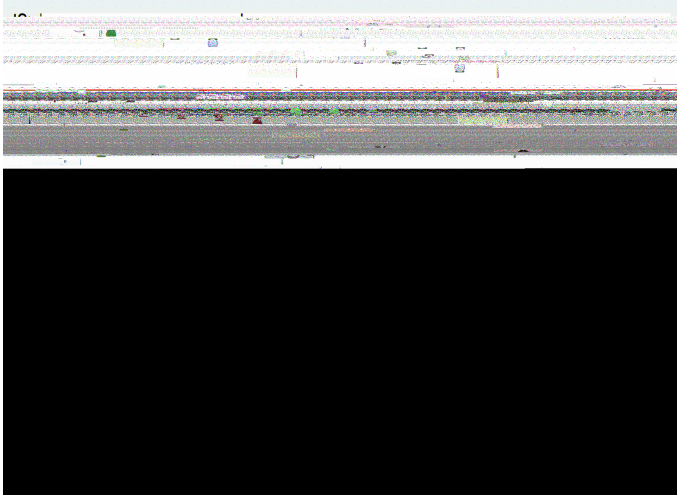
Dependent Variable	(1) Started College	(2) Currently Enrolled	(3) Associate's Degree	(4) Bachelor's Degree or higher
Minimum Wage	-0.0226*** (0.000438)	-0.00513 (0.00985)	-0.0177*** (0.000372)	-0.0439*** (0.000825)
Observations	3,301,931	409,422	2,552,000	2,041,419
R-squared	0.057	0.061	0.011	0.075

**Notes:** Column 1 shows whether someone has ever enrolled in college, regardless of whether they are currently enrolled. Column 2 shows

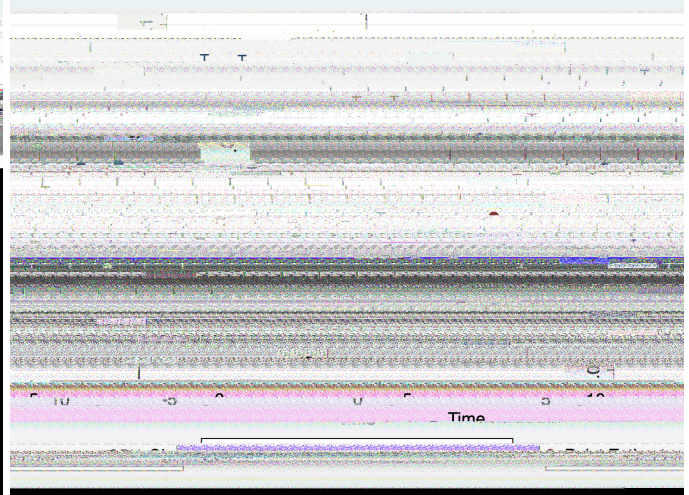
degree program when presented with the opportunity to earn more money outside school. Figure 4 illustrates the results in Table 6 using event study graphs.

