What Are The Employment Effects of The Minimum Wage?

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Abstract

The effect which the minimum wage has on employment is an important discussion in economics. This study aims to investigate whether the conventional theory surrounding the effects of the minimum wage holds up in the real world. This was done through regression analysis of the effects which variables such as the Real Minimum wage, Real GDP per capita and labour market variables had on levels of employment and unemployment in the US. Findings showed support for the conventional theory surrounding the negative effects that the minimum wage has on the levels of employment. These findings are useful for policy makers as it advices them of the true effects are of the policy they implement.

AI Statement

I acknowledge the use of generative AI in literature search in this paper. However, the work reported remains my own.

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Introduction

The minimum wage is a form of government intervention which enforces employers to pay their workers at or above a set wage level. The main aim of the policy is to make those on lower incomes better off by increasing their income and earnings, it can also act as an incentive to work as workers who were not previously working could be enticed by a higher wage. However, the conventional theory about the minimum wage suggest that the higher wage level imposed by the minimum wage would cause a fall in employment and an increase in unemployment. The main aim of this paper is to find out what effects the minimum wage has on the labour market, specifically employment and unemployment. As well as that, this study also aims to either provide support for the conventional theory for the effects of the minimum wage or provide evidence that the theory does not hold up in the real world. This paper will achieve this by running multiple tests on the United States employment and unemployment levels as the dependent variables using minimum wage and other factors as independent variables in order to find what effect the minimum wage has in the real world. This research will be to the benefit of policy makers as it will improve their understanding of the effects of the minimum wage allowing them to use it more effectively. Most papers on this topic were written decades ago using outdated data sets and techniques, this study provides a modern and fresh analysis of the minimum wage. Contrary to some papers, these findings show more support for the conventional theory surrounding the minimum wage and these results are supported by multiple different tests which makes it more reliable than many other papers on the topic which only provide one form of evidence.

Literature Review

The minimum wage and its effects on the employment level has been a hot topic in economic discussions for many years. There have been many papers on this area of the labour market trying to determine the true effect of the minimum wage, this discussion has been one which has been ongoing for many years since the minimum wage was introduced in the mid-1900s up until today. The motivation behind the research into the topic is whether the conventional theory about the effect of an increase in the minimum wage holds up in the real world. The assumption made by the conventional theory is that an increase in the minimum wage would result in an increase in unemployment due to rising labour costs as well as an increase in the supply of labour which exceeds the demand for labour. The ongoing argument between researchers has been focused around whether this effect can be observed in real life or if the conventional theory is not an accurate representation of the true effect of a rise in the minimum wage.

Firstly, a discussion of studies which contest the conventional theory of the minimum wage. A significant study by Card and Krueger based on the effect of the minimum wage in the fast-food industry of New Jersey and Pennsylvania is one such study (Card D, 1994). The study focuses on a rise in the minimum wage in New Jersey and its corresponding effects on employment of fast-food workers. Card and Krueger find that although the minimum wage had increased, it actually lead to a positive effect on employment as average employment had increased at the restaurants surveyed in New Jersey. They also found that an increase in the level of the minimum wage did not lead to fewer McDonalds opening. They make use of empirical data to find these results as they conducted their own survey of 410 restaurants across New Jersey and Pennsylvania finding variables such number of workers and the starting wage at each establishment. They surveyed each restaurant twice, once just before the rise and a second time 8 months after the rise. Card and Kreuger used a difference in

difference approach which means that they compared the changes in employment across the two periods to find their results, this method is appropriate for their data as they are comparing two periods with a different minimum wage against each other. They did face some challenges in collecting data from their surveys as they had to call each restaurant individually in order to obtain their results, a few restaurants which participated in the first wave were unable to be contacted for the second round of the survey. This issue was resolved as they were able to either get into contact with them after calling numerous times or they found out that they could not contact them due to the fact that they had shut down. The fact that Card and Krueger used the fast-food industry when looking at the employment effects is a strength of the paper as the fast-food industry is a leading employer of low wage workers so it is a great section to focus on rather than employment in general, similarly this current paper collected data on employment figures of restaurants across multiple different states. However from a critical standpoint, it can be argued a weakness of the paper by Card and Krueger is that they only focused on the short term effects of a rise in the minimum wage, this current paper will be tracking the effects on employment over a 10 year period in order to observe both long and short-term effects.

This is not they only study which managed to produce results which suggested that an increase in the minimum wage had positive effects. A study on the minimum wage in Germany is another to disagree with the conventional theory, this study is written by Holtemöller and Pohle (Oliver Holtemöller, 2020). They used panel data of German states similar to what this current paper will be using for its study of the effects in the United Sates. Germany as of 2015 has introduced a national minimum wage so this study is dedicated to finding the effects of this, in their study they found that although the minimum wage has had a negative effect on marginal employment it had a positive effect on regular employment. Lastly, a study by Azar, Huet-Vaughn, Marinescu, Taska and Wachter looking at minimum

wage employment effects and relating it to market concentration also found that the effect of the minimum wage was positive (José Azar, 2023). They found that the elasticity of employment with respect to minimum wage increases with the concentration of the labour market, with these results carrying over to the entire low wage market which is an area this current paper will be addressing in its study by looking at how an increase in the minimum wage effects the restaurant industry.

