ANALYSIS OF THE DISTRIBUTION OF SUBMINIMUM WAGE RATES

An Undergraduate Research Scholars Thesis

by

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ABSTRACT

Analysis of the Distribution of Subminimum Wage Rates

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Over the last decade, there has been an increase in the discussion of minimum wage policy in the field of economics. This has also been reflected in increased wage rates in a variety of states as an attempt to increase standard of living and purchasing power of low-skilled workers. Thus, the minimum wage rate debate can have drastic implications on a multitude of economic variables. My research question asks whether subminimum wage rates are evenly distributed or "bunched", which will determine the market power that firms have over low-skilled labor. My research will analyze an implication of the minimum wage debate, the market power of firms over low-skilled workers, based on the distribution of subminimum wage rates.

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CHAPTER I

INTRODUCTION

Over the last two decades, minimum wage policy has become an increasingly partisan issue on all levels of government. Consequently, various negative economic consequences are magnified as both elected officials and voters choose to vote in this issue amongst party lines rather than using quantitative analysis to support positive economic policies. Referencing basic economic theory, a monopsonistic economic system is susceptible to employment loss and "bunching" of subminimum wages when there is an increase in the general minimum wage. Furthermore, the individual firm's attitude to profit margins is a natural deterrent for increases in minimum wages, as when wages drop below marginal productivity, firm owners can increase the margins by firing workers while maintaining the same level of efficiency. This results in a downturn of employment as the expense for a higher minimum wage.

The conclusion as to whether minimum wage policy has an impact over employment has become a highly contested topic in the field of economics. One of the theory-based arguments as to why it would not is firm market power over workers. If there is a lack of firm power over workers, this would imply that workers are able to change jobs freely and would be paid at the equilibrium, with this quantity having the potential to rise. However, if firms can exercise this "monopsony power", then they are able to consequently pay workers below the competitive equilibrium wage. Furthermore, this power can also have effects on employment, as subminimum wage rates would be more frequently used to pay low-skilled workers.

In my study, I analyze one crucial variable, market power exercised on low-skill, minimum wage workers with usage and concentration of subminimum wages. By using a dataset

with components from the Current Population Survey, ASEC, the Department of Labor, and the Department of Statistics, I analyze the "bunching" of subminimum wage rates. I employ an adjusted linear regression with indicator variables for wage differentials and specific subminimum wages, controlling for state and year values. Furthermore, I utilize kernel distribution graphs to provide a complement to this econometric model by analyzing the distribution of subminimum wages to hourly wages of workers in the CPS. The results of my study find that there is bunching of subminimum wage rates for tipped workers, which is strong evidence that firms have strong market power over them and are able to pay these workers below their market equilibrium.

Literature Review

Referencing contemporary economic literature, the implementation of minimum wage policy throughout the United States has had mixed results and consequences. In certain studies, the increase in specific minimum wages have had positive employment effects in labor markets that are more concentrated i.e. where wages are larger than marginal productivity level. However, evidence of negative employment effects are also present in less concentrated markets (Avar et. al 2019). Additionally, other studies in particular areas of the United States show evidence that minimum wage increases had negligible effects on employment in labor markets. Such studies would imply that an increase in minimum wage would lead to higher economic prosperity with few negative consequences (Cengiz et al 2019).

Beyond consequences in markets with different concentrations, the literature supports that an increase in minimum wage has adverse employment effects on young workers, particularly those in high school (Clemens 2015). There are also a variety of issues with regards to accurately measuring the effects of minimum wage policy. Simple empirical models may not

be adequately used to measure changes in the labor market and are inefficient in their value measure outstanding omitted variables that may impact results, such as the gradual effect of minimum wage policy (Meer and West 2015). Additionally, minimum wage policy can also have unobserved spillover effects on fringe benefits and hiring practices (Clemens, Kahn, and Meer 2018) (Clemens, Kahn, and Meer 2019). In such cases, healthcare benefits and turnover rates can affect results in changes of employment. Furthermore, increased search activity can also limit hiring rates and have complex effects in employment with changes in minimum policy (Adams, Meer, and Sloan 2018).

