DOES INCREASING THE OVERTIME ELIGIBILITY THRESHOLD INCREASE INCOME INEQUALITY?

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ABSTRACT

Under the Fair Labor Standard Act (FLSA), employees working more than 40 hours per week must be paid time-and-a-half. However, for several decades, a growing number and now millions of employees have been uncompensated for their long hours of overtime. In order to address this issue, the Department of Labor recently passed the final overtime rule, which increased the overtime salary threshold from $23,660 per year ($455 per week) to $47,476 per year ($913 per week). Workers earning below this threshold are entitled to overtime pay whether classified as a salary worker or not. According to the Department of Labor, the final rule would extend overtime pay to approximately 4 million employees.

Much of the existing literature on income inequality primarily focuses on economic indicators, such as the GDP and unemployment rate. There have been studies which analyze the impact of employment legislation on income inequality, however, in majority of these studies, overtime pay is not taken into consideration. This gap, which currently exists in the literature, is addressed in this research.

The study evaluates whether U.S States with an overtime threshold above the 2003 federal overtime threshold of $23,660 per year have an associated higher level of income equality. A timeframe of 10 years, from 2003 to 2013, was chosen for this evaluation. An OLS model is utilized, where the dependent variable is the Gini Index and the primary independent variable is the overtime threshold. U.S. States which are above the 2003 federal overtime threshold were assigned a value of 1 and U.S. States which are at the 2003 federal overtime threshold were assigned a value of 0. The database for this study was compiled from the Bureau of Labor Statistics and the published work of other researchers.

The findings of this study do not support the belief that a higher overtime threshold is associated with lower income inequality. The study suggests that states that have overtime threshold above the 2003 federal overtime threshold of $23,660 are associated with higher level of income inequality. On average, the Gini Index for states above the threshold is 12.4 percent higher than states at the threshold. A higher Gini index represents a higher income inequality.

In addition, the findings of this study should be viewed in the context that only a limited number of states had an overtime threshold above the federal threshold and the period of 2003 to 2013 was a period of unusual economic conditions, including the financial meltdown of 2008. A longer duration of study in normal economic conditions, which is recommended for future research, might have yielded different results. Even though the study did not demonstrate that higher overtime threshold reduces income inequality, it probably had more positive implications on the welfare of employees than any negative implications.

Furthermore, in this study, minimum wage was negatively related to income inequality, meaning it helped decrease the Gini Index or income inequality. On average, increasing the minimum wage is associated with a decrease in the Gini Index by 1.43 percent.
The research and writing of this thesis is dedicated to everyone who helped along the way.

Many thanks,
MARIAM SHAMIM KHAN
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INTRODUCTION

The purpose of this study is to determine whether increasing the overtime threshold in the United States has a significant impact on income equality. While several studies have reported the benefits of increasing the overtime threshold, its role in addressing long-term income equality has yet to be determined, which is the subject of this research.

Since the 1940s, the level of income inequality in the United States has been growing at an alarming rate, as shown in Figure 1. In this figure, income inequality is expressed in terms of Gini Index, where a value of 0 indicates perfect equality and a value of 1 indicates perfect income inequality. In 2013, the top 1 percent captured 85.1 percent of the total income growth in the United States (Sommeiller, Price, and Wazeter, 2016). Even more shocking, the top 1 percent earned 25.3 times more than the bottom 99 percent (Sommeiller, et. al., 2016). Unfortunately, the United States continues to have one of the largest levels of income inequality in the world, which is depicted in Figure 2.

![Gini Index in the United States from 1917 to 2013](source)

*Source: Frank, Sommeiller, Price, & Saez (2015)*

**Figure 1: Gini Index in the United States from 1917 to 2013**
The increase in the level of income inequality can be partially attributed to the growing number of Americans who are uncompensated for their overtime work (Gould, 2014; Burstein, 2016). For several decades, millions of employees have been uncompensated for their long hours of overtime.

**Relationship between Overtime Threshold and Hourly and Salary Workers**

Under the Fair Labor Standard Act (FLSA), employees working more than 40 hours per week must be paid time-and-a-half if their annual earnings were below a salary threshold. The threshold exists to prevent companies from designating all or most workers as salary workers, not hourly workers, and thus not having to pay a premium for overtime hours. Unlike salaried employees, as long as an hourly employee works more than 40 hours per week, they are qualified for overtime pay.
Problem with FLSA Salary Threshold

While the FLSA appears to be beneficial, many workers lacked access to overtime pay. In 1975, 62 percent of salaried workers received overtime pay; however, by 2016, only 7 percent of salaried workers received overtime pay (EPI, 2015). The main problem was that the FLSA salary threshold for overtime pay, which was $23,660, was too low for any significant population of the U.S. workforce to qualify for overtime pay. In addition, numerous employees were not eligible for overtime pay due to their job classification. Employees classified as professionals, administrators, or executives were not eligible for overtime pay, regardless of their pay rate.