In contrast to those studies mentioned above, now a discussion of studies whose results align more closely to the predictions made by the conventional model. One such study is by Neumark and Wascher which uses panel data of state minimum wages in the United States finds that employment does fall when there is a rise in the minimum wage. This research makes use of similar data to that this current paper uses when finding its results, though the paper by Neumark and Wascher is quite old being published in 1992. With newer data, results may differ as well as more modern data being more accurate meaning results may not be the same as earlier studies. As well as this, a potential limitation of the study by Neumark and Wascher is that it only focuses on teen employment levels rather than low-wage industry employment which is a big area affected by the minimum wage changes. Another study by Meer and West is an interesting one as its results focus more on the long run effect of a rise in the minimum wage (West, 2016). They found that minimum wage rises lead to a reduction in employment over a longer period of time than much of the recent literature has been more focused on. This is a key strength of the paper which openly challenges papers like that of Card and Krueger's (Card D, 1994) which make claims only focused on the short-term effects of a minimum wage rise.

An interesting study by Manning explores the elusive effect of the minimum wage (Manning, 2021). He does also find that a rise in the minimum wage does lead to a negative employment effect on teens in 2 of the models he used but in the other 5 models he uses he also finds that

the minimum wage has a positive effect on employment, though the positive effects he found were not statistically significant. This led manning to come to the conclusion that the effect of the minimum wage remains elusive. In his regression he used variables such as the log of the minimum wage, percent of teens in population and controlled for economic conditions across states. This is similar data to what this current paper is using as it has controlled for different economic conditions across states by including data such as state level GDP per capita. Manning questions his data and methodology in his study and re-runs his models by changing his data used, for example people criticise the use of employment-population ratio and suggest log employment to be used instead, after making changes he still found the effect of the minimum wage to be elusive. A weakness of Mannings study is similar to that of Neumarks, there is no mention of the effect on the low-wage industry rather a focus on just teen and young adult employment. Mannings study does include multiple models which is a strength as his findings are backed up by multiple models. A study by Cengiz, Dube, Linder and Zipperer about the effect of minimum wage on low wage jobs supports the idea that the effect of the minimum wage being elusive (Cengiz, 2019). They found that the number of jobs created above the new minimum wage after a rise matches the number of jobs lost due to the rise. These results suggest that the minimum wage has little effect on the number jobs available. This study does a great job a focusing on low-wage jobs and in the paper they claim that using wage bins is more accurate than using teen employment.

The aforementioned studies above have motivated and shaped this current study to what it is now. In this paper an updated data set compared to many of the studies mentioned above, like that of Neumark (Neumark, 1992), will be used as well as some more suitable data as well as low-wage industry data in its analysis learning from the likes of Card and Krueger (Card D, 1994) and Cengiz (Cengiz, 2019). The time period chosen by the researcher to study is as recent as possible with its data ranging from 2014-2023. Its contribution to the study of

employment effects of the minimum wage is that it will be able to provide a modern outlook on the effects of the minimum wage using data from key industries, such as the restaurant industry, while tracking minimum wage changes across all 50 states in order to give a well-informed review of the effect of the minimum wage as it will able to observe many changes as each state has the power to alter its own minimum wage.

Methodology

This paper has used quantitative research, this means that it has collected and analysed statistical numerical data in order to get a grasp of relationships and trends between the variables that it has collected. The study follows a correlational research design which means that it has investigated how the different independent variables that it has collected effect the dependent variables it has. The correlation between the variables will show the strength and direction, positive or negative, in which each different independent variable will change the dependent variable. It will also show whether the effect it has is statistically significant or not.

Initially, the researcher's first thought when it came to data collection was to collect data from the United Kingdom. This means that the researcher would have observed the effect of the minimum wage in the UK over a set time period which would have shown an effect of the minimum wage on employment in the UK however, using data from the US permits the researcher to exploit the between state variation in the minimum wage and thus it was decided to focus on the US. This means that instead of tracking one minimum wage that would only have changed a few times over the years observed, the researcher was able to track fifty independent minimum wages over ten years which all have the ability to be changed by each sate across the time in which the researcher observed. In the United States there is a federal minimum wage which every state must enforce, which during the time of

research was $7.25 however, each state is free to set their own minimum wage which can be greater than that of the federal minimum wage. During the collection of minimum wage statistics it was found that thirty of the fifty states set their own minimum wage above the federal level. The state with the highest average minimum wage from across the time observed was Washington which had an average minimum wage of $12.02, just under five dollars greater than the federal minimum wage. More data being collected means that results are more accurate which in turn brings more validity to the findings.