The fundamentals of my research build on the acquired economic literature, primarily the past work of market concentration analysis and the study of different low-skilled labor groups. Furthermore, my research will analyze an implication of the minimum wage debate, the market power of firms over low-skilled workers, based on the distribution and use of subminimum wage rates. This will provide a foundation for future studies regarding wage concentration and the increase in the utilization of subminimum wages.

CHAPTER II

DATA AND METHODOLOGY

The dataset used to derive the results of the study are a result of a combination of multiple components from both government and private databases. The foundation of the data is from the Current Population Survey, which annually tracks information of an estimated 75,000 workers over decades of time. The survey contains detailed social and economic questions, including occupation and wage, and are organized with unique identifications of households. Furthermore, other important information for individual workers, such as disability status and firm size were recorded from the Annual Social and Economic Supplement (ASEC), an add-on of the CPS that is released annually by the United States Bureau of Statistics. State, national, and tipped subminimum wages were recorded using information from the Department of Labor, which is updated continuously and contains a historical database of past wages (Figure 1). Subminimum wage rate information, excluding tipped wage, was gathered through state Department of Labor websites and cross checked with unofficial websites to assure accuracy.

A variety of important definitions are necessary to pinpoint the parameters of the study. Subminimum wages are wages allowed to be lower than federal and state mandated wage levels for specific worker populations. This includes tipped, young, disabled, probationary, and small business wages. Tipped worker subminimum wages are defined as those paid to workers who earn tips according to their service, such as waiters/waitresses, hotel workers, bartenders, etc. Young worker subminimum wages are defined as those paid to workers under the age of 18 and is particularly used for high school students. Disabled worker wages are defined as those paid to people with certain disabilities, and require a formal proposal and documentation to be submitted

to the Department of Labor of the states that allow it to be used before it is assigned to workers of these characteristics. Probationary subminimum wages are assigned to people before reaching 90 days of employment, as a sort of "testing period" wage to allow firms to evaluate the quality of the worker and adjust to the increased expense of hiring another worker. The small business wage is defined as a wage able to be paid to workers of businesses below a specific threshold of employees. As an example, California defined this threshold as 25 workers or less.

The focus of the study ranges from the first financial quarter of 2005 to the fourth financial quarter of 2018, which also coincides with the increase usage of subminimum wages. Within this time period, there was some variation of state policies. Many states adjusted their wages, such as California and Minnesota introducing a small business subminimum wage. Before 2005, the use of subminimum wages besides the tipped minimum wage was rare, as small business subminimum wages were nonexistent and more states followed federal guidelines rather than producing state minimum wage policies.

From this time frame, there are over two million observations of workers from the CPS, with the information of their state minimum wage, disability status, profession, and earned wage. To estimate the effects of subminimum wages on low-skilled worker population, the sample size of the dataset was cut to workers earning a real wage less than 15 dollars an hour. To do this calculation, CPI values were used to control for inflation across years. They were gathered from the U.S. Bureau of National Statistics and set according to the most recent CPI value available for 2019. The number of observations fell to 660,229, which nonetheless covers all 50 states and invariably those with subminimum wages (Table 1).

There are some limitations to the accessibility of the data. The Department of Labor websites of a vast majority of the states did not have complete information on their use of

subminimum wages; there was a need to obtain the data from unofficial websites and cross check them with others to ensure accuracy. Furthermore, there is a wide margin of variety in the policy changes of states towards their subminimum policy. Regarding tipped and probationary worker subminimum wages, eight and twelve states have changed their policies, making the effect of each subminimum wage easier to calculate. For the other three subminimum wages, however, there was only one state variation for the young worker subminimum wage, one for the disability subminimum wage, and two for the small business subminimum wage. Furthermore, there are a variety of states that do not utilize these subminimum wages, and those characteristics are shown below (Table 2). This problem stems from the fact that many states have had conservative wage laws for decades and adhere to federal policy, as well as the novelty of these specific subminimum wages, specifically the small business minimum wage. Regardless, the bunching of these wages can still be studied with the specific minimum wage of their respective states.