**Figure 4**

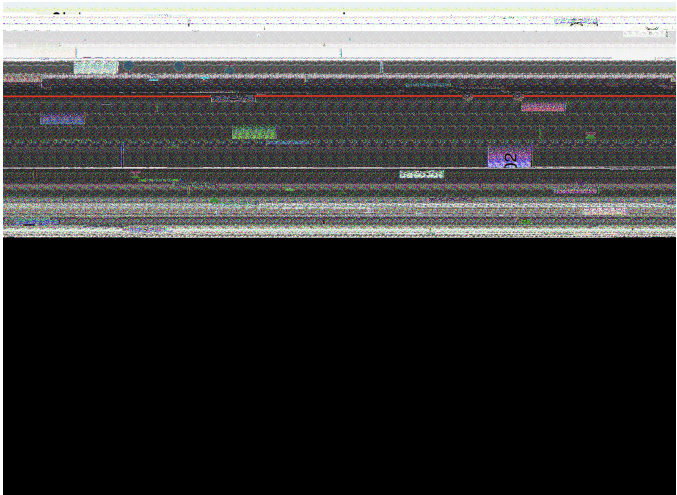
*A. Started College*



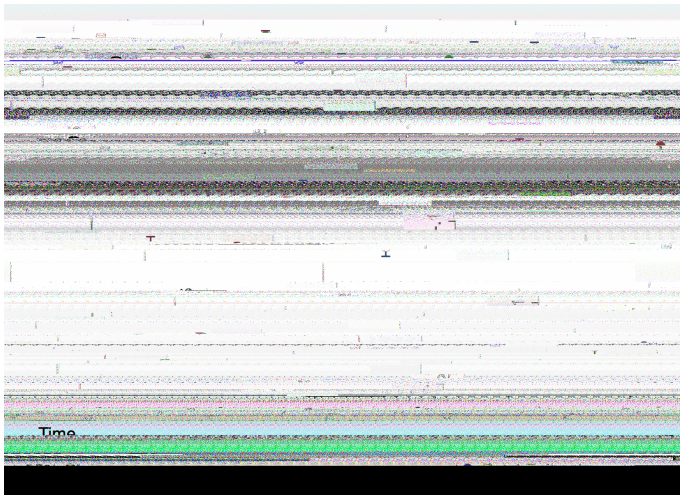
*B. Currently Enrolled*



*C. Associate's Degree Attainment*



*D. Bachelor's Degree Attainment*



**Notes:** Graph A indicates the change in the number of people that enrolled regardless of whether they graduated or are still enrolled. Year 0 indicates the year in which a minimum wage increase occurs. On each graph, the left of the black line is pre-increase and the right of the black line is post-increase.

In these graphs, 2010 is year 0. I group one year before and after a minimum wage increase into year 0. Given that students may enter college at different times and may respond to minimum wage policies at different times, creating a group of years around the time of a policy

change may provide a better estimate of the general response to a policy change. Each event study includes the same controls as used for previous results, state and year fixed effects, and state specific time trends. The graphs for associate's degree attainment and bachelor's degree attainment (C and D) show the decline in degree attainment after the increase. For each of these graphs, the trend in degree attainment is flat prior to the increase, indicating that the minimum wage increase caused the decline in degree attainment. The graph using a combined enrollment and attainment dependent variable (A) similarly illustrates this decline in overall educational outcomes. The graph for current enrollment (B) shows a slight increase in enrollment, however estimates are imprecise, and this result corresponds with the insignificant effect shown in Table 6. Together, these graphs provide convincing evidence of the decline in associate's and bachelor's degree attainment caused by a minimum wage increase and illustrate the insignificant effect on current enrollment of 18 year olds.

### ***Results by Race and Ethnicity***

Given the decline in associate's and bachelor's degree attainment, I then sort results for these outcomes by race and ethnicity. These results are shown in Table 7. The negative result is still present across each population group. For both associate's degree attainment and bachelor's degree attainment I find that there is a stronger effect for the White population compared to non-White and for the non-Hispanic population compared to the Hispanic population. The difference is most pronounced when comparing the White and non-White population for bachelor's degree attainment; White people experience a 4.6 percentage point decline in the likelihood of earning a bachelor's degree compared to a 1.7 percentage point decline for the non-White population. This result indicates that non-White students are more committed to





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## **VII. Conclusion**

I use a difference in differences model to estimate the effect of state minimum wage increases on college enrollment and degree attainment across two periods of time with state minimum wage variation but a constant federal minimum wage. I then use an

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## VIII. References

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## IX. Appendix

**Table A.1**

VARIABLES	(1)	(2)	(3)	(4)
	Minimum Wage	Minimum Wage	Minimum Wage	Minimum Wage
Low min wage *	1.810***	-0.368***	1.562***	1.387***
post	(0.00134)	(0.00447)	(0.00126)	(0.00122)
F-Statistic	1.8e+06***	6765.72***	1.5e+06***	1.3e+06***
Observations	3,301,931	409,422	2,552,000	2,041,419
R-squared	0.643	0.856	0.740	0.811