In order to address this issue, in May 2016, the Department of Labor issued the Final Overtime Rule, which increased the salary threshold for overtime pay from $23,660 per year ($455 per week) to $47,476 per year ($913 per week). All employers were to comply with this ruling by December 1, 2016. In following this ruling, the employers only have a few choices. They can either increase the salary of the employees to the new threshold or they can pay time-and-a-half for the hours worked beyond 40 hours per week by their employees. Another option, which many dismay, is that employers can convert their employees from salaried to hourly employment status. Finally, employers can continue to pay their employees at the same salary, as long as their employees do not work over 40 hours per week. With this option, the employers would need to account for this loss of overtime work by hiring additional employees. Several studies have concluded that the Overtime Rule would result in the creation of new jobs. According to Goldman Sachs, approximately 120,000 jobs are expected to be created annually as a result of this ruling.\(^1\)

Most importantly, studies have also shown that the overtime rule would positively benefit low- and middle-income workers. According to the Economic Policy Institute, the rule would

extend overtime protection to 12.5 million workers. Under the new threshold, 35 percent of salaried workers would be qualified for overtime pay, which is a significant increase. Employees who are expected to benefit the most include women, African-Americans, workers with less than a college degree, and workers under the age of 35.

The new overtime threshold can be considered a catch-up action by the Federal Government because the issue was neglected for such a long time. If adjusted for inflation, the new overtime threshold would be equivalent to overtime threshold in 1975, which is illustrated in Figure 3.

Source: U.S. Department of Labor

Figure 3: Weekly Overtime Pay Threshold from 1950 to 2016
POLICY RELEVANCE

In June of 2016, Dr. Jared Bernstein, the Chief Economist and Economic Advisor to Vice President Joe Biden, testified before the House Committee on Education and the Workforce and supported the recent overtime rule. In his testimony, Dr. Bernstein discussed how an increase in the overtime threshold is associated with a decrease in income inequality. Dr. Bernstein cited an example of how income inequality grew during the early 1980s, a period in which labor standards such as the overtime rule and the minimum wage were allowed to erode. The new overtime rule and its implications on the wellbeing of Americans can be considered a major labor policy overhaul after 1938 when Fair Labor Standard Act was enacted, which is a time period of almost eight decades. This policy change is current and in keeping with inflation adjusted wages; employers were required to be in compliance with the new policy by December 2016.

The primary purpose of this study is to analyze and determine whether there is a relationship between income inequality and the overtime pay threshold, as highlighted by Dr. Bernstein. The study will establish whether the Department of Labor’s recent increase in the overtime threshold from $23,660 per year to $47,476 will have a potential positive impact on income equality.

2 http://edworkforce.house.gov/uploadedfiles/testimon_bernstein.pdf
LITERATURE REVIEW

A review of past studies that have analyzed the impact of overtime regulations on the general overall condition of employees is presented here. Also, past studies that have analyzed the impact of employment and labor regulations on the level of income inequality have been reviewed. While majority of the studies focus on economic determinants of income equality, which will be discussed here, the past studies on the impact of overtime regulations on income inequality are almost non-existent. This knowledge gap will be addressed here.

The Effect of Overtime Regulation on Wage and Hours

In the existing literature, the relationship between overtime pay and the number of hours worked is ambiguous. Much of the ambiguity is primarily due to the variety of overtime policies in different countries. For example, Kuroda and Yamamoto (2012) analyzed the effect of Japan’s Labor Standard Act on the hourly wages and the number of hours worked by employees in Japan. The Japanese Labor Standards Act, which was implemented in 1947, requires employers to pay a minimum overtime premium of 25 percent to employees who work more than 40 hours (Kuroda & Yamamoto, 2012). Like the white-collar exemption in the FLSA, certain employees in Japan are not eligible for overtime pay (Kuroda & Yamamoto, 2012). Using data from the 2004 through 2010, Keio Household Panel Survey (KHPS), Kuroda and Yamamoto (2012) compared the wages and hours worked by exempt and non-exempt employees. Overall, the study discovered that in comparison to non-exempt employees, the average number of hours worked by exempt employees were significantly longer (Kuroda & Yamamoto, 2012). Furthermore, the study found that the hourly earnings between exempt and non-exempt employees were not significantly different. This finding appears to be consistent with the fixed job model which predicts that the market wage is unaffected by the overtime pay regulation (Trejo, 1991).
In comparison to Kuroda & Yamamoto, Trejo (1991) found similar results in regards to the effect of the FLSA overtime rule on the earnings of employees. Using data from the 1974, 1976, and 1978 May Current Population Surveys, the study found that there were no significant differences in weekly earnings between employees exempted and not exempted under the FLSA overtime rule (Trejo, 1991). In contrast to Kuroda & Yamamoto (2012), the study found that the incidence of employees working exactly 40 hours per week were higher in jobs with FLSA overtime pay coverage. This finding appears to be consistent with the fixed-wage model, which predicts that raising the overtime premium reduces the number of overtime hours worked (Barkume, 2007).