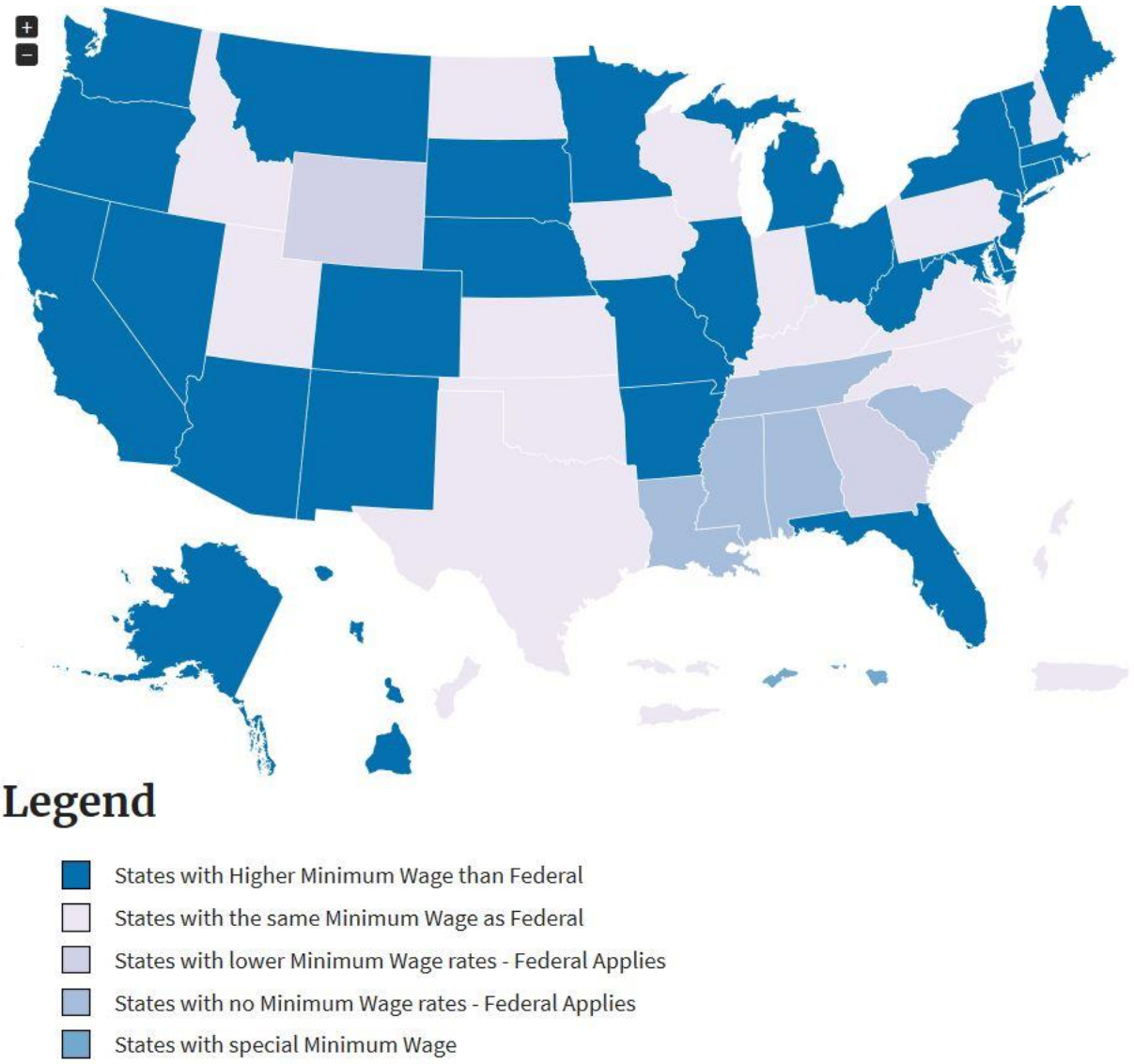

Figure 1. Minimum wage information obtained from the Department of Labor.

Table 1. Summary Statistics of Wage Information

VARIABLES	(1) N	(2) Mean	(3) Standard Deviation	(5) Min	(6) Max
Real Wage	660,229	10.96	10.96	0.0233	15.00
State Minimum Wage	660,229	7.256	7.256	5.150	11.50
Tipped Worker Subminimum Wage	654,862	4.041	4.041	1.590	11.50
Small Business Subminimum Wage	641,197	7.080	7.080	2	11.50
Youth Worker Subminimum Wage	595,717	7.001	7.001	4.250	11.50
Probationary Worker Subminimum Wage	578,110	5.874	5.874	4.250	11.10
Disabled Worker Subminimum Wage	134,868	5.972	5.972	1.167	10.50

Note: The Disability Worker Subminimum Wage has considerably less observations because it is the most rarely used wage in the sample. This is why it is not included in the regression in Chapter 3.

Table 2. Overview of State Subminimum Wage Policy (2005-2018)

Subminimum Wage	States That Utilize It	States That Do Not	States that Changed Policy
Tipped Subminimum Wage	17	33	8
Small Business Subminimum Wage	45	5	2
Youth Worker Subminimum Wage	10	40	1
Probationary Worker Subminimum Wage	26	24	12
Disabled Worker Subminimum Wage	4	46	1

In order to analyze bunching of subminimum wage rates, a modified linear regression model is created to control for a variety of variables (Equation 1).

$$y_i = \beta_0 + \gamma tipped + \theta youth + \varphi disabled + \delta small + \vartheta probationary + \beta_2 + \beta_3$$

Equation 1. Modified Linear Regression

The dependent variable is binary: it holds a value of one if workers from the dataset are paid below their standard minimum wage in the form of a subminimum wage rate and is zero otherwise. This is because the study is only focused on estimating market power over low skilled workers, as they are the ones impacted the most by minimum wage policy. The five different

coefficients following the constant are simply indicator variables of each of the studied subminimum wage rates: tipped subminimum wage, youth subminimum wage, disabled subminimum wage, and probationary subminimum wage rate. The value of these variable is 1 if the state of each respective worker has that subminimum wage policy, and zero otherwise. The other betas are used as macroeconomic control variables to estimate the distribution of wages without concern of difference in time periods or location. They control for year and state, respectively.

If the value of the indicator variables is both positive and statistically significant, that would imply that employers are utilizing these subminimum wage rates and thus are exerting greater market power over their low-skilled laborers. If they are not, then that would rather imply that employers are not fully utilizing the subminimum wages and that their market power over their workers is limited. The control variables that I have chosen are crucial to the Linear Regression model. The state control variable is important because it allows the bunching of subminimum wages to be analyzed nationally without worrying about different state policies, i.e some states like California have a variety of subminimum wages, while others like Texas do not.

If this control was not included, the statistical significance of the indicator variables would be grossly overstated. Furthermore, the results could not be generalized, as the effects of one or two states should not be able to apply to the rest of the country. The year control variable is important because it controls the results of the equation with regards to inflation, recession periods, and changes in minimum wage policy. Without this control, wages would fluctuate significantly due to other unrelated causes and the bias of certain subminimum wages could be potentially misrepresented.

CHAPTER III

RESULTS

The results of the linear regression had statistically significant values for four of the five indicatory variables for subminimum wages: tipped, youth, disabled, and probationary workers (Figure 2). The youth worker subminimum wage had the highest statistical significance, at the 5% level of significance, and produced a coefficient of .0941. This means that, in the presence of a youth subminimum wage, low-skilled workers are 9% more likely to be paid at a level below their respective state minimum wage. Furthermore, the tipped and disabled subminimum wages produced statistically significant results at the 10% level of significance, producing coefficients of .018 and .00945. Consequently, these results suggest that the presence of both subminimum wages, workers are 1.8% and .945% more likely to be paid below their specific state minimum wage. Additionally, the results of the probationary subminimum wage are significant at the 10% level and imply that the presence of this subminimum wage leads to workers being paid 1.13% more than their state minimum wage. The small business subminimum wage produced no statistically significant results. The following figure includes year and state effects but are omitted from being reported to make the table smaller.

VARIABLES	(1) Below Minimum Wage
Tipped Worker Subminimum Wage Control	0.0180*
	(0.00915)
Youth Worker Subminimum Wage Control	0.0941**
	(0.0467)
Disabled Worker Subminimum Wage Control	0.00945*
	(0.00496)
Small Business Subminimum Wage Control	-0.00342
	(0.0150)
Probationary Worker Subminimum Wage Control	-0.0113*
Constant	0.0400***
	(0.0109)
Observations	660,229
R-squared	0.025

*** p<0.01, ** p<0.05, * p<0.1

Figure 2. Linear Regression Analysis results

Despite the statistically significant results, this model has limitations previously explained in the data section of the paper. The data available for this study is quite limited, so certain adjustments must be made in order to properly estimate the distribution of subminimum wages and obtain generalizable results. Identification variables that failed to measure a large variation of state policy were removed from the regression to focus on those that did. This means that young worker, small business, and disabled wage identification variables were dropped due to lack of necessary observations to estimate significant results. The adjusted regression model contains only tipped and probationary subminimum wages, which meet the criteria mentioned earlier (Figure 3).

VARIABLES	(1) Below Minimum Wage
Tipped Subminimum Wage Control	0.0223**
	(0.00939)
Probationary Worker Subminimum Wage Control	-0.00738
	(0.00488)
Constant	0.0532***
	(0.00485)
Observations	660,229
R-squared	0.024

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 3. Adjusted Linear Regression Analysis Results

The adjusted regression model results show a statistically significant coefficient for the tipped subminimum wage. This result means that, in the presence of a tipped subminimum wage, low-skilled workers are 2.23% more likely to be paid less than the state minimum wage. This effect can have drastic implications on low-skilled worker populations and are evidence of monopsony power of firms over workers. With such power over tipped workers, firms are able to utilize this lower wage to pay workers below the equilibrium wage. A change of minimum wage policy may have drastic implications on this worker population due to the use of this subminimum wage and the power the firm has over this population.

The probationary subminimum wage coefficient was not statistically significant. However, there are a variety of reasons that such effect may occur. As previously mentioned, the probationary subminimum wage may only be used by firms within the first 90 days of employment of their worker. Of the other subminimum wages, this one contains the smallest time horizon of the same period. This shorter time horizon is not a permanent wage and may

affect the results of the regression, while the other wages are permanent and can only be changed with policy changes at the state or federal level. Additionally, measuring market power over this subset is rather difficult due to the nature of the subminimum wage and the workers, as these first 90 days have differing turnover rates than established workers and those of other professions.

The results of the regression can be supported through the use of kernel density graphs, which measure the distribution and concentration of subminimum wages around specific values. In order to calculate and quantify this concentration, the hourly wage of each individual observation was subtracted from the subminimum wages of their state. The sample size was limited to +/- 10 dollars from zero, recentered to the minimum wage/subminimum wage of each observation's state in order to observe the concentration more accurately. Furthermore, this cuts out workers earning much larger wages than the definiton of "low-skilled" laborers and avoids measuring concentrations irrelevant to the study (Figures 4-8). Evidently, there is strong concentration of subminimum wage values around state values for the tipped minimum wage workers. The probationary kernel density graphs contains more sporadic relationships.

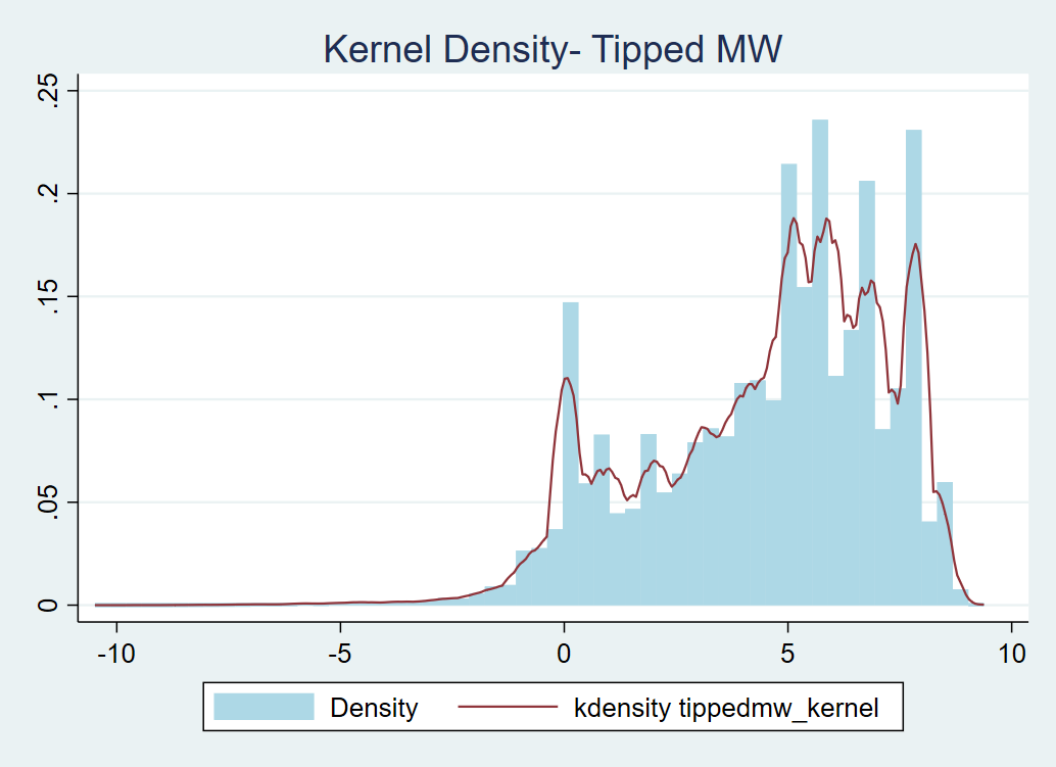

Figure 4. Kernel Density graph of Tipped Subminimum Wage

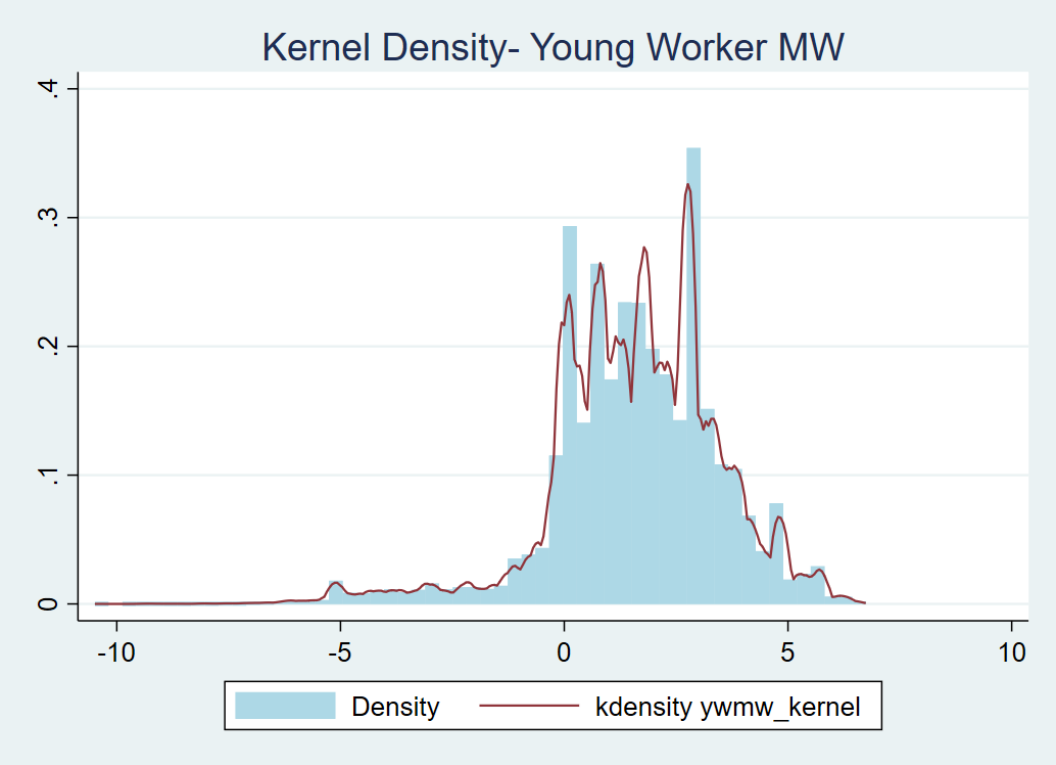

Figure 5. Kernel Density graph of Young Worker Subminimum Wage

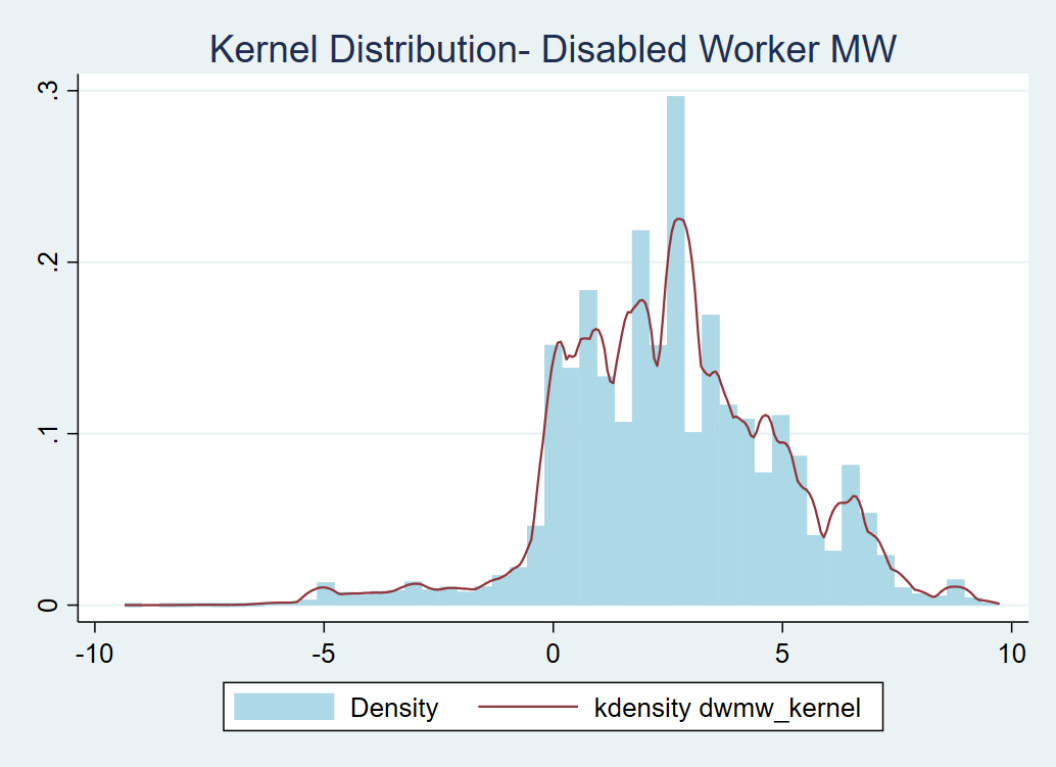

Figure 6. Kernel Density graph of Disabled Worker Minimum Wage

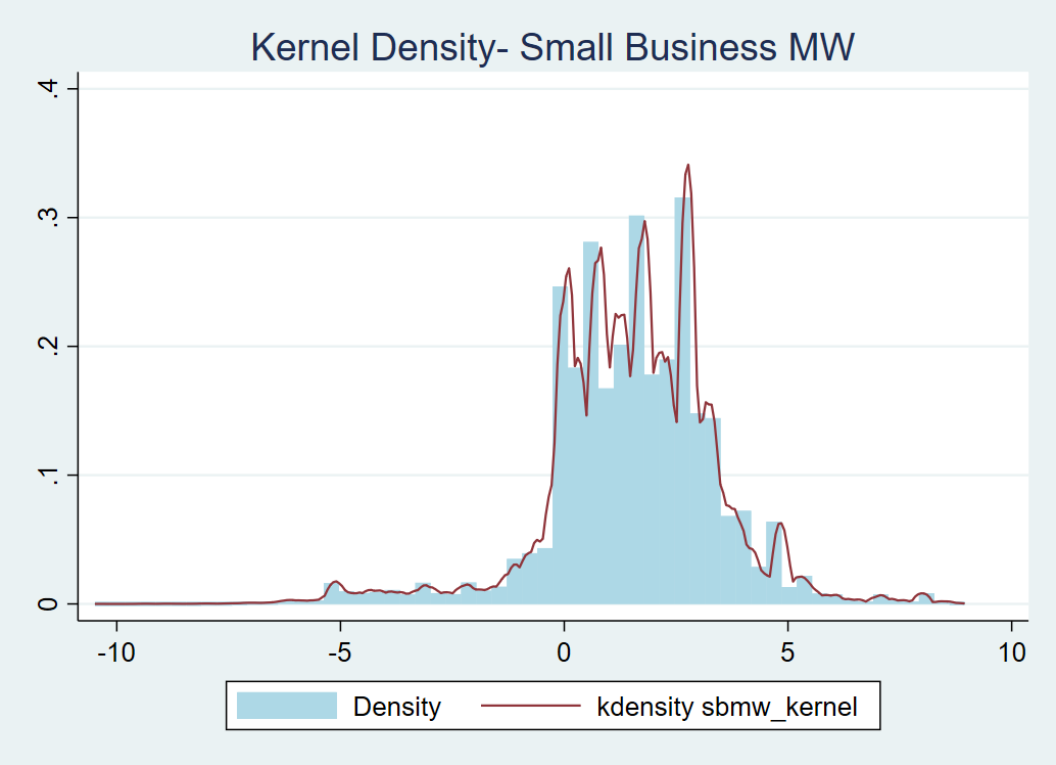

Figure 7. Kernel Density graph of Small Business Minimum Wage

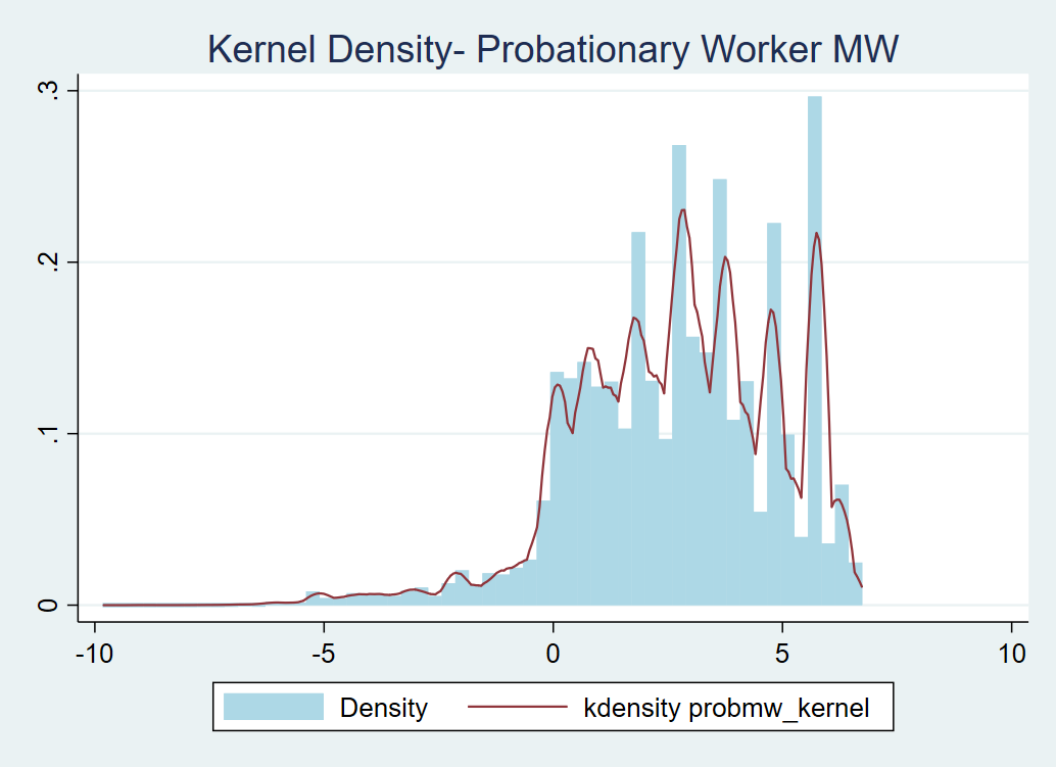

Figure 8. Kernel Density of Probationary Worker Subminimum Wage

CHAPTER IV

CONCLUSION

The purpose of this study was to determine whether there was evidence of market power exerted on workers by firms through the analysis of the distribution of subminimum wages. With the use of a dataset created from multiple economic government sources and the use of two regression models, evidence was found of bunching of the tipped subminimum wage. This result would consequently suggest the presence of monopsony power, which could lead to potential changes in employment in the instance of minimum wage policy change.

As previously mentioned, the limitation of the study arises from lack of data pertaining the use of some of the subminimum wages. The disabled worker subminimum wage policy of various states is to subtract a percentage of the wage of said worker, which is only done after extensive documentation and proposals, hence its lack of data availability. Similarly, the small business subminimum wage is relatively new and thus lacks evidence of long-term effects. As subminimum wages become more prevalent in the labor market and years pass, these effects will be able to be observed at greater length.

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