The data which has been collected for the research is US state level panel data. Panel data is similar to time series data but instead of tracking data on one unit over many time periods, in panel data one would track data on multiple units over many time periods. In this case the units are the different states which make up the US. If the paper stuck to tracking just UK data it would have had time series data instead. The paper's use of state level panel data is similar to that used by Neumark who also collected state level panel data for the United States in his research (Neumark, 1992) but, as mentioned previously this data set is far newer making it more relevant to today's labour market and economy than the research in Neumark's 1992 paper which is now over three decades old. The researcher sourced its data for its research from the Federal Reserve Economic Data (FRED) and from the U.S. Bureau of Labor Statistics.

The research began by finding the minimum wage for every state in the US over a ten year time period from 2014 to 2023, this gives five hundred observations of different levels of the minimum wage over time. The minimum wage was then adjusted for inflation over the time period with 2014 being the base year in order to find the real level of the minimum wage. Even though the nominal minimum wage may remain the same in a state for many years, the real value would change due to inflation. This means that the minimum wage could be falling over time in real terms leading to a similar effect on employment levels to that of a decrease

in the minimum wage. According to the conventional economic theory about the effects of the minimum wage, in testing one should observe that an increase in the minimum wage would lead to lower employment and higher unemployment. Next data on employment statistics in every state was found over the same time period as before, the number of people employed will be used as one of three dependent variables which the researcher will be using in order to estimate the employment effects the minimum wage has on the labour market. The second dependent variable which the researcher will be using is the number of people who are registered as unemployed in each state over the ten years. The unemployment number tracks the amount of people who are willing and able to work but do not have a job. The reason for using unemployment statistics as well as employment statistics is for two main purposes, one is to see how unemployment levels are effected by a changing minimum wage. The second is as a form of a robustness check. If one were to observe the minimum wage to have a negative effect on employment one would expect to see the minimum wage having a positive effect on unemployment. This would add another layer of support and validity to the findings and make them more robust. The final dependent variable which the paper will be testing on will be restaurant employees. Data has been collected on the number of restaurant employees in each state over the ten years. The reason for this is because the restaurant industry is more heavily affected by the level of the minimum wage than the economy as a whole, this means that one may be able to observe a more accurate impact of the minimum wage in an industry where it plays a bigger role as they are one of the biggest employers of minimum wage workers. The paper has taken inspiration from the work done by Card and Krueger when taking a closer look at the restaurant industry, especially their 1994 paper on the fast-food industry (Card D, 1994).

Moving on to the other independent variables which the paper will be using alongside the minimum wage when testing for the effects of the minimum wage on employment levels. For

each of the states over the ten years Gross Domestic Product (GDP) per capita for each state has been collected, this is because in order to find the effect of the minimum wage one needs to use other variables which may affect employment numbers so that the findings are not skewed due to missing variables. This could lead to the strength or direction of the effect being misreported. GDP per capita was then converted into real GDP per capita the same way as the minimum wage, using 2014 as the base year. GDP per capita is a good indicator of economic performance, one would expect to see higher employment numbers when GDP per capita is higher. It is important as well as useful to know how strong of an impact economic performance is having on employment figures as it would give an idea of how strong the impact of the minimum wage is relative to other contributing factors. The next three variables collected for the research are labour market related variables, the first of the three was the number of Job Openings. This shows the number of jobs available in each state over the ten years observed. A higher level of job openings could show that employers are hiring at a higher rate meaning that the level of employment would be higher as a result. The second labour market statistic used was the number of Layoffs & Discharges in each state for each year. Layoffs are a termination in employment due to business performance and discharges are a termination in employment due to the worker's performance. A higher level of Layoffs & Discharges would lead to the expectation of a lower level of employment and a higher level of unemployment. The last labour market statistic which was used in the research was the number of Hires in the economy. One would expect for the number of hires to have a positive effect on the level of employment due to the nature of the statistic. As mentioned earlier the paper has also collected some data on the restaurant industry. One of these was the Number of Restaurants in each state over the ten years. This is because one would expect to see a strong correlation between the Number of Restaurants and Restaurant Employees as one would assume more restaurants would lead to more employees. This variable was used

mainly to avoid missing variable bias in order to ensure that other variables are not misreported.

This paper has also collected other forms of data which will not be used in testing but were found to be interesting and relevant to the discussion. These help give a greater understanding of labour market conditions. These variables include Labour force Participation Rate, Unemployment Rate and the Real Average Annual Restaurant Pay. The average labour force participation across all states has decreased from 2014 to 2023 however, before 2020 the participation rate was steady but dropped in 2020. This could be due to the Covid pandemic which started in 2020, the participation rate has been slowly recovering since. The state with the highest Average Participation Rate over the ten years was North Dakota with 70% and the lowest was West Virginia who's Average Participation Rate was only 54%. This is interesting because for all but one of the ten years observed the minimum wage was at least one dollar more in West Virginia than North Dakota. The Unemployment Rate from across all states had decreased from an average of 5.7% in 2014 to a 3.5% in 2019, then a large increase to 7.4%. This could also be due to the covid pandemic as it is known there was a lot of job loss caused by the pandemic. Since 2020, the Unemployment Rate resumed its downward trend and as of 2023 it sits at its lowest rate covered in this experiment, 3.3%. North Dakota also has the lowest unemployment rate on average out of all fifty states at only 2.8% and Nevada has the highest unemployment rate at 6.5%. Once again the state with the lower minimum wage is performing better than a state with a higher minimum wage. So far the data would suggest that a lower minimum wage would be beneficial for the health of the labour market. The real average annual restaurant pay has increased on the whole over the ten years, it has gone from $15,806 to $19,282 from 2014 to 2023. Its only dip was in 2022. The state with the highest average pay was New York with $24,106 and the lowest was Mississippi with $13,863. As to be expected, the minimum wage in New York is far greater than that in Mississippi. New

York has one of the highest minimum wages that peaks at $11.03 in real terms and Mississippi has the joint lowest with the 19 other states that have not adjusted their minimum wage over the ten years observed, with it being $5.63 at its lowest, just over half of New York's in the same time period.

Now that the research design of the experiment has been laid out, a discussion on how the paper has gone about analysing the data in order to get its results. In order to find the magnitude and direction of the effect which the minimum wage has on employment and unemployment levels the researcher has used a fixed effects regression. The reason for using a fixed effects regression over a random effects regression is that the data set is panel data. Unlike a random effects regression, a fixed effects regression will control for factors which vary between states but remain the same in each state over time. These factors include but are not limited to: the cost of living in each state, the type of industries people from the state tend to work in, religious beliefs and values of the state, the political bias of the state, how good the levels of education are, the climate and geography of the state. Without these factors being controlled for it could lead to biases in the relationships found for the effect of the minimum wage. Using fixed effects does not come without drawbacks, one such drawback is that estimates can be nosier, meaning that the variance could be higher, due to the fact that a fixed effects regression does not consider between state variation. In order to prepare the data for the regression testing it was decided that it would be beneficial to convert the data into logarithms instead of using the raw data so that a log-log functional form could be used, it was decided to do this for multiple reasons which include ease of use and for reliability. Using a log-log functional form means that the regression will look similar to this, $\log(Y) = \beta \log(X) + \varepsilon$. Y is representing the dependent variable which for now will represent the number of people employed and X is the real minimum wage. Because this is a log-log regression a one percent change in the value of X would lead to a percentage change in Y equal to β,

effectively it shows the elasticity of the dependent variable in relation to the independent variable. This is really helpful to use as an economist as the results are more meaningful when put in terms of percentage change rather than the raw number change which would have been given out by a linear model. Using logs rather than the absolute values also helps to deal with skewed data, this is because when one converts the raw numbers into logs it compresses the data down. This is important for the data as not every state will have a similar level of GDP per capita like for example California's GDP per capita is over double that of Alaska's, a conversion to logs brings them much closer together. This makes a regression more robust and ensures that large values don't end up dominating the results of the model leading to inaccurate coefficients being produced. The next adjustment made to the regression was to add time dummy variables to the regression. The main reason for adding these time dummy variables was in order to control for time-specific shocks which may have taken place over the time observed. These time dummies will absorb anything that affects all variables in the given time period. These can include: recessions or booms like the Covid pandemic, changes to federal policy, technological advancements as well as changes in culture or ideals. This ensures that the results are not effected by external events. This prevention in omitted variable bias is very important as an independent variable could be mistakenly attributed with trends in time effecting the value of its coefficient.

As mentioned earlier, the paper has three dependent variables which will be tested on; employment, unemployment and the number of restaurant employees. For each dependent variable three regressions have been generated. The first includes all 50 states, the second regression only includes the 30 states which have adjusted their minimum wages over the 10 years observed. The last regression then includes the 20 states which have not adjusted their minimum wage over the time observed. This means in total there are nine regressions. This

allows for comparison between the different dependent variables as well as comparison within each dependent variable allowing for a greater level of analysis.