Friesen (2002), in contrast to the previous studies, found different results with respect to the overall effect of Canada’s overtime rule. It is important to emphasize that the overtime pay threshold varies in Canada across provinces (Friesen, 2002). However, in most provinces, exemptions are based on occupation (Friesen, 2002). Using data from the June 1997 Canadian Labour Force Survey, the study found that greater overtime coverage was associated with higher wages. Additionally, Friesen (2002) found that provinces with lower overtime thresholds were correlated with lower number of overtime hours worked by employees.

Like the results of Friesen (2002), Costa (1998) found that between 1938 to 1950, the overtime provisions of the Fair Labor Standards Act reduced the number of hours worked by employees in the wholesale and the retail industry in the United States. More specifically, the Fair Labor Standards Act reduced the proportion of men and women working more than 40 hours per week by at least 18 percent (Friesen, 2002). The decline in the total weekly hours in the proportion of employees working more than 40 hours per week was larger in the South than in the North of the United States (Friesen, 2002).
It should also be noted that several countries, such as Britain, do not have overtime regulations. However, employers in these countries may choose to pay their employees for overtime. In 2003, Bell and Hart investigated British firms which paid an overtime premium. Based on the results from the 1998 British New Earnings Survey, they found that British firms which had higher overtime premiums, paid lower wages to their employees (Bell and Hart, 2003).

**Economic Determinants of Income Inequality**

A vast majority of literature focuses on the macroeconomic roots of income inequality. For instance, Conceição, Ferreira, and Galbraith (1999) discuss the relationship between unemployment and income equality. Based on their analysis, which primarily looked at European countries from 1970 to 1992, they found that the unemployment rate is positively correlated to income inequality. The national unemployment rate was higher in European countries where the wages were low and the social insurance system was weak. (Conceição, et. al., 1999). These countries typically had the highest levels of income inequality (Conceição, et. al., 1999). More specifically, their results found that an increase in unemployment is associated with a 0.37 increase in the Gini Index (Conceição, et. al., 1999).

Other studies, such as Naguib (2015), looked at the relationship between income inequality and GDP growth. Naguib (2015) primarily focused on 33 countries from 1981 to 2010. Based on their research, GDP growth and income inequality were found to have a positive correlation.

In contrast, Bulír (1998) and Dincer (2014) analyzed the correlation between inflation and income inequality. Using a database containing 75 countries, Bulír (1998) found that
countries with high inflation are associated with a high Gini Index (greater inequality). When inflation occurs, taxes as well as the cost of living increase, which makes it difficult for the working and middle class to save and invest which results in a significant increase in income inequality. Dincer (2014) investigated the relationship between inflation and income inequality in 48 states from 1976 to 2005. The results of this study also demonstrated that inflation increases income inequality in the long run. More specifically, a one standard deviation increase in the inflation rate increased the income share of top 10 percent by 0.3 standard deviations (Diner, 2014).

Finally, several studies, such as Jensen and Rosa (2007), focus on the impact of foreign direct investment (FDI) on income inequality. For example, Jensen and Rosa (2007) specifically analyzed the relationship between multinational corporations and the level of income inequality in the 32 states of Mexico from 1990 to 2000. They found that the FDI inflows are associated with a decrease in income inequality (Jensen & Rosa, 2007). Similarly, Herzer and Nunnenkamp (2011) researched the relationship between FDI and income inequality in European countries from 1980 to 2000. They found that in the short run, FDI inflows has a positive effect on income inequality. However, in the long-run, there is a negative effect on income inequality (Herzer and Nunnenkamp, 2011). The author also acknowledges that the higher inequality, in the long run, also leads to lower FDI inflows (Herzer and Nunnenkamp, 2011).

**Labor and Employment Regulations and Income Inequality**

There is a prolific amount of literature on the impact of labor and employment protection regulations on income inequality. Several studies have reported that these regulations are associated with a decrease in income inequality. Furthermore, several studies have reported that diminishing the strength of these regulations can increase income inequality.
Researchers, such as Checchi and García-Peñalosa (2005) and Gkinni and Vasilaki (2014), found that government regulations in the labor market have led to reduction in wage inequality. For example, Gkinni and Vasilaki (2014) conducted a cross-sectional data analysis of 83 developed and developing countries, in which the dependent variable was income inequality and the explanatory variables were various labor regulations. The study analyzed three forms of labor regulations: employment laws, collective relations laws, and social security laws (Gkinni & Vasilaki, 2014). Based on their regression analyses, they observed that majority of their independent variables had significant negative coefficients (Gkinni & Vasilaki, 2014). These results indicated that increased employment regulation and protection is associated with lower income inequality (Gkinni & Vasilaki, 2014).

Checchi and García-Peñalosa (2005) primarily looked at 16 Organisation for Economic Co-operation and Development (OECD) member countries from 1960 to 1996 to analyze income inequality. One particular aspect of the study was the impact of labor market institutions, particularly the effect of unemployment benefits and the minimum wage (Checchi & García-Peñalosa, 2005). Results showed that OECD countries which provided unemployment benefits, had a positive impact on the share of wages (Checchi & García-Peñalosa, 2005). Results also showed that OECD countries which implemented a minimum wage, had a higher share of wages. (Checchi & García-Peñalosa, 2005).

However, it is important to emphasize that the existence of labor regulations alone is not sufficient in reducing income inequality. For example, according to Lee (1999) and Lemieux (2008), much of the increase in income inequality in the United States in the 1980s, can be attributed to the decline in the real value of the minimum wage. The weakening of employment protections can further compound the problem, leading to significantly higher income inequality,
which has been discussed by Stand and Rising (2011) and Dabla-Norris et al. (2015). Stand and Rising (2011) analyzed the rise of income inequality in several OECD countries in the past two decades. A significant portion of the rise of income inequality was attributed to the weakening of collective bargaining coverage and unemployment benefits (Stand & Rising, 2011). In addition, Dabla-Norris et al. (2015) discussed how the rise can also be attributed to the reduction of minimum wage relative to the median wage and weakening of the income protection system. From the combined effect of these various factors, by 2012, the top 1 percent shared approximately 22 percent of the total wealth in the United States, which is a level almost as high as in 1929 (Saez & Zuckman, 2014).

Current Gap in Literature

While previous literature has analyzed the effect of overtime pay on hours and wages, and the effect of labor regulations on income inequality, the effect of the overtime pay threshold on income inequality has not been addressed. This thesis will address this gap in knowledge that currently exists, while building upon previous literature.
HYPOTHESIS

The hypothesis for this study is between 2003 and 2013, U.S. States with an overtime threshold higher than the 2003 federal overtime threshold of $23,600 per year are associated with higher levels of income equality. The intuition for this hypothesis primarily relies in the testimony that Dr. Jared Bernstein gave before the House Committee on Education & Workforce in support of the Department of Labor’s final overtime rule. During the testimony, Dr. Bernstein discussed that when the labor standards and bargaining power of employees decrease, the level of income inequality tends to increase. Dr. Bernstein stated that he is not claiming a direct, causal trend between these two trends, rather an important observation, which needs more research. Dr. Bernstein presented an important graph in his testimony, as shown in Figure 4, which is primarily the foundation of this hypothesis. The figure demonstrates that as the overtime threshold, normalized to 2016 dollar, decreased over time, the top 1 percent income share increased. Thus, it is reasonable to infer that U.S. States with a higher overtime threshold would likely have lower level of income inequality.

Source: Testimony of Dr. Jared Bernstein, House Committee on Education & Workforce, June 9, 2016.

Figure 4: Overtime Threshold and Top 1-percent Income Share from 1950 to 2016
In order to effectively assess the impact of increasing the overtime pay threshold on the level of income inequality, an OLS model will be utilized in this research. In the model, state dummies were included. Implementing state dummies eliminates any potential omitted variable bias associated with state characteristics. The following model is used in this research:

\[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + a_t + u_t \]

Where:

\[ Y = \text{Gini} \]

Gini Coefficient

\[ X_1 = \text{HigherOvertimeThreshold} \]

Dummy Variable. Whether U.S. States’ overtime threshold were above the 2003 Federal Overtime Threshold, which is $23,600. A value of 1 is assigned if the state’s overtime threshold is above the 2003 federal overtime threshold and a value of 0 is assigned if the state’s overtime threshold is at the federal overtime threshold

\[ X_2 = \text{Top1(adj)} \]

Income shares for the top 1 percent

\[ X_3 = \text{AvgInc} \]

Average Income per tax unit, current $ 

\[ X_4 = \text{HighSchool} \]

High School attainment rate

\[ X_5 = \text{Unemp} \]

Unemployment rate for people over the age of 16

\[ u_t = \text{Unexplained Variance, Error Term} \]
\[ \beta_0 = \text{Y-intercept} \]

\[ \beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5 = \text{Coefficients for respective independent variables} \]

\[ a_i = \text{State Dummies} \]

*Source of Variables:* All variables from Frank, Sommeiller, