The Effect of the Seattle Minimum Wage Hike on Employment in King County

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The Effect of the Seattle Minimum Wage Hike on Employment in King County

Jared Pollock
April 7, 2017
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by

Jared Pollock

Submitted to The Department of Economics

Project Advisor: Professor Bilo

Second Reader: Professor Golden

April 7, 2017

I hereby recognize and pledge to fulfill my responsibilities as defined in the Honor Code and to maintain the integrity of both myself and the College as a whole.

Jared Pollock
To my family
Table of Contents:

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Chapter I: Review of Literature</td>
<td>2</td>
</tr>
<tr>
<td>Chapter II: Theoretical Framework</td>
<td>7</td>
</tr>
<tr>
<td>Chapter III: Empirical Results</td>
<td>18</td>
</tr>
<tr>
<td>Concluding Remarks</td>
<td>42</td>
</tr>
</tbody>
</table>
List of Tables:

Table 2.1: Wage Breakdowns of Workers in Seattle’s Low Wage Industries 15
Table 2.2: Percentage of Low Wage Workers by Age Group 16
Table 2.3: Estimated Number of Low Wage Workers by Age Group 16
Table 3.1: Cross-Contiguous Counties Model Predictions of Low Wage Sectors 19
Table 3.2: Shapiro-Wilk Test 37
Table 3.3: Regression Results and ANOVA Table 38
Table 3.4: Breusch-Pagan Results 39
Table 3.5: Test for Multicollinearity 39
Table 3.6: Link Test Results 40
Table 3.7: RESET Test Results 40
List of Figures:

Figure 2.1: Competitive Model of Labor Market for Industry and Individual Firm 7
Figure 2.2: Simple Static Monopsony Model 9
Figure 2.3: Map of King County and Surrounding Areas 17
Figure 3.1: Food Service Jobs in King County and its Neighbors 21
Figure 3.11: Percent Change in Number of Food Service Jobs in King County 23
Figure 3.12: Percent Change in Food Service Jobs during Volatile Months 24
Figure 3.2: Accommodations Jobs in King County and its Neighbors 25
Figure 3.21: Percent Change in Number of Accommodation Jobs in King County 27
Figure 3.22: Percent Change in Accommodation Jobs during Volatile Months 28
Figure 3.3: Retail Jobs in King County and its Neighbors 29
Figure 3.31: Percent Change in Number of Retail Jobs in King County 31
Figure 3.32: Percent Change in Retail Jobs during Volatile Months 32
Figure 3.4: Low Wage Earners as Percentage of King County Labor Force 33
Figure 3.5: Number of Jobs in King County for Workers 14-24 35
Figure 3.6: Kernel Density Estimate 37
Abstract

In 2014 Seattle became one of the first major cities to raise the minimum wage to $15 an hour; it will be incrementally raised to this number by January 2017 for some businesses and as late as 2021 for others. Classical economic theory suggests that raising the wage above the equilibrium rate will distort the market and create unemployment. However, this is not always the case, as noted by economists David Card and Alan Krueger, who studied the effects of raising the minimum wage on employment in New Jersey, while using Pennsylvania as a control. Ultimately, they concluded that the minimum wage hike had no discernable effect on unemployment. This paper will examine if this will be the case in Seattle by comparing employment data in low wage sectors in King County, the county Seattle is in, and its neighboring counties. The results from this comparison will be used to support past regressions that reached similar conclusions as Card and Krueger. Finally, through the use of a regression that analyzes data in King County, it will be argued that the county may not face a rise in unemployment, as classical theory suggests, but instead the minimum wage hike may have little to no adverse effects, or even a possible positive effect.
Introduction

The passage of Seattle’s recent minimum wage hike has rekindled a dialogue that has spanned decades between economists of whether or not an increase in the minimum wage hike will result in an increase in the unemployment rate. Traditional economic theory, as well as many prominent modern economists such as Neumark and Wascher (2008) write that this is indeed the case and any minimum wage increase will be met with unemployment and severe layoffs. However, other modern economists such as Card & Krueger (1994) or Alan Manning (2013) assert the exact opposite, that there are no adverse effects on employment and may even be a positive effect. These opposing views have been clashing for years without reaching a common consensus, and have relied on studying cities that have passed new minimum wage laws in order to reinforce their claims.

Because Seattle’s law was enacted several years ago, enough time has passed to form conclusions about its effectiveness. This paper will argue that the Seattle minimum wage hike has had no negative effects on employment in King County, the county to which Seattle belongs. The theory behind this will include a dynamic monopsony model of labor, which will highlight why firms may not lose as much money as it may seem, as they face higher retention and lower turnover. Therefore, firms can save money even with the increased cost of labor. Furthermore, efficiency wage theory will propose that the increase in wage will make workers more productive, and therefore make it profitable for firms to pay an increased wage.

Data will also be presented that will compare employment in low wage sectors in King County and other counties in Washington. The food service, accommodations, and retail industries will be of particular interest, as they represent especially large shares of low wage workers. This data, and resulting regression, will also be compared to the results of the cross-
contiguous counties model, which refined the Card and Krueger study by accounting for any possible biases it suffered from. The cross-contiguous counties model also detected positive effects of raising the minimum wage, confirming the Card and Krueger study. This regression also included every minimum wage hike nationwide between 1990 and 2006 and used panel data from 1,381 counties, a total of 91,080 observations were recorded. Therefore, it can be determined with certainty whether or not the Seattle minimum wage hike’s effect on employment at the county level is in line with the trend from this comprehensive model, and any discrepancies will be explained. This paper, though, hypothesizes no negative consequences on employment attributable to the increased minimum wage hike, and also expects longer employee tenure and less turnover costs.

Chapter I: Review of Literature

The conclusion that a minimum wage hike does not have an adverse effect on employment was famously reached in a 1994 case study between New Jersey, who had recently increased their minimum wage, and Pennsylvania who had not. Not only was no adverse effect found, but a slight positive effect on employment was observed (Card & Krueger, 1994). This conclusion is in direct opposition of what had become a widely accepted theory among economists in past decades—that there is no evidence of a minimum wage hike coinciding with job growth, but there is strong evidence that it reduces aggregate employment (Stigler, 1946). Though the Card and Krueger study was not without its flaws, it sent shockwaves through the economic community, who now began to develop or refine theories that could have explained the phenomenon.

One such theory was the dynamic monopsony model. Although it does not mean a monopsony in the literal sense, where there is only one buyer of labor, it does have the valuable
and realistic feature of firms setting the wage, as opposed to firms being price takers. This model explains the possible positive effect raising the minimum wage can have on employment by stating that it removes the frictions created by low-wage firms habitually operating with vacancies (Schmitt, 2013). These frictions are removed because employers will have more ability to recruit, as the increased wage will be more attractive to potential employees. These new employees would also stay at the firm longer because they will be less inclined to leave after learning of a higher paying job at another similar firm (Manning, 2013). Evidence of alternative wage models gained enough popularity during the 1990’s that it prompted researchers at the Atlanta branch of the Fed to explore the dynamic monopsony, among other potential alternative labor models, to explain possibilities of why the minimum wage hikes were not detrimental to employment (Zavodny, 1998).

Among these theories was the efficiency wage model, which again sought to explain the alleged positive effects associated with a minimum wage hike. This model has similar implications as the dynamic monopsony, though its rationale differs. Adherents of this theory state that the increased wage will increase workers productivity, as it discourages workers from “shirking” from their duties—something that can conceivably be done while unemployment insurance exists (Shapiro & Stiglitz, 1984). The increase in productivity is the result of employees working harder, first, out of fear from being laid off due to the wage hike, and then is sustained because of their increased opportunity cost of not working (Schmitt, 2013).

These theories, as well, are not always entirely accurate. For example, they have to grapple with the effect of the wage hike on teenagers, who because of their lack of experience, may be less likely to get hired as the wage increases. A famous study concluded that the elasticity for teenagers working minimum wage jobs ranged from -0.1 to -0.3. Due to its ability to
describe the employment patterns teenagers, who are often viewed as the cliché minimum wage earner, some still subscribe to the neoclassical model as being the best model to predict labor market outcomes (Neumark & Wascher, 2008).

While it is true that the classical model does have the advantage of simplicity, as the literature regarding the minimum wage grows more voluminous, the more the model is undermined. This claim is especially seen in studies focusing on other major cities, such as San Francisco, who in 2003 voted to increase its minimum wage from $6.75 to $8.50 by 2004 and $9.14 by 2007. A study of wage increase confirmed the study done by Card and Krueger while addressing some of its issues, such as it not including hours worked and possibly suffering from measurement error. Ultimately, a compression of wage distribution, an increase in employee tenure, and support for the dynamic monopsony model were all found. Some evidence, though, partially supported aspects of the traditional competitive model (Dube, Naidu, & Reich, 2007).

Another city that has received attention from economists because of its minimum wage hike is Santa Fe, New Mexico. In 2006 the city passed an ordinance requiring businesses with 25 or more employees to pay a wage of $8.50 per hour, up from the state’s minimum wage of $5.15. While the traditional model would dictate that firms would lay off employees so that they have 24 or fewer workers and have to pay less in wages, research concluded that firms actually hired an average of 2.7 more employees than Albuquerque firms. Indeed, employment trends in all sectors except construction displayed similar growth trends in the two cities. The difference in the construction sector, though, could be attributed to trends in Santa Fe instead of adverse effects from the minimum wage ordinance. Interestingly, as has been the case with other studies, the food industry, the industry that is most commonly used as the gauge for the effects of raised wages, posted positive growth relative to Albuquerque (Potter, 2006).
Studies were also done to address the increase in the federal minimum wage increase of 1996, which raised the minimum wage nationwide from $4.25 per hour to $4.75. Again, there were no widespread layoffs as a result. Indeed, after seasonally adjusting data, it was discovered that there was a statistically insignificant increase in employment. This claim held true even after narrowing the focus of the study to those who are typically viewed as most vulnerable during minimum wage hikes, teenagers and young adults between the ages of 16 and 24 (Bernstein & Schmitt, 1997).

Not only was the unemployment rate of low wage workers unaffected, but just as the dynamic monopsony and efficiency wage theories suggest, firms have found it easier to recruit and retain workers. Though uneducated workers tended to face more of the brunt of potential consequences, overall the increase in the minimum wage is associated with a decrease in the length of an unemployment spell (Pedace & Rohn, 2010). This increase in tenure and decrease in time spent unemployed is consistent with the case study of San Francisco, in which the typical worker experienced a 5 month longer tenure with significance at the 10% level. The same effect occurred with fast food workers, whose tenures increased by 6 months (Dube, Naidu, & Reich, 2007).

More recently, President Obama’s 2013 State of the Union address suggested raising the federal minimum wage from $7.25 to $9.00. While a detailed experiment over a hypothetical minimum wage hike’s effect on employment could not be conducted, it was determined that such a hike would provide a stimulus of up to .3% in the short run GDP and would have little to no effect in the long run (Aaronson & French, 2013). While this conclusion is reached under the assumption that there are no effects on employment, it illustrates that it could be beneficial for businesses to increase the minimum wage—as it could spur increased growth.
In addition to the evidence suggesting that a minimum wage hike may not have a negative effect on employment but is also successful at its goal of helping to alleviate poverty and create a more just economic system, in terms of how income is distributed (Prasch, 1996). Of course, economists, contrary to the claims of some congressmen, are not arguing that the minimum wage should be raised to some arbitrarily high number, but instead should be related to the living wage. Studies of the living wage, after discussion and refinement, have found no negative effects on employment (Waltman, 2007).

Of course, if raising the minimum wage does not harm employment, and can even be beneficial, the question is raised of why firms have not already raised their wages. One possible explanation for this is the firm’s fear that they must raise prices in response to the increased cost of labor. Firms will be hesitant to be the first to raise prices, as it could be giving an advantage to rival firms. Indeed, a survey that asked the importance of not being the first to raise prices, over 60% of responders reported it was either moderately important or very important. The largest share of these responses was made up by trade and food services (Blinder, 1994). Therefore, to address this coordination failure, a government mandated wage increase appears a viable option. However, an earlier study in response to the 1990 and 1991 federal minimum wage increase determined that a wage increase had little relationship with changes in output price, the same study also found that employment increased at firms that were the most heavily impacted by the wage hike (Katz & Krueger, 1992).

As the Seattle minimum wage law has been in place for over two years, enough time has passed to finally analyze its effects on employment and if its implementation has displaced any workers, or if it fits the trend of there being a slight positive effect or simply no discernable effect. The percentage that Seattle has raised the minimum wage by, nearly 60%, makes it one
of the larger hikes that have been studied, thus a reason for skepticism that the pattern of conclusions of past research will hold. Reasons to be skeptical are not unreasonable—the cost of living in Seattle is lower than in San Francisco, whose minimum wage is now $13.00, so there is reason to fear this hike was excessive. If so, it should be seen clearly, as the increase will affect roughly 16% of workers in Seattle, which translates to 6% of King County’s population. It is worth noting, though, that 40% of minimum wage workers in Seattle live outside of the city (Klawitter, Long, & Plotnick, 2014). It is also worth noting that the percentage of workers affected may be understated, as they exclude workers who fall in the $15.01-18 an hour bracket, who very well may experience a bump in their wages as well.

Chapter II: Theoretical Framework

Before presenting the framework that will be used to examine the Seattle minimum wage hike, the competitive model that this paper will question will be explained. In this model, a binding minimum wage will result in a surplus of labor, so that firms must lay off workers in order to maximize profits. Figure 2.1 will explain this visually:

**Figure 2.1: Competitive Model of Labor Market for Industry and Individual Firm**

As Figure 2.1 shows, in the competitive model for labor, the results are unambiguous; an increase in wages will be met with unemployment. The degree of the unemployment will
depend on the elasticity of the firm’s demand for labor, if it is inelastic then the response will be minimal, and vice versa. This model, though, portrays a clear adverse effect on aggregate employment. Under the assumptions of this model, though, all workers have the same skill level, and the output price remains constant because no one firm can dictate output price. It is also assumed that firms can hire unlimited workers at equilibrium wage, and would never have to offer a higher wage to attract workers. Last, for the individual firm, it assumes that the intersection of the marginal cost and price, or marginal revenue, curves will produce the wage that workers are paid. This is seen on the right hand side of Figure 2.1 as the marginal cost, which is equal to the wage “$w$” divided by the marginal product, which is the derivative of the labor function. As the wage increases, MC shifts left to MC’ and results in less output. Because less output is produced, less labor is needed, so firms will lay off employees. In the end, unemployment and less output throughout the industry should be expected. This is because less labor will be needed to make the new level of output, and the industry graph is the summation of all firms in the industry. It is also this decrease in output that results in the price changes represented on the graph (Zarvodny, 1998). The profit maximization function under the competitive model can be seen below, where “$w$” represents the wage, $Y(l)$ is the firms revenue function if it is assumed labor is the only input, and $l$ is quantity of labor:

(1) \[ \max \pi = pf(l) - wl \]

After taking the derivative, setting it to zero, and some algebraic manipulation, we get the optimal wage:

(2) \[ w = p * f'(l) \]

In Equation 2, the wage is equal to product of the price and marginal product, which is known as the value of the marginal product. This term will appear again when defining the
dynamic monopsony model. Under this model, the value of the marginal product is equal to the marginal cost, which is the wage.

Next, before presenting the more complicated dynamic monopsony, a simple static monopsony will be pictured in Figure 2.2:

**Figure 2.2: Simple Static Monopsony Model**

![Graph of Wage, Marginal Cost of Labor, MRP, Rate of Exploitation, Marginal Revenue Product of Labor, and Employment]

Under this model, the supply of labor is still upward sloping, but employees face the wage “w”, which is less than the value where the firm’s marginal cost and marginal revenue intersect. The difference between the MRP and “w” is known as the rate of exploitation. This may sound like a radical term, but it merely suggests employees are paid less than the value they create. Although this discrepancy would also be considered exploitation under perfect competition, under the dynamic monopsony, firms set wages instead of acting as price takers. Therefore, the exploitation could be more deliberate and calculated. However, if a firm wishes to hire additional workers, then a higher wage must be offered. But, because a new worker cannot be paid a higher wage than the other workers at the firm, they will have to pay “w(l)!” to current employees, where w(l) is a wage function meant to attract new workers. This can be thought of as the firm’s supply curve. Thus, the profit maximization function becomes:
(3) \[ \text{max} \pi = pf(I) - w(l)l \]

After taking the derivative and setting the marginal product equal to the marginal cost, we arrive at:

(4) \[ p \times f'(l) = w(l) + w'(l)l \]

Unlike the competitive model, marginal product of labor is not equal to the wage, and the rate of exploitation seen in Figure 2.2 emerges. The equations have been restated below for the sake of comparison, the competitive model on the left, and the monopsony on the right:

\[ w = p \times f'(l) \quad \quad p \times f'(l) = w(l) + w'(l)l \]

The key differences are that the competitive model assumes an unlimited number of workers can be hired at wage “w” instead of the higher wage “w(l)” that must be offered to all current workers and new workers. Thus, the marginal revenue product of labor is not equal to the wage, but is equal to where the firm’s marginal cost of labor and marginal product of labor intersect. The “w'(l)l” variable creates this wedge, which is the derivative of the supply curve multiplied by the quantity of labor.

In addition to all of this, a benefit of the dynamic monopsony model is that it accounts for information asymmetry in the labor market, which will be discussed in greater detail later in this section.

The foundations for this study will incorporate both the dynamic monopsony and efficiency wage theory. These two theories, though slightly vary in their approach, offer similar outcomes and complement each other quite well. Due to the similar implications, it becomes difficult to distinguish if a certain outcome is a consequence of efficiency wage, or the dynamic monopsony. Evidence in favor of both of them will be presented, but more importantly, together they will show the inaccuracies of the traditional competitive model.
The dynamic monopsony, like the simple monopsony, possesses the distinct feature that employers, not workers, set the wages; in other words, firms are not price takers. The important implication of this feature is that it means employers will struggle to fill any vacancies at their firms. For instance, if a business has had an open position for months, it may consider offering a higher wage in order to attract qualified applicants. However, again, firms cannot do this without also raising the wage for all of its other employees. Thus, more often than not, these vacancies go unfilled for much longer than they should. This claim is reinforced by a recent BLS survey that reported a 6.1% vacancy rate in the food service and accommodations industry, behind only arts and entertainment, and health care (BLS, 2016). Therefore, an increased minimum wage could actually attract new workers into these low wage sectors and lower the unemployment rate as these vacancies become filled.

Another advantage of raising the wage under the dynamic monopsony model is that it reduces turnover costs, which can be quite costly for firms between the cost of training and the effort to complete the clerical work. Food service is well known for its short tenures and frequent departures, which in part, can be attributed to information asymmetry. No person can be aware of the wages offered at other firms, only the firms that he has applied to, or has at least done research to. Hence, as a worker becomes aware of a better wage at a different firm, he will leave his current job and accept the higher wage, if hired (Manning, 2013). An increased minimum wage could resolve the issue that arises from information asymmetry, as it would likely, more or less, equalize the wage offered to low wage workers. So, eliminating the information asymmetry would induce workers to stay at their job longer, something that will also be explored later in this paper with efficiency wage theory.
Furthermore, unlike the competitive labor model, the dynamic monopsony recognizes that there are frictions in the labor market—Alan Manning offers the example that people go out to drink and celebrate upon hearing the news of becoming employed, instead of simply shrugging it off. Conversely, if they are fired, they go out to drink to drown their sorrows instead of instantly taking a position at another business. Of course, this scenario does not take an active imagination to conceive—it is reality—and yet the traditional model does not account for it. Another example of these frictions existing is that if employers were to cut wages, not all workers would quit their jobs on the spot. They may leave at a faster rate, but the extreme predictions of the competitive model does not accurately describe this. As a result, it can be seen that the firm is not facing an infinitely elastic supply curve (Manning, 2013). Therefore, it is made clear that the dynamic monopsony model has some substantial advantages over the normal textbook model of labor economics, and should be referred to when analyzing Seattle’s wage ordinance.

The dynamic monopsony, though, should not be the only model discussed when discussing a wage increase, as there are benefits to it that it ignores. These omissions are where efficiency wage theory becomes of importance. Specifically, this theory highlights how it could be profitable for firms to increase their wage, not just through the reduced turnover costs from the dynamic monopsony, but because it will increase the productivity of its workers. Again, the claim that increasing wages can be profitable for employers may seem counterintuitive but it is indeed logical. For instance, if a worker is anticipating a wage increase and fears that it would cause him to be laid off, he will work harder to prove to his employer that he is worthy of keeping his job. Therefore, before even paying the worker an extra cent, the employer is able to extract more productivity from the employees. The story does not end here, however, as this
increase in productivity will be sustained even after the increased wage is implemented, for there will be a greater opportunity cost of workers shrugging off their work, or doing other actions that may result in getting fired. This is precisely the same phenomenon as what Carl Shapiro and Joseph Stiglitz wrote; the only way to induce workers not to shirk in their effort is by increasing their wage. Unemployment benefits have increased the equilibrium unemployment rate, not because people are incentivized to remain unemployment, but because there is little penalty for not acting as productively as possible. The increase in productivity after the passage of a higher wage, additionally, will further save businesses money because it will reduce their costs associated with monitoring and supervising workers. In this model, though, the higher wage can decrease the demand for labor (Shapiro & Stiglitz, 1984). However, because of the shortage of labor in the dynamic monopsony model, and the possible surplus in the efficiency wage model, it remains possible that an increased wage will not affect employment greatly, and this paper will be strengthened from its ability to look at the increased wage from both the laborer and firm’s point of view.

This efficiency wage theory, not only is logical when looking at the increased opportunity costs of workers and the savings of firms, but also is backed up by behavioral economics. This theory is supported by what is known as a “partial gift exchange” in which a firm willingly pays a wage higher than the market clearing wage and expects the favor to be returned in the form of increased productivity. The counterintuitive nature of this wage setting compared to simple supply and demand economics is acknowledged, but is indeed natural (Akerlof, 1984). Continuing with this behavioral economic approach, it is written that firms that lay off workers as a result of a wage hike will still suffer from under-productivity, as the worker will still be underpaid. He will also resent executives for not sacrificing some of their pay, which is
becoming increasing multiples more than the average worker’s pay, and may therefore not work as hard (Stiglitz, 2013). The disparity between executive compensation is shown in a 2014 study that found the gap was especially large in the accommodation and food service sector, with a CEO-to-worker pay ratio of 543:1 in 2012. This figure is an increase from the period between 2000 and 2012 where the ratio was 332:1 (Ruetschlin, 2014).

A famous example to promote efficiency wage theory is Henry Ford’s introduction of a $5 work day in 1914. This wage hike both drastically increased the productivity of Ford workers and Ford’s profits. This led Henry Ford himself to contend that this minimum wage hike was not an act of charity, but rather, it was good economics. In this claim, Ford is offering his support of efficiency wage theory. Ultimately, this strategy was utilized by other automobile manufacturers in the early 20th century, in hopes of emulating Ford’s success (Raff & Summers, 1987).

Of course, this example is just one individual firm, but it does exemplify the success that an increased wage could yield. Furthermore, the fact that efficiency wage theory proved successful at the microeconomic level should be reassuring, if macroeconomics are considered to be a compilation of microeconomic events. Thus, efficiency wage is a valuable inclusion in the theoretical framework of this paper.

According to both the dynamic monopsony model and efficiency wage theory, the results from the Seattle minimum wage hike should include positive growth in the low wage sectors that will be explored. The wage breakdowns of these low wage sectors is given in Table 2.1. This table portrays the percentage of workers in this industry that earn either the minimum wage of $9.32, between $9.33-12.12, and between $12.13 and $15. Note that food services and accommodations have been combined into one category, something that will change when other counties are looked at in the empirical section.
Table 2.1: Wage Breakdowns of Workers in Seattle’s Low Wage Industries

<table>
<thead>
<tr>
<th>Industry</th>
<th>$\leq$9.32</th>
<th>$9.33$-$12.12</th>
<th>$12.13$-$15$</th>
<th>Total $\leq$15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodation and Food Services</td>
<td>32%</td>
<td>21%</td>
<td>10%</td>
<td>63%</td>
</tr>
<tr>
<td>Retail</td>
<td>19%</td>
<td>12%</td>
<td>17%</td>
<td>48%</td>
</tr>
</tbody>
</table>

Data from Klawitter, Long, & Plotnick, 2014

It can be clearly seen that the effects of an increased minimum wage would resonate most within these sectors, making them of special importance when analyzing the possible benefits or consequences of Seattle’s wage ordinance. It also gives a broader scope than past studies, such as Card and Krueger’s which focused only on fast food restaurants. This industry is not the only one that would be susceptible to the effects of the increased wage, so it would be unwise to consider only its effect on them when analyzing the policy—as its reach extends much farther. Another difference between the scope of this paper and others is that it will not only focus on teenagers. Although they do still make up a large portion of minimum wage workers, their share of this percentage is declining. However, because of their lack of experience compared to the rest of the workforce, attention will still be paid to them. Furthermore, as Tables 2 and 2.1 will illustrate, although the majority of workers in their late teenage years and early twenties are low wage workers, numerically speaking, they are not the largest group affected by the hike in Seattle. This title belongs to the 25-44 age group. Thus, to more fully understand the effects of the wage hike, this age group must be included as well. This, among more details, can be seen on the following table.
Table 2.2 Percentage of Low Wage Workers by Age Group

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Under 19</td>
<td>61%</td>
<td>14%</td>
<td>1%</td>
<td>76%</td>
</tr>
<tr>
<td>19-24</td>
<td>35%</td>
<td>21%</td>
<td>10%</td>
<td>66%</td>
</tr>
<tr>
<td>25-44</td>
<td>7%</td>
<td>8%</td>
<td>9%</td>
<td>24%</td>
</tr>
<tr>
<td>45-54</td>
<td>9%</td>
<td>6%</td>
<td>9%</td>
<td>23%</td>
</tr>
<tr>
<td>55+</td>
<td>8%</td>
<td>3%</td>
<td>10%</td>
<td>21%</td>
</tr>
</tbody>
</table>

Data from Klawitter, Long, & Plotnick, 2014

Table 2.3: Estimated Number of Low Wage Workers by Age Group

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 19</td>
<td>4,129</td>
<td>946</td>
<td>93</td>
<td>5,168</td>
</tr>
<tr>
<td>19-24</td>
<td>16,112</td>
<td>9,575</td>
<td>4,587</td>
<td>30,274</td>
</tr>
<tr>
<td>25-44</td>
<td>12,613</td>
<td>14,362</td>
<td>14,467</td>
<td>41,442</td>
</tr>
<tr>
<td>45-54</td>
<td>5,542</td>
<td>3,574</td>
<td>5,780</td>
<td>14,896</td>
</tr>
<tr>
<td>55+</td>
<td>3,540</td>
<td>1,327</td>
<td>4,700</td>
<td>9,567</td>
</tr>
</tbody>
</table>

Data from Klawitter, Long, & Plotnick, 2014

These tables show just exactly how the theoretical framework will be applied in the empirical section. Tables 2.2 and 2.3 shows that teenagers are most likely to be low wage workers; however, they do not represent the largest group of low wage workers. They are outnumbered by more than 10,000 people who fall within the 25-44 age group. Therefore, the narrow focus on teenagers in the fast food industry, although may have been an accurate demographic choice to study in the past, is not applicable in the case of Seattle’s minimum wage hike. Some data is available regarding youth employment in King County, though, which this paper will make use of in the empirical section. It seems, though, the Mayor of Seattle has prepared for the possible detriments to youth employment by announcing a youth employment initiative in 2015. Whether or not teens may be more adversely affected by the increase is still the subject of controversy, with some studies concluding significant albeit not large impacts, while others find close to no effect (Reich, Allegretto, Jacobs, & Montialoux, 2016).
The reason that the data being used is at the county level is because that the wage hike in Seattle has ramifications that extend beyond its city limits. 40% of workers who earn the minimum wage in Seattle are not residents of the city, and this large group would be excluded from employment data if the scope focused solely on Seattle (Klawitter, Long, & Plotnick 2014). Moreover, if a firm decided to relocate from Seattle to elsewhere in King County, a decrease in the number of jobs should be expected, as it is unlikely every single worker would be willing to make this change. Last, as the largest city in both King County and the state of Washington, any negative effects would be felt countywide. Before continuing to the empirical section, a map of King County and its neighbor counties will be presented to establish where the theory will be applied:

**Figure 2.3: Map of King County and Surrounding Areas**

Printed with permission from GEOFRED, retrieved from geofred.stlouisfed.org

The three counties pictured that border the shaded region, which is an inlet of the Pacific Ocean, are the three largest in the state, so comparison to Pierce County and Snohomish will be of particular importance.
Now that both the relevant theoretical framework, and the appropriate demographics to study have been determined, the attention of this paper will now be shifted to data concerning these low wage sectors, in order to evaluate the success of the increased minimum wage. Indeed, the predictive power of the dynamic monopsony model and efficiency wage theory will also be put to the test. The prediction that will be tested is that because of the increased productivity brought about from efficiency wage as well as the reduced turnover costs from a dynamic monopsony, the number of jobs in low wage sectors will not dwindle due to the higher wage. It will also be expected that employees are retained longer than before.

Chapter III: Empirical Results

To determine whether or not the minimum wage hike has had any unintended negative consequences on employment, it first becomes important to establish the general trend that a minimum wage increase yields. In order to accomplish this task, the cross-contiguous counties model will be relied upon. This model is a valuable resource because it is the most comprehensive study in the past several decades, and takes painstaking measures to avoid any source of bias. It collected data from every minimum wage increase between 1990 and 2006, resulting in a total of 91,080 observations, and ran a regression. Then, the study is fine-tuned so that it does not suffer any of the biases that older models suffered from. Particularly, it addresses the issue spatial heterogeneity, which means that the data used was distributed unevenly or did not span a sufficiently long time period. This paper resolves the spatial heterogeneity problem by looking at trends in job growth dating back to 2010, so that a pattern may be seen prior to the wage increase. The cross-contiguous counties model also has the advantage of accounting for one county siphoning off workers from another county. For instance, say a worker in County A happened to be laid off due to the minimum wage hike. It is then possible that he would seek
employment in the neighboring County B—hence, if he became employed there, it would not appear in County A’s unemployment report. This model determined that this was a rare occurrence, and does not really exist. Hence it did not contaminate their model, nor will it affect this study (Dube, Lester, & Reich, 2010).

The methodology of this model, at its core, is also focused on the same concerns as this paper. It looks at counties that share a border and compares the effects on employment after one of the counties has an increased minimum wage law passed inside of it. The cross-contiguous counties model, though, also deals with counties that share a state border, something that this paper needs not address, as King County is surrounded entirely by other Washington counties. This study, thus, proves to be a valuable comparison to what is happening in Seattle, as its conclusions regarding the effects of a minimum wage hike on employment are more comprehensive and robust than any other in recent history.

This model also studies the industries that are of particular interest in this paper, food service, accommodations, and retail. Furthermore, it reached the same conclusion that this paper aims to, confirming the results of the Card and Krueger study: that there is no adverse and even a possible positive effect on employment after a minimum wage hike. Its predictions on a minimum wage hike’s effect on employment can be seen below in Table 3.1:

**Table 3.1: Cross-Contiguous Counties Model Predictions of Low Wage Sectors**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Positive Correlation</th>
<th>Statistically Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restaurants</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Accommodation</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Retail</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Data from Dube, Lester, & Reich, 2010

Table 3.1 makes it abundantly clear that raising the minimum wage does not have catastrophic consequences on these low wage sectors. Indeed, retail is the only one listed that
does not have a positive correlation, but its negative correlation is not even statistically significant. It is worth noting, too, that in the cross-contiguous counties study it was observed that retail workers tended to already earn more than 10% above the minimum wage, so that increasing it could have pushed their wages too high and it could have been detrimental to employment. However, as Table 2.1 stated, nearly half of Seattle’s retail employees were low wage workers. Therefore, the possibility still remains that the positive effects of a dynamic monopsony and efficiency wage will be felt, as this scenario differs from that studied by Michael Reich and his team of researchers. In either case, though, due to its scope not only through time, but in counties researched, the cross-contiguous county model is a valuable reference to compare to King County and to see where it falls in this trend.

Now that a regression model that has included many of the minimum wage hikes in the past several decades has been presented, attention will shift to job reports from King County and its neighbors. Instead of looking at the unemployment rate, which can be manipulated by a myriad of other factors that has little or nothing to do with the minimum wage, the job reports will show the number of jobs reported in low wage sectors in each of the counties. This should paint a clearer picture of what kind of effect the increased minimum wage has had, without having to take unrelated details into account. Given the theoretical framework of this paper, the dynamic monopsony and efficiency wage theory, it should be expected that there should be growth in the number of jobs, as workers will be attracted to fill whatever vacancies may exist. The food service industry will be explored first, and will perhaps the most valuable, as 66% of people in the “food preparation and serving” occupation are low wage earners (Klawitter, Long, & Plotnick, 2014). Figure 3.1, pictured below, shows the number of food service jobs in King County, and compares it to the same sector in other counties so that trends can more easily be
observed. The data in Figure 3.1, though is not seasonally adjusted, would portray major differences in growth rates after the passage of the minimum wage ordinance, if such a difference exists. To more easily make the comparison, every county except for King County is measured on the secondary axis on the right side of the graph.

**Figure 3.1: Food Service Jobs in King County and its Neighbors**

![Food Service Jobs (In 000's)](image)

Data from Washington State Employment Security Department, retrieved from https://esd.wa.gov/labormarketinfo/county-profiles

This graph should immediately dispel the belief that a minimum wage increase is a “job killer” to employees in the food industry. At no point did the number of food service jobs in King County dip below its level in 2014 when the minimum wage ordinance was passed. It has followed its same pattern of a lull around January, growth for several months after, then another lull the following January. The implications of the number of jobs not declining is valuable as well, as it is the precise opposite of what the textbook labor market model would dictate. The
absence of a decline could be due to either the increased productivity of workers brought about by efficiency wage, the savings to the firm explained by a dynamic monopsony, or as this paper argues, a combination of the two, as the implications of the theories are so similar, one cannot be discerned from the other. In either case, though, the predictions from the cross-contiguous county appear to be accurate, as there was a positive relationship between the wage and number of jobs. Pierce County on the secondary axis, interestingly follows the same trend as King County until around the implementation of a higher wage, after which, they suffered a much more dramatic decline in the number of food service jobs. This paper argues that this difference exists because the workers facing the higher wage are more productive, and firms are more motivated to retain them.

Furthermore, the slope of the King County line is becoming steeper, especially as 2016 comes to a close and businesses begin to anticipate the full $15 wage taking effect. This slope represents the rate at which jobs are being filled, because it is positive, it means that the predictions of the dynamic monopsony are holding to be true. Figure 3.11 on the next page will provide greater insight into the slope of Figure 3.1, by showing the percent change in the number of jobs from month to month. Pierce County, the second largest in the state, will act as a control group. This comparison is appropriate, not only because of them being the two largest, but they are also neighbors and therefore likely to experience similar trends.
After the wage increase in 2014, citizens became more motivated to fill positions in low wage businesses. This fact can be clearly seen through the increased stability of King County’s food service growth rate, while Pierce County’s becomes less stable. For instance, during the normal industrywide decline in January, King County’s January rate of decline has lowered since the 2014 minimum wage law. That is, its January 2013 rate of -3%, over recent years, has improved to roughly -2%. This should come as a surprise to subscribers to the competitive model of the labor market, where one would expect a sharp decline in King County’s food service industry after the wage increased in early 2014. Figure 3.12 will further explore the food service industry by season, by narrowing the focus on the percent of change in food service.
employment between January and the preceding December, as because Figure 2.1 has shown that they are the most volatile months. Pierce County, again will be used as a point of comparison.

**Figure 3.12: Percent Change in Food Service Jobs during Volatile Months**

Data from Washington State Employment Security Department, retrieved from https://esd.wa.gov/labormarketinfo/county-profiles

Figure 3.12 is valuable because it highlights that the minimum wage hike has not created any additional volatility to the seasons where the food service industry already suffers from its most dramatic declines. Indeed, the data follows roughly the same trend before 2014 as it does afterward, that is a steady decline. This would not be expected under the competitive model, as employers would be expected to jump at the opportunity to lay off more expensive workers in order to maximize profits. It is Pierce County that actually sees more volatility in recent years, with its volatility rate beginning to increase again in 2015 then dramatically increased during the winter of 2016. This comparison offers proof of the dynamic monopsony’s prediction that employees will stay at their job longer when offered a higher wage. Furthermore, the
consistency of the negative values, also, conveys that the minimum wage hike is not entirely responsible for the declines seen in Figure 3.11, but rather, is to be expected.

Figure 3.2 will explore whether or not the same trend from food service will remain in the accommodations sector. Note that the food service jobs from Figure 3.1 have been subtracted out of the data used to create Figure 3.2, thus, creating the illusion that King County does not indeed have the largest accommodations industry in Washington. Also note that more counties are included in this graph, as it is uncommon for food service to be separated from the rest of the accommodations sector. Hence, Figure 3.2, will also be of utmost importance when examining the effects of the minimum wage hike.

**Figure 3.2: Accommodations Jobs in King County and its Neighbors**

![Accommodation Jobs Graph](image)

Data from Washington State Employment Security Department, retrieved from https://esd.wa.gov/labormarketinfo/county-profiles
Figure 3.2 does not illustrate the same sort of growth that was seen in the food service industry, though there has been minor growth since 2014. The importance of this graph does not come from this slight growth, though, it comes from the lack of a decline in the industry. Table 2.1 showed that 63% of food service and accommodations workers were low wage workers, making less than $15 per hour. Given this fact, it cannot be argued that the minimum wage hike has had any catastrophic impact on employment in this industry—food service had a very noticeable increase in the number of jobs since 2014, and accommodations experienced a slight increase, an increase that was also predicted by the cross-contiguous county model. Though Snohomish County and Pierce County experienced greater growth since 2014, they are following the same trend they usually do: an increase, likely due to tourism during the summer, followed by a decline. The rates of increase and decrease in this industry will be analyzed on the following page in Figure 3.21:
Figure 3.21: Percent Change in Accommodation Jobs in King County

Not unlike Figure 3.11, Figure 3.21 shows the industry wide decline at the beginning of every year. At the beginning of 2015 and 2016, the magnitudes of the decline in King County are less than in previous years. This improvement can be attributed to the dynamic monopsony model, which states that low wage firms will face a higher retention rate as the minimum wage increases, as employees will be more motivated to stay if their wage has increased. Furthermore, employers could have become aware of the reduction in turnover expenses that the minimum wage brings, so firms could have become motivated to retain workers during the lull, instead of laying them off and replacing them later. Pierce County, though, shows much more fluctuation,
and recently, their peaks have not been as great in magnitude as King County, while their troughs are far more severe. Figure 3.22 will examine these lull months more closely:

**Figure 3.22: Percent Change in Accommodation Jobs during Volatile Months**

![Percent Change In Accommodation Jobs During Volatile Months](image)

Data from Washington State Employment Security Department, retrieved from https://esd.wa.gov/labormarketinfo/county-profiles

Figure 3.22 further shows that the minimum wage hike helped to lessen the magnitude of the declines. The decline began in 2013, remained steady through 2014, the year that the ordinance was passed, and did have a dramatic spike in 2015. However it had an even more dramatic decrease in the levels of volatility during 2016, as the wage continued to increase. The fact that the volatility in 2016 is nearly half of what it was in 2015, this paper, argues, is that firms realize the value in retaining workers, as they will not have to incur the turnover costs that they would have without the increased wage. Pierce County, which serves as the control, on the other hand, strongly deviates from its trend of reduced volatility. Its straying from the trend shows that the reduced volatility in King County in 2016 is not attributed to a statewide trend
that also affects its neighbors; but rather, is due to the positive impact of the minimum wage hike.

Figure 3.3 below will explore the retail sale sector, which is the only low wage industry listed in Table 3.1 that does not have a positive correlation with a minimum wage increase. Looking at the number of jobs added or lost since the implementation of an increased wage will determine whether or not this prediction is true.

**Figure 3.3: Retail Jobs in King County and its Neighbors**

Data from Washington State Employment Security Department, retrieved from https://esd.wa.gov/labormarketinfo/county-profiles

The trend observed in other low wage sectors remains for the retail industry, the increased wage has not resulted in mass layoffs and unemployment. As was the case with the other sectors, the number of jobs has risen since its passage in 2014 and the King County line is
following the same behavior it has for years, a peak towards the holiday season, followed by a lull, then a steady increase until it peaks again.

Unlike the other industries, however, retail is the only one to not follow the predictions made by the cross-contiguous counties model, that is, a negative correlation. As mentioned earlier, this discrepancy can be attributed to the fact that in the cross-contiguous counties model many retail workers were already being paid more than 10% above the minimum wage, so their wage increase may have gone too far and resulted in negative effects. Table 2.1, though, illustrated that 19% of Seattle retail workers earn the minimum wage of $9.32, representing a larger share than any of the other low wage brackets—$9.33-$12.12 or $12.13-$15. Therefore, King County residents are more likely to feel the positive effects that a dynamic monopsony and efficiency wage bring with it than the retail workers surveyed in the cross-contiguous counties model. Thus, the discrepancy can be resolved by attributing it to a difference in the earnings of retail workers in the studies, not because of a lack of predictive power in the cross-contiguous counties model. The rates of growth and decline, again, will be explored in Figure 3.31 on the next page:
Unlike the previous graphs that depicted the percentage of growth or decline in low wage sectors from month to month, the magnitude of King County’s decline in January and February have not decreased. However, this fact should be not be distressing, first because it shows that the minimum wage has not had a noxious effect on the industry. But more importantly, because it immediately follows the holiday season. Retailers, according to the graph, hire labor at a much faster rate as the season approaches to satisfy the massive influx of customers they must face, then lose some of their labor as the holidays end. Thus, this trend should continue regardless of what the minimum wage is. The other industries differ from this pattern, because they experience less of a holiday rush. For example, for the holidays people may tend to celebrate with more freshly prepared food than fast food. Pierce County’s retail sector, then, should behave similarly to King County. Figure 3.32 will illustrate this more clearly by focusing solely
on these months to show that these dips in employment fit a pattern that predates the minimum wage hike:

**Figure 3.32: Percent Change in Retail Jobs during Volatile Months**

![Percent Change In Retail Jobs During Volatile Months](image)

Data from Washington State Employment Security Department, retrieved from https://esd.wa.gov/labormarketinfo/county-profiles

Indeed, Figure 3.32 illustrates not only that the decline in the retail sector is a yearly occurrence when observing the difference in the number of jobs between January and December, but that the degree of the decline has decreased since the passage of the minimum wage increase. Granted, it decreased between 2012 and 2013 as well. But as was the case in the other examinations of the volatile months, it should be expected that firms would be eager to rid themselves of expensive labor after they are no longer needed in the post-holiday season. However, more workers have been retained, which is a prediction given by the dynamic monopsony model. Unlike the prior graphs that explored volatility, Pierce County does follow the same general trend as King County. This similarity is still of value, though, as opponents of the wage hike could have expected King County to suffer from more dramatic fluctuations in volatility than its neighbor.
Finally, though the number of jobs in these low wage sectors have increased, and the patterns of growth and decline show no substantial difference from before 2014, these sectors as a percentage of King County’s workforce has not yet been examined. This data can be thought of as the employment rate in the three low wage industries that this paper explores. Figure 3.4 will convey this information:

**Figure 3.4: Low Wage Earners as Percentage of King County Labor Force**


If the minimum wage hike were to have a negative effect on employment, the yellow line, surely, would have spiraled downward. The labor force would have increased, due to the influx of citizens who wish to work with the higher wage. Meanwhile, to preserve profits, firms would have laid off workers and employed machines instead. This duo of problems would spell catastrophe for low wage earners. As Figure 3.4 shows, though, there was no such occurrence.
The trend line continues to increase, and indeed, the slope of the trend line is nearly identical when looking at the period between 2010-2014 and 2010-2016, thus showing that the minimum wage hike had no negative effects on the employment rate in these three low wage industries.

It should be no surprise that as the employment rate of low wage workers increased, the countywide unemployment rate decreased in tandem. The fact that both of these lines tell the same story further proves that the minimum wage hike was not a vicious business killer, but indeed provided a stimulus to the labor force and businesses alike.

Additionally, despite the wage increase King County has still consistently had a lower unemployment rate than the rest of the state. So, although the statewide economy is still in a recovery, the higher wage has not offset any of this recovery. Indeed, as was presented in the graphs, it may have stimulated the low wage sectors.

Now, the scope of the paper temporarily narrows to teenagers, who because of their lack of work experience, may struggle even more to find employment. The state of Washington has historically had an issue with high youth unemployment figures. Figure 3.5 will show the number of jobs in King County that are held by people from ages 14-24 in the accommodation & food service, and the retail trade sectors.
Figure 3.5: Number of Jobs in King County for Workers 14-24

![Graph showing number of jobs in King County for workers 14-24]

Source: U.S. Census Bureau, retrieved from https://ledextract.ces.census.gov

Figure 3.5 shows that the growth in the number of jobs for people within the 14-24 age group did not experience the same growth rates that the entire labor force enjoyed. This supports literature suggesting that teenagers are likely to be the ones who are most hurt by minimum wage increases. This claim is best seen in the flattening of the retail line. However, the dramatic increase in the number of accommodation and food service jobs at the beginning of 2015 does offer support for the dynamic monopsony still, as the increase fell during a time as the wage was set to hit the $11 per hour benchmark. Thus, it can be said that teenagers do not reap the benefits of an increased wage as much as the rest of the workforce, but saying that it hurts them appears to vary based on sector.

Finally, after the case for the minimum wage hike has been graphically presented, it will be presented mathematically with the use of a regression with equation:

\[
LowWageEmp = \beta_0 + \beta_{\text{wage}} X_1 + \beta_{\text{lowedu}} X_2 + \beta_{\text{teens}} X_3 + \mu
\]
Where “LowWageEmp” is the share of the total workforce represented by retail, accommodation, and food service jobs, “wage” is what the minimum wage has increased to, “lowedu” is the number of jobs held by people whose maximum education is a high school degree, and “teens” is the number of jobs held by people ages 14-24. This variable is valuable because it will show how age plays a role in low wage employment after the minimum wage hike. Because the methodology of this paper does not survey employers so that dummy age variables can be created for each age group, “teens” serves as the age variable of sorts. The observation period begins in the first quarter of 2010 and continues to the first quarter of 2016, and all observations occur at the beginning of every quarter. The data for the regression was retrieved from the Washington State Employment Security Department and The U.S. Census Bureau’s Quarterly Workforce Indicators.

Following the theory of this paper, it should be expected that wage will have a positive coefficient, as the increased wage will attract more workers and increase their tenure. Teenagers, or workers with low education levels is more ambiguous, past research shows that an increased wage may harm these groups. However, if the wage and low wage employment have a positive relationship, then it still may lift up all groups. A positive and statistically significant relationship between low wage employment and these groups would reflect that the wage increase has no negative consequences for the labor force as a whole, as even the most vulnerable groups benefit from it.

In order to show that the regression will be accurate, the distribution will be proved to be normal by plotting the kernel density estimate against a normal bell curve. By following the normal distribution, further calculations will be able to be made. The kernel density estimate can be seen on Figure 3.6:
Figure 3.6: Kernel Density Estimate

The estimate takes the approximate shape of a normal distribution, however, to be reassured that it is normal, instead of just appearing to be so, a Shapiro-Wilk test will be done as well.

Table 3.2: Shapiro-Wilk Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>W</th>
<th>V</th>
<th>Z</th>
<th>Prob&gt;Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>residual</td>
<td>25</td>
<td>0.97755</td>
<td>0.624</td>
<td>-0.965</td>
<td>0.8327</td>
</tr>
</tbody>
</table>

This test proves that the data is normally distributed, as the p-value produced is greater than the .05 necessary to definitively fail it. The p-value is generated on the assumption that data is normally distributed, because the value produced is so large, the hypothesis that the data is abnormally distributed is rejected. This conclusion is backed up as well by the W value being so close to 1. Now that normality has been established, the regression from equation 5 will be run.
Table 3.3: Regression Results and ANOVA Table

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>DoF</th>
<th>MSS</th>
<th>Number of Obvs. = 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>24.4908936</td>
<td>3</td>
<td>9.83029788</td>
<td>F(3, 21) = 559.28</td>
</tr>
<tr>
<td>Residual</td>
<td>0.369107596</td>
<td>21</td>
<td>0.017576552</td>
<td>Prob &gt; F = 0.0000</td>
</tr>
<tr>
<td>Total</td>
<td>24.8600012</td>
<td>24</td>
<td>1.24416672</td>
<td>R-squared = .9876</td>
</tr>
</tbody>
</table>

LowWageEmp | Coefficient | Standard Error | t-value | P>t     | 95% Confidence Interval |
-----------|-------------|----------------|---------|---------|-------------------------|
wage       | -0.076837   | 0.039271       | -1.96   | 0.064   | [-.1585056, .0048315]   |
lowedu     | 0.0001466   | 0.00001        | 14.61   | 0.00    | [.0001258, .0001675]    |
teens      | 0.0001061   | 0.0000233      | 4.56    | 0.00    | [.0000577, .0001544]    |
constant   | 4.148928    | 0.6685486      | 6.21    | 0.00    | [2.75805, 5.539251]     |

The regression reinforces everything that has been stated graphically. The coefficient for the wage variable is negative, however it is statistically insignificant at the 5% level so not much can be drawn from it. It is, still, in and of itself, an important strike against those who would expect dramatic layoffs. The fact that both workers with low education attainment and teenagers had positive and significant, albeit very small, coefficients is valuable as well. Not only are those likely to be worse off after a minimum wage hike not worse off at all, but because they are it can be assumed that if they are not worse off, then more skilled and educated workers are probably not worse off either. This would seem especially true after the graphs presented earlier in the empirical section.

The R\(^2\) value of .9876 shows that roughly 98% of the variance of “LowWageEmp” can be explained through the explanatory variables, and the low MSE shows that the regression is an accurate fit for the scenario. The small residual value in the sum of squares column of the ANOVA table is another source of confidence. However, more tests must be done to guarantee
the accuracy of these figures. A Breusch-Pagan test for heteroscedasticity will be done first. If the test is not passed, this would mean that the models ability to predict the dependent variable is inconsistent across different values of the variable. Therefore, the model would not be entirely trustworthy.

Table 3.4: Breusch-Pagan Results

<table>
<thead>
<tr>
<th>$H_0$ = Constant variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables: Fitted values of LowWageEmp</td>
</tr>
<tr>
<td>Prob &gt; Chi = .3123</td>
</tr>
</tbody>
</table>

The p-value is greater than the usual threshold of .05, so we fail to reject the null hypothesis of constant variance. Heteroscedasticity, then, does not appear to be present. To further prove the validity of the regression results, the variance inflation factor of the variables will be examined. This test will show if multicollinearity is an issue. If it were an issue, two or more of the explanatory variables would have a strong relationship and skew the regression results.

Table 3.5: Test for Multicollinearity

<table>
<thead>
<tr>
<th>Variable</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>lowedu</td>
<td>5.42</td>
</tr>
<tr>
<td>teens</td>
<td>4.21</td>
</tr>
<tr>
<td>wage</td>
<td>1.66</td>
</tr>
<tr>
<td>Mean VIF</td>
<td>3.76</td>
</tr>
</tbody>
</table>

All of the values produced are less than 10, so multicollinearity is not undermining the regression. Finally, a link test for misspecification and a RESET test for omitted variable bias will be conducted. These will show if equation 5 is in need of a different functional form, and if
any additional variables are needed. Failing these tests would mean that the model violates the assumptions a regression must meet to be viewed as trustworthy.

**Table 3.6: Link Test Results**

<table>
<thead>
<tr>
<th>LowWageEmp</th>
<th>Coefficient</th>
<th>t-value</th>
<th>P&gt;t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y-hat</td>
<td>1.124838</td>
<td>1.08</td>
<td>0.29</td>
</tr>
<tr>
<td>Y-hat squared</td>
<td>-</td>
<td>-0.12</td>
<td>0.905</td>
</tr>
</tbody>
</table>

**Table 3.7: RESET Test Results**

<table>
<thead>
<tr>
<th>H₀ = Model has no omitted variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>F(3, 18) = 1.16</td>
</tr>
<tr>
<td>Prob &gt; F = .3522</td>
</tr>
</tbody>
</table>

The link test tests for specification error by adding the squared Y-hat values into the regression. If this term is statistically significant, then the model suffers from misspecification. The squared term is insignificant in this model, so it is correctly specified. In the RESET test presented in Table 3.7, the p-value is greater than .05, so we fail to reject the null hypothesis and can conclude the model is not in need of more variables.

All of these tests prove the validity of the regression, which produced a statistically insignificant relationship between low wage employment and the wage. As a result of this insignificance, not much can be concluded with certainty. However, because of the small positive and significant coefficients for teens and workers with a maximum education of a high school degree, shows that it is entirely possible that the workforce as a whole enjoyed the benefits of the dynamic monopsony and efficiency wage theories. Furthermore, the significant relationship for teens reinforces the Card and Krueger study which made the same conclusion.
To summarize, the theories of the dynamic monopsony and efficiency wage have proven accurate when observing the effects of Seattle’s minimum wage hike on King County. The number of jobs in low wage sectors has not decreased, but has in fact increased. If firms are entities that exist to maximize profits, and the number of jobs has increased, then there must be benefits to employers from a minimum wage increase. This paper argues that these benefits are a reduction of turnover costs, a longer job tenure, more quickly filled vacancies, and increased worker productivity. If these benefits had not occurred, a decline in the number of jobs would be expected, as a profit maximizing firm under the competitive model would have laid off workers. However, the dynamic monopsony has shown that firms can still experience growth after a minimum wage increase due to the longer tenure of their employees, reduced turnover costs, and increased attractiveness at the new wage level. The absence of layoffs can also be dedicated to efficiency wage theory, which states that workers will be more productive when paid more. If this added productivity was not the case, a loss in jobs could have been expected. As stated earlier in the paper, these different theories provide different rationale behind the same outcome. These conclusions not only are logical, but are supported by the graphs above, which show that growth has occurred in the number of jobs in low wage industries since the minimum wage law was passed in 2014. Although there is currently no data available regarding employee tenure and turnover rates, these are implicit in the graphs. Particularly, through the contraction in the magnitudes of decline that occur early into the calendar year. The increase in tenure has been measured in San Francisco, though, and a five month longer tenure was discovered (Dube, Naidu, & Reich, 2007). Furthermore, the increase in productivity, something that would be near impossible to measure and calculate for low wage workers in an entire city, is also implicit in the graphs. If employees were not acting more productively in response to the increased wage, then
they presumably would have been laid off as they would have proven unworthy of the pay raise. The fact that there were no mass layoffs visible in the graphs proves that workers were indeed earning their raise in wages. Therefore, the theoretical framework of this paper is visible in its results, and the results validate these two alternative labor market theories.

Concluding Remarks

This case study of Seattle’s minimum wage hike to $15 and its effect on employment in low wage industries in King County offers the counterintuitive conclusion that the hike actually helped to raise employment and benefitted businesses. This conclusion does not differ from evidence presented by past studies, such as the minimum wage increases in San Francisco, Santa Fe, and even the nation after federal minimum wage increases. Hence, the trend of minimum wage hikes not being the fatal blow to employment that its opponents believe it to be remains.

This paper credits the continuation of this trend to the dynamic monopsony model as well as efficiency wage theory. The dynamic monopsony model predicts that a firm can save money by increasing its wage though the reduction of turnover costs, time spent training new employees, and because the higher wage removes the difficulties of recruiting new employees. As a result of these savings, an increase in employment can occur. Efficiency wage theory, similarly, predicts that the pay raise will result in more productive workers, making it possible for a firm’s profits to increase despite the greater cost of labor. This phenomenon dates back to Henry Ford’s $5 work day, which after being implemented, gave way to one of the most profitable periods in his company’s history. The evidence presented in the empirical section shows that a similar phenomenon may be taking place in Seattle, as the number of jobs has not declined, suggesting that the benefits of the dynamic monopsony and efficiency wage theory are being felt.
Whereas the traditional textbook model of the labor market would predict a minimum wage hike, especially one of the magnitude of Seattle’s, would be met with catastrophic levels of layoffs in industries where low wages are common; this paper argues in opposition to this view. Evidence suggests that two years after the passage of Seattle’s minimum wage ordinance, little to no adverse effects have occurred and growth has continued in low wage sectors. The number of jobs in low wage sectors are following their normal behavior, as well as following an upward trend.

While this paper has concluded that the increase in Seattle’s minimum wage did not result in layoffs and unemployment in the low wage sectors explored, other aspects of employment are in need of research, as they are beyond the scope of this study. Some of these elements in need of more research are the number of hours worked by low wage earners, as well as if any cuts to benefits, such as health care, have occurred. No health insurance cuts were observed in San Francisco, the city that serves as the best reference point to Seattle, as they both increased their minimum wage substantially, are in the same region, and have high costs of living (Dube, Naidu, & Reich, 2007).

The conclusions reached by this paper, despite the absence of those elements, provide a valuable argument in favor of the dynamic monopsony model and efficiency wage theory. More importantly, it undermines the validity of the competitive labor market model, which is the most prominent labor market theory in policy making. Just as Card & Krueger discovered no adverse effects of raising the minimum wage in New Jersey, this paper has discovered no adverse effects on employment in King County after Seattle’s minimum wage hike. Its success, likely, influenced the rest of the state of Washington to vote for a statewide minimum wage hike, which will take effect in 2017.
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