The Effect of Minimum Wage Policy Changes on a State's Unemployment Rate

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Abstract

Policymakers often use statistical measurements like the unemployment rate to express the effectiveness of certain policy implementations. The purpose of this study was to examine the effect of minimum wage policy changes on a state's unemployment rate. Previous research has found varying results regarding the relationship between minimum wage and employment; economic theory anticipates a rise in minimum wage will lead to higher unemployment, but many studies' empirical results are neither robust nor statistically strong. The results of this study conclude that when a state changes their minimum wage, there is a statistically significant decrease in their unemployment rate compared to a state that does not change their minimum wage rate. However, states with active legislation to annually increase minimum wage or states where the minimum wage is indexed for inflation are expected to see an increase in their state unemployment rate compared to states who do not adjust their wages annually.

I. Introduction

Minimum wage is the lowest hourly wage that a worker may be paid, as mandated by state and federal law. The purpose of this labor policy is to set a price floor for workers and protect employees against low pay. However, economic theory argues changes in a price floor above the equilibrium will increase unemployment due to job loss. This trade-off between providing a minimum standard of living and causing job loss for low-skilled workers has been a central topic in many studies, legislations, and political conversations since the first minimum wage law was established.

In 1912, Massachusetts became the first U.S. state to enact a minimum wage law. In 1913, eight more states passed similar minimum wage laws. Sixteen U.S. states had enacted such laws before the Federal Fair Labor Standards Act of 1938 was passed. This statute established the first federal minimum wage of 25 cents an hour, a maximum work week of 44 hours, and banned cruel child labor. President Franklin Roosevelt passed this act after saying "something has to be done about the elimination of child labor and long hours and starvation wages" (Grossman, 1978). Since establishing the first federal minimum wage, it has been raised nation-wide 22 times. The most recent federal minimum wage change was on July 24, 2009 to $7.25.

After New Jersey increased their minimum wage from $4.25 to $5.05 per hour in 1992, a study concluded that fast food restaurants increased employment by 13 percent state-wide (Card and Krueger, 1993). This conclusion conflicts with the economic theory of supply and demand; implementing a policy that mandates a price floor will cause unemployment because more people are willing to work at higher wages, but fewer jobs will be available at higher wages. Card and Krueger's study concluded that increases in the minimum wage of New Jersey increase employment by 13% for the restaurants included in their data. However, their analysis was of the

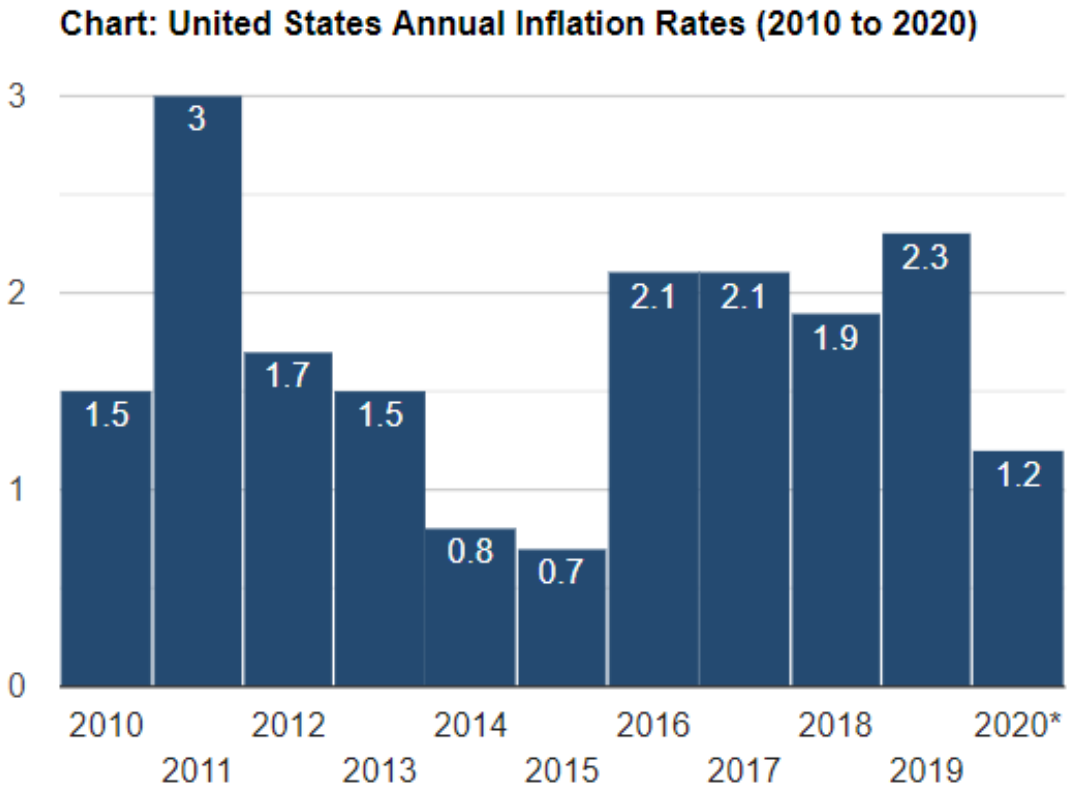
fast-food industry in New Jersey compared to Pennsylvania, and while their results were statistically significant, they were not representative of the entire population.

Studies that focus on broader groups predict negative employment effects. In studies that analyze the effects of minimum wage policies on cities such as Santa Clara when California implements state-wide minimum wage increases (Neumark, and Yen, 2020) or groups affected nationwide by minimum wage changes (Neumark and Wascher, 2006), most of these studies indicate negative employment effects of minimum wages (although they are not always statistically significant or robust). These results correlate with the economic theory that negative employment effects when there are changes in minimum wage.

As of September 30, 2020, there are 29 states that have raised their minimum wage to a wage higher than the federal minimum wage of $7.25 per hour. Several states increase rates due to previously approved ballot initiatives or legislation. For example, in April 2016, California's Governor Brown signed a bill to raise the state minimum wage to $15.00 per hour by 2022. This bill enacted a minimum wage schedule that would increase the state's minimum wage from $10.00 to $10.50 in 2017, $11.00 in 2018, with a dollar increase each year until the wage reaches $15.00 in 2022 (Turman and Julius, 2017). Several other states, such as Maine, New York, and Washington have similar bills in place to ensure increases in state minimum wages.

Another reason minimum wage is adjusted at a state level is to adjust for cost of living. Cost of living is the amount of money needed to sustain living with expenses such as housing, food, healthcare, and taxes. The cost of living differs from city to city and is often related to wages. In cities that have higher expenses, such as New York City or San Francisco, salaries need to be adjusted to sustain the cost of living in that location. To address this, Congress enacted legislation in 1973 to adjust Social Security and Supplemental Security Income benefits

for inflation. Many states adjust minimum wage rates frequently to account for changes in cost of living and inflation. In January 2020, seven states (Alaska, Florida, Minnesota, Montana, Ohio, South Dakota, and Vermont) raised their minimum wage based on the cost of living.



Source: usinflationcalculator.com

While many states have continued to raise their minimum wages to adjust for the rising cost of living, other states such as Georgia, Louisiana, and Tennessee have not. There continues to be a battle between political powers and the labor force. The argument of the trade-offs continues; some argue the minimum wage needs to be adjusted for cost of living and inflation to help low to middle income families, while others argue many low-income workers would lose work hours, money, and even their jobs. Because the unemployment rate is a key identifier in assessing the need for minimum wage policy changes, understanding the relationship between the two variables is essential to policymakers and the nation's workforce.

II. Data

The data for this analysis comes from the Bureau of Labor Statistics (BLS) and the Minimum-Wage private resource website. BLS data sources utilize samples of the United States to reflect the entire population.

The BLS researches, assembles, and publishes statistical employment and economic data on inflation, labor force, productivity, and wages. The BLS is the U.S Department of Labor's (DOL) principal fact-finding agency. They collect data from about 60,000 households about characteristics such as age, sex, race, marital status, educational attainment, etc. To measure unemployment rates, they collect labor force data such as jobholding and job seeking for every member of the residence. To avoid sample bias, participants are not asked their labor force status. Instead, they are asked specific questions about recent activities, and their status is determined based on their responses. To identify those who are employed and unemployed, there are four basic concepts used: (1) people with jobs are employed, (2) people who are jobless, looking for a job, and available for work are unemployed, (3) the employed and unemployed make up the labor force, and (4) people who are neither employed nor unemployed are not in the labor force.

The data used from the BLS for this paper is each state's seasonally adjusted unemployment rate and minimum wage from January 2009 to September 2020. The data is adjusted each month based off statistical trends, making it easier to observe nonseasonal movements. The last federal minimum wage change was on July 24, 2009, when the rate was raised from $6.55 to $7.25. The data used for this study will observe state's unemployment before and after the federal change as well as each state's changes thereafter.

Minimum wage rates for each state from January 2009 - September 2020 were compiled using information from the Minimum-Wage private resource website. This site is a free public service not affiliated with the Department of Labor or any governmental organization that regularly updates their database to include each state's current minimum wage rates, and labor laws.

The unemployment data and minimum wage for each state was collected and compiled into a spreadsheet. The minimum wage data was recorded for each month in each state in 3 different ways: (1) A 1 was used to indicate each month there was a change of minimum wage within a state. When there was no change, it was recorded as a zero. (2) The dollar value of the minimum wage was recorded. (3) The dollar increase in a state's minimum wage was recorded when there was a change, and no change was recorded as zero. 7,050 observations were recorded for each of the 50 United States for 141 months. Table 1 shows the frequency at which states change their minimum wage rates. From January 2009 to September 2020, states have changed their minimum wage 2.99% of the 7,050 observations.

Source: Economic Policy Institute

Table 1

Minimum Wage	Freq.	Percent	Cum.
Change	**211**	**2.99**	**2.99**
No Change	**6,839**	**97.01**	**100.00**
Total	**7,050**	**100**	

III. Method

The first model is to identify if there is an impact on a state's unemployment rate when the state changes their minimum wage. This method compares the state's unemployment rate the month before and after their change in minimum wage. To measure this, the outcome variable is the unemployment rate by month at state level.

$$(1)\ unemployment\ rate_{it} = \beta_0 + \beta_1\ (minimum\ wage)_{it} + \lambda(year) + \kappa(\text{state}) + \mu$$

This model uses any change in minimum wage as a key variable, where a change equals one and no change equals zero. i is used to indicate data measured at a state level, and t is used to indicate time in months. To control for time-variate factors, this method utilizes a fixed effect for year. The fixed effect for year controls for macroeconomic cyclical factors such as business cycles. This model also includes a fixed effect for state to control for differences in cost of living and state level cyclical effects. This model compares a state's unemployment rate when the state changes their minimum wage compared to when they do not. This level of comparison identifies the impact of minimum wages on unemployment rates by controlling for yearly and state cyclical effects.

The second model changes the key variable from any change in minimum wage to the difference in minimum wage. This is measured by differencing the minimum wage before and after a minimum wage policy change.

$$(2)\ unemployment\ rate_{it} = \beta_0 + \beta_1\ (minimum\ wage\ change)_{it} + \lambda(year) + \kappa(\text{state}) + \mu$$

This model controls for time-variate and geographical factors while measuring the impact of minimum wage changes. Again, i is used to indicate data measured at a state level, and t is used to indicate time in months. The difference between model (1) and model (2) is that model (2) is measuring the impact of the size of change in minimum wage policies at a state level. By changing the key variable from a binary variable representing a change in minimum wage to the size of the wage difference, this model will identify the linear relationship between a state's minimum wage and their unemployment rate.

Both models are linear in parameters and the data observed addresses the entire labor force within each state. These assumptions guarantee the validity of utilizing the ordinary least squares method for estimating the linear regressions.

The third model compares states who have laws in place to adjust minimum wages annually for cost of living and inflation compared to those who do not. The following 18 states have established legislation and regulations regarding annual adjustments of this price floor: Alaska, Arizona, Colorado, Connecticut, Florida, Maine, Minnesota, Missouri, Montana, Nevada, New Jersey, New York, Ohio, Oregon, South Dakota, Vermont, Virginia, and Washington. These states were assigned a 1 for the key variable in model (3): "inflation adjusted states". The other 32 states were assigned a 0.

$$(3)\ unemployment\ rate_{it} = \beta_0 + \beta_1\ (inflation\ adjusted\ states)_{it} + \lambda(year) + \mu$$

In this model, i is again used to indicate data measured at a state level, and t is used to indicate time in months. This model does not have a fixed effect for state because of issues with multicollinearity in 47 states. However, this model identifies the impact of minimum wage changes enforced by annual legislation on unemployment rates, controlling for yearly cyclical

effects. By comparing states with current laws to adjust rates to states without those laws, this model will recognize if policymakers creating legislation is beneficial to the workforce.

IV. Results

In model (1), the data shows statistically significant differences in state's unemployment rate when a state changes their minimum wage compared to when they do not change their minimum wage amount. When states change their minimum wage, their unemployment rate is expected to decrease by .298. To put a -.298 unemployment rate change in perspective, the 2020 U.S labor force is approximately 203,000,000 people, so a .298 decrease in the unemployment rate means an additional 605,600 people employed nationwide. The p-value is .002, meaning the minimum wage change is significantly different than 0 at the 99% confidence level. Empirical estimations of model (1) are shown in column 2 of Table 2. Table 3 shows the U.S labor force effect based on the empirical estimations. Model (1) identifies a positive employment relationship associated with changes in a state's minimum wage, meaning if a state increases their minimum wage rate, they should expect to see an increase in employment (a decrease in unemployment rate).

In model (2), it is suggested that for every $1.00 change in a state's minimum wage, there is an expected .68 decrease in the state's unemployment rate, meaning an additional 138,040,000 people employed nationwide. This model confirms that a $1.00 change in minimum wage is statistically different than 0 at the 99% confidence interval. By including fixed effects to control for the year and state, it can be concluded that changes in a state's minimum wage explain 72% of the variation in unemployment rate. Empirical estimations of model (2) are

shown in column 3 of table 2. Table 4 shows the U.S labor force effect based on the empirical estimations. In accordance with model (1), model (2) identifies a positive employment relationship associated with a $1.00 change in a state's minimum wage.

Model (3) compares states whose minimum wage is indexed for inflation to states who are not. Many of these states have legislations in place because of approved ballots that will incrementally increase their minimum wages. This data shows that states who adjust for inflation and cost of living are expected to have an increase of .118 in their unemployment rate, controlling for the year. In comparison to model (1) and (2) that observed a decrease in the unemployment rate, model (3) sees an increase. States that do not adjust minimum wage annually for inflation are expected to have an unemployment rate of 8.427 while states that do adjust annually are expected to have an expected unemployment rate of 8.545; significant at the 99% level with a p-value of .09. Empirical estimations of model (3) are shown in column 4 of table 2. Table 5 shows the U.S labor force effect based on the empirical estimations. Model (3) identifies that the 18 states with laws to increase minimum wage incrementally have a negative relationship with employment, meaning that approximately 23,954,000 people would lose their employment status. This model shows that states who adjust their minimum wage rate because of an acting law are not as effective as states who do not enact said laws. This is crucial for policymakers to address, as these policy changes effect millions of people in the workforce.

Table 2

VARIABLES	Model (1) Unemployment Rate	Model (2) Unemployment Rate	Model (3) Unemployment Rate
Minimum Wage Changed	-0.298***		
	[0.0957]		
Difference in Minimum Wage		-0.680***	
		[0.153]	
States that Adjust for Inflation			0.118***
			[0.0449]
Constant	8.488***	8.490***	8.427***
	[0.0558]	[0.0556]	[0.0756]
Observations	7,050	7,050	7,050
R-squared	0.727	0.727	0.512
Year	YES	YES	YES
State	YES	YES	NO

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Some limitations of these models are that they measure short-term, month-to-month effects, not long-term effects. If a minimum wage change affects the unemployment rate after a month of the policy implementation, these models will not capture that impact. While the unemployment rates are seasonally adjusted, these models do not include monthly fixed effects. Because policy changes are often implemented in January after approved ballots, there might be different impacts on the months following January.

Another limitation is differing minimum wages within the same state. For example, California has a higher minimum wage for big businesses and a smaller minimum wage for smaller businesses with less than 500 employees. Because small businesses may be impacted differently than big businesses in a minimum wage increase, another study should be conducted measuring the different impacts. To control for this, the data used in this paper uses the highest

minimum wage within a state (likely reflecting big businesses), but the unemployment rates for each state utilize the entire state's workforce, not just big businesses.

Some industries are impacted more heavily by minimum wage changes than other industries. This is evident in Card and Krueger's fast food industry results. Because this study analyzes unemployment for the entire state, it does not take into consideration differences in industry. Industry cannot be taken into consideration in these models because the analysis is at state level.

Table 3

Model (1)

Minimum Wage Changed	p-value	Labor Force Effect
-0.298	0.002	60,494,000

Table 4

Model (2)

Difference in Minimum Wage	p-value	Labor Force Effect
-0.68	0.000	138,040,000

Table 5

Model (3)

Inflation Adjusted States	p-value	Labor Force Effect
0.118	0.009	(23,954,000)

V. Conclusion

The relationship between minimum wage and employment has been analyzed in many studies, but each has yielded different results. Basic economic theory argues increasing the price floor for wages will increase unemployment, but several studies have found exceptions to this economic principle. This study concludes that there is a positive relationship between minimum

wage policy changes and employment, however, there is a negative relationship if the change is the result of legislation that forces incremental increases in minimum wage.

This study identifies the effect of minimum wage policy changes on a state's unemployment rate using three statistical models. States that change their minimum wage rate are expected to see a significant increase in state employment. The magnitude of these expectations is reflected by comparing the change in employment to the predicted 2020 U.S labor force of 203,000,000 people. Increasing the minimum wage increased the employment rate, providing millions of jobs. However, the positive wage-employment relationship inverts when analyzing states who have laws regarding minimum wage rate changes in place.

The 18 states with active legislation in place to adjust minimum wage incrementally see a decrease in employment when they raise minimum wage compared to the 32 states that do not have laws to increase minimum wage. This model shows that states who adjust their minimum wage rate because of an acting law are not as effective as states who do not enact said laws. This is crucial for policymakers to address, as these policy changes affect millions of people in the workforce. Further research could examine these minimum wage laws and compare differences in the legislation to identify the cause of the negative wage-employment relationship. As the evidence suggests from this study, States that change their minimum wage rate are expected to see a significant increase in state employment, but if the change is the result of active legislation, states are expected to see a decrease in state employment.

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