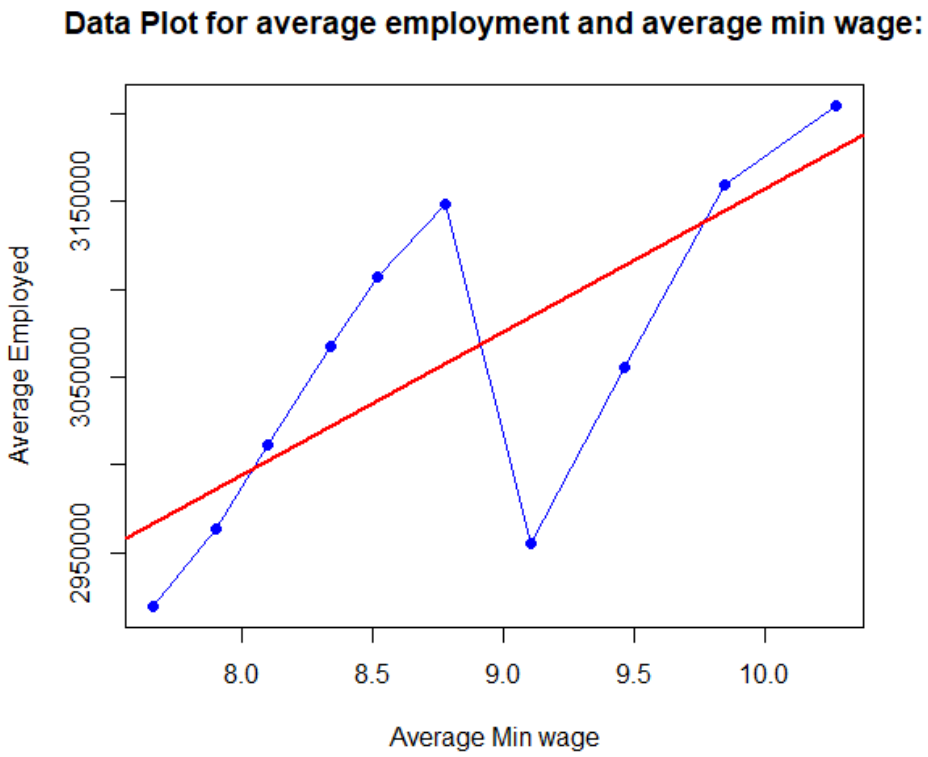

Figure 1

In Figure 1 above a graph is shown with the average number of people employed across all states on the y-axis and the average minimum wage across all states on the x-axis. The graph shows an upward trend with the minimum wage and employment, this is the opposite of what was predicted by the conventional theory. However, this upward trend in employment is likely to be more correlated with real GDP per capita than the minimum wage as one can observe a drop in employment at the same time which real GDP per capita fell due to covid. Therefore, one may infer that there are other factors which play a bigger role than the minimum wage does in determining the level of employment in the economy. This is because the average minimum wage continued to rise throughout Figure 1 and employment did not and instead dropped when the average minimum wage was just over $9.

Some potential limitations in the methodology could be that a longer time period observed could have allowed more changes in the minimum wage to be observed, this could have potentially improved the accuracy of the results. However, data collection has become more common and available in recent years and had this paper used a longer time period it would have had missing data for some states so it was judged that it would be more useful to have a slightly shorter time period but have full data rather than five more years but with incomplete data. Another potential limitation is that the paper could have used multiple industries which are potentially more affected by minimum wage changes. Having more data could have been useful as it would have allowed for comparison between different industries. As well as this, primary research may have been more accurate than using secondary research when it come to looking at restaurant employment, like that done by Card and Krueger (Card D, 1994). However, this was not feasible for this paper due to time and cost limitations.

Findings

Now that the data collected and the methodology have been discussed next this paper will take a look at the findings of the researcher. The first set of three results which are going to be shown and discussed use the number of people employed in each state as the dependent variable. These results can be found in table 1 below. Column number 1 contains the results for the regression which contains all fifty states, this means that there are five hundred observations for this regression. Like for all regressions featured in table 1, the independent variables are shown with their corresponding coefficient estimates for each regression. Looking first at the Real Minimum Wage one can see that its coefficient is negative meaning that when the Real Minimum Wage increases one would observe a fall in the level of employment. Because a log-log functional form was used one can observe that a 1% increase in the level of the Real Minimum Wage would result in a -0.022% effect on the number of

people employed. Looking at the index below the table one can see that the singular star next to the coefficient for the Real Minimum Wage represents that it is statistically significant at the ten percent level. The next coefficient is for the Real GDP per capita, in contrast to the Real Minimum Wage the paper found that it has a positive effect on the number of people employed. For a 1% increase in Real GDP per capita there would be a 0.025% increase in the number of people employed. Real GDP per capita is also highly significant as it is statistically significant at the one percent level. The last coefficient which is statistically significant is Hires which is also statistically significant at the one percent level. It is also positively correlated with employment as to be expected, for a 1% increase in the number of hires there would be a 0.08% increase in the number of people employed. The last two coefficients, Job Openings as well as Layoffs & Discharges, are not statistically significant but are positive.

	Dependent variable:		
	LN_Employed		
	(1)	(2)	(3)
LN_RealMinWage	-0.022*	-0.013	-0.123
	(0.013)	(0.020)	(0.087)
LN_RealGDPpercapita	0.025***	0.031***	0.016
	(0.008)	(0.010)	(0.012)
LN_Hires	0.080***	0.049*	0.162***
	(0.025)	(0.029)	(0.045)
LN_JobOpenings	0.011	-0.003	0.032
	(0.015)	(0.018)	(0.032)
LN_LayoffsAndDischarges	0.010	0.009	-0.010
	(0.012)	(0.014)	(0.024)
Observations	500	300	200
R2	0.613	0.638	0.623
Adjusted R2	0.557	0.577	0.550
F Statistic	49.303*** (df = 14; 436)	32.173*** (df = 14; 256)	21.188*** (df = 13; 167)
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 1

Column 2 contains the regression which only includes the thirty states which adjusted their minimum wage over the ten years observed, this means that for this regression there are 300

observations. Similarly to the first regression in column 1, the coefficient for the Real Minimum Wage is negative, however it is no longer statistically significant. Real GDP per capita is still positive as well as continuing to be statistically significant at the one percent level. Hires is also still statistically significant but its significance has dropped to now only being significant at the ten percent level. Job Openings and Layoffs & Discharges still remain statistically insignificant but Job Openings coefficient has changed to a negative value. The third column contains the regression which includes only the twenty states which have left their minimum wage unchanged over the ten years observed, this regression contains 200 observations. The Real Minimum Wage still has a negative coefficient but, like in column 2 it is statistically insignificant. This means in two out three of the regressions, with the number of people being employed as the dependent variable, Real Minimum Wages effect has been statistically insignificant. Real GDP per capita is no longer statistically significant in the third regression as well as Job Openings and Layoffs & Discharges remaining statistically insignificant. The only statistically significant variable in this regression was Hires which is positive and statistically significant at the one percent level.

The next set of regressions have the number of people unemployed as the dependent variable rather than the number of people employed. This regression uses the same independent variables as the previous set of regression meaning only the dependent variable has changed. The table displaying these results can be found below in Table 2. The column's also display the regressions in the same order meaning column 1 in Table 1 uses the same set of states as column 1 in Table 2.

	Dependent variable:		
	LN_Unemployed		
	(1)	(2)	(3)
LN_RealMinWage	0.163***	0.173	0.637*
	(0.063)	(0.106)	(0.364)
LN_RealGDPpercapita	-0.113***	-0.079	-0.121**
	(0.037)	(0.054)	(0.048)
LN_LayoffsAndDischarges	0.158***	0.244***	0.154
	(0.060)	(0.078)	(0.102)
LN_JobOpenings	-0.067	0.104	-0.396***
	(0.074)	(0.096)	(0.135)
LN_Hires	-0.104	-0.148	-0.101
	(0.121)	(0.156)	(0.188)
Observations	500	300	200
R2	0.821	0.824	0.847
Adjusted R2	0.795	0.795	0.818
F Statistic	143.088*** (df = 14; 436)	85.888*** (df = 14; 256)	71.140*** (df = 13; 167)
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 2

Starting with column 1 again, one can observe now that unemployment numbers are being used the effect of the real minimum wage is now positive. A 1% increase in the Real Minimum Wage would result in an increase of 0.163% of the number of people unemployed according to the coefficient which has been found. The Real Minimum Wage is also statistically significant at the one percent level which is the highest level of significance observed for it so far. Real GDP per capita is also significant at the one percent level and because now unemployment is being used as the dependent variable it has now changed to being negatively correlated. Another change now that unemployment is the dependent variable is that Layoffs & Discharges are now statistically significant at the one percent level in column 1. It is positively correlated with the number of people who are unemployed, a 1% increase in the number of layoffs & discharges would lead to a 0.158% increase in the number of people unemployed. Job Openings and Hires are both negatively correlated with the number of people unemployed but both coefficients are statistically insignificant in column 1. Moving on to column 2, which is the states with changing minimum wages, one can observe that the real minimum wage is still positively correlated with unemployment.

However, it is now statistically insignificant with its effect on unemployment. Real GDP per capita is also now statistically insignificant along with Job openings and Hires which have remained statistically insignificant. The only variable which has remained statistically significant is Layoffs & Discharges which is still significant at the one percent level. Now onto column 3, which is the states which haven't adjusted their minimum wage, one can observe that Real Minimum Wage is now statistically significant again, this time at the ten percent level, as well as its coefficient being large. According to this regression a 1% increase in the real minimum wage would result in a 0.637% increase in the number of people who are unemployed which is massive. With the dependent variable being the number of people unemployed, the coefficient for the real minimum wage has been statistically significant two out of three times. Real GDP per capita is now statistically significant at the five percent level and has remained negatively correlated with unemployment. In column 3 Job Openings has become statistically significant for the first time in this table as is statistically significant at the one percent level. It is also negatively correlated with unemployment having quite a large effect as for a 1% increase it results in a fall in unemployment by -0.396%, not as big as the magnitude of the Real Minimum Wage though. Layoffs & discharges is no longer statistically significant in column 3 along with Hires which has remained insignificant throughout Table 2.

The last set of regressions uses the number of restaurant employees as the dependent variable, these regressions contain an extra independent variable than the others as the Number of Restaurants in each state has been added. These regressions still include the other independent variables used previously. Table 3 below displays all the results for the regressions on Restaurant employees.

	Dependent variable:		
	LN_RestaurantsEmployees		
	(1)	(2)	(3)
LN_RealMinWage	-0.033*	-0.023	-0.104
	(0.018)	(0.028)	(0.111)
LN_RealGDPpercapita	0.015	0.020	0.003
	(0.010)	(0.014)	(0.014)
LN_NumberOfRestaurants	0.559***	0.570***	0.501***
	(0.054)	(0.071)	(0.079)
LN_Hires	0.043	0.044	0.105*
	(0.034)	(0.041)	(0.057)
LN_LayoffsAndDischarges	-0.012	-0.001	-0.018
	(0.017)	(0.020)	(0.030)
LN_JobOpenings	0.007	0.014	-0.029
	(0.021)	(0.025)	(0.039)
Observations	500	300	200
R2	0.790	0.834	0.770
Adjusted R2	0.759	0.806	0.724
F Statistic	109.235*** (df = 15; 435)	85.552*** (df = 15; 255)	39.652*** (df = 14; 166)
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 3

Column 1, all states, shows that the Real Minimum Wage is negatively correlated with the number of people employed by restaurants. A 1% increase in the Real Minimum Wage would result in a fall in the number of people employed by restaurants by -0.033%. Real minimum wage is statistically significant at the ten percent level in the first column. The number of restaurants is statistically significant at the one percent level and its coefficient is positive and large in its magnitude. A 1% increase in the number of restaurants would result in an increase in the number of restaurant employees by 0.559%. The rest of the variables are all statistically insignificant in column 1. In column 2, which contains the states which have changed their minimum wage only, the Real Minimum Wage is no longer statistically significant though it does remain negatively correlated with the number of Restaurant employees. The only statistically significant variable in this column is the Number of Restaurants which has remained statistically significant at the one percent level. Its magnitude has also remained at a similar high level when compared to the coefficient in column 1. Moving on to column 3, which contains the states which have not changed their minimum wage. The coefficient for the Real Minimum Wage is again negative as well as

being statistically insignificant. With the dependent variable being the number of people employed by restaurants, the coefficient for the real minimum wage has only been statistically significant in one out of three regressions. Once again the number of restaurants is statistically significant at the one percent level. Interestingly Hires is now statistically significant at the ten percent level after being statistically insignificant previously. It is positively correlated with the number of restaurant employees. All the other variables have remained statistically insignificant. However, this was to be expected as they are not restaurant specific data as they were calculated considering the whole economy rather than just the restaurant industry.

Discussion

Now that the results have been discussed this paper will take a closer look at what the researcher has found and interpret what it means for the effect which the minimum wage has on employment. In Table 1 one can observe that the effect that the Real Minimum Wage has on employment is consistently negative across all three regressions. This lines up with what the conventional economic theory about the minimum wage suggests, that a higher minimum wage would lead to a reduction in the level of employment. However, the tests find that the Real Minimum Wage is only statistically significant in one of the three regressions which happens to be the first which includes all fifty states. When the states are broken down into groups which have and have not changed their individual minimum wage it looses its statistical significance. One could infer from this information that rather than small individual changes in the minimum wage having an effect on employment levels, different levels of the minimum wage have greater effects. This is because in the first regression there is a big difference in the levels of the minimum between the states which have and have not changed their minimum wages but this difference in levels is removed when the states are split up into their different categories. If a state were to instead of making a small increase in its minimum

wage, which would not have a significant effect on employment, it changed its minimum wage quite considerably it would have a significant effect on employment levels. What the tests find in Table 2 supports what was found in Table 1. This is because with unemployment being the dependent variable, the effect of the Real Minimum Wage is now consistently positive rather than negative. This provides even more support for the conventional theory about the employment effects of the minimum wage as the theory suggests that higher levels of unemployment would be created as a result of an increase in the minimum wage. In Table 2, two out of three coefficients for the Real Minimum Wage are statistically significant. This means that an increase in the Real Minimum Wage has a greater effect on unemployment levels than it does on employment levels. This could suggest that an increase in the minimum wage not only increases unemployment through people losing their job but also through people who were not previously working at the old wage level now trying to find a job now that the minimum wage has met their reservation wage. A reservation wage is the lowest wage level a person would be willing to work a certain job at. Looking at Table 3, one can see that now that the dependent variable has switched back to being a measure of employment the effect which the Real Minimum Wage is now constantly negative again like previously in Table 1. All three tables support each other's findings as there is no disagreement between them about the effect which the minimum wage is having. Table 3 supports the theory about different levels of the minimum wage having a greater effect on employment rather than small changes as only the regression which includes all states is significant. The results in Table 1 and 2 lead this paper to come to a similar conclusion than that of Neumark meaning that this paper has found empirical evidence which supports the conventional theory about the employment effects of the minimum wage just as Neumark did in his paper (Neumark, 1992). However, the findings in Table 3 contradict the findings of Card and Krueger in their 1994 paper as they found that a higher minimum wage actually lead to higher levels of

employment whereas the results suggest that it is the opposite and in fact lead to a decrease in the level of employment (Card D, 1994).These findings also suggest that the minimum wage could be a very good way to improve living standards without having a massive effect on employment and unemployment. Only four out of nine regression suggest that a change in the minimum wage has a significant effect on employment and unemployment and that most of the regression which provide a significant effect suggest that the level of the minimum wage is more important. This means that policy makers could be able to slightly increase the minimum wage in order to increase the earnings of those on lower wages therefore improving living standards without having a significant effect on the level of employment. This shows that the minimum wage can be a very useful tool to policy makers in order to improve equity and living standards as its drawbacks are limited.

Real GDP per capita is also worthy of discussion of its effects on employment and unemployment. As predicted earlier, it did have a positive effect on employment as well as being a significant factor in a majority of regressions in Table 1 and 2. Due to the nature of GDP per capita it was expected to have a large effect as more demand for goods would result in more demand for workers to produce those goods. In Table 2 its effect was consistently negative which supports the results in Table 1. However, one may be surprised to see that it did not have a significant effect on restaurant employment. One may expect its effect to be less but would still think it would be significant. This could be explained by the demand for restaurant food being inelastic meaning that no matter the income of individuals their demand to eat at restaurants remains unchanged meaning there is always demand for restaurant employees. Moving on to the labour market variables, as expected the number of Hires was positively correlated with employment and was significant in all three regressions in Table 1. Hires was also negatively correlated with unemployment and was statistically insignificant throughout these regressions which was to be expected. The next variable is Job Openings,

this variables coefficients were statistically insignificant in Table 1 and 2 apart from the third regression in Table 2. Its coefficient is also not consistent in all of the regression as it flips between being positively and negatively correlated with both employment and unemployment. This can be interpreted as if there are a lot of job openings then employers are trying to hire a large amount of people meaning it could increase employment or there are a lot of job openings but no one is applying as the wages offered do not meet wage expectations of potential workers so it is negatively correlated with employment. Job openings only significant coefficient is negatively correlated with unemployment meaning that more job openings would lead to less unemployment. However, on the whole its coefficients are small and is statistically insignificant most of the time. The last labour market variable is Layoffs & Discharges, in Table 1 it was for the most part positively correlated with employment which is strange to see due to the nature of the variable as one would expect to see less people employed when more people lose their job. However, these coefficients are all statistically insignificant so not to much emphasis should be put on those results. In Table 2 one can observe what was expected as Layoffs & Discharges is positively correlated with the number of people unemployed. Two out of the three coefficients are statistically significant. This shows that Layoffs & Discharges has a more significant effect on the number of people unemployed rather than the number of people employed. In Table 3 all of the labour market variables are statistically insignificant, apart from Hires in the third column. This was expected to be the case as these are variables which encompass the whole economy rather than just data on the restaurant industry. Moving on to the last variable featured only in Table 3, the Number of Restaurants. One would expect this variable to be highly positively correlated and significant when it came to the amount of people employed by restaurants. This is exactly what is shown by looking at the coefficients, the number of restaurants is statistically significant in all three regressions and is high in its magnitude with

the coefficients ranging from 0.501 to 0.559. This shows that the number of restaurants is consistently highly correlated with the number of employees.

Conclusion

This project set out to find the employment effects which the minimum wage has on the labour market. As well as an investigation as to whether the conventional theory of the minimum wages effects on the labour market holds up in the real world. The findings show that an increase in the minimum wage is correlated with a fall in the level of employment and an increase in the level of unemployment. The effect which the minimum wage has is only significant when comparing different levels of the minimum wage, meaning that its effect on employment and unemployment levels is not significant when there are only small changes in the minimum wage. This does still show support for the conventional theory about minimum wage as the effects of the minimum wage which were found still align with the prediction of the conventional theory. As stated earlier in the discussion of the results, they do fall in line with other papers on the topic of the minimum wage, such as Neumark's paper in which they used a similar but older data set than this paper used (Neumark, 1992). However, the results also disagree with findings of other papers when it came down to industry specific data, these results contradicted what Card and Krueger found in their work on the fast food industry in New Jersey (Card D, 1994). These findings are important as they provide a useful insight into the effects of the minimum wage, especially for policy makers as its allows them to observe the real effects of a tool which is at their disposal. These results could help policy makers to make better informed decisions when it comes to the use of the minimum wage. Further research into to more industries which a expected to be more heavily influenced by minimum wage changes, like the restaurant industry, would give an even bigger picture of the effect of the minimum wage and its true effects on employment levels. As well as this, the minimum

wage is not an exclusive policy to the United States so more research on different countries and how their minimum wage effects their labour markets would also further our understanding of the effects that the minimum wage can have, like the work done in Germany by Holtemöller and Pohle (Oliver Holtemöller, 2020). Ultimately, having a true understanding of the effect which the minimum wage has on employment and unemployment is essential when making changes to the minimum wage so that policies make the change that they were intending to make.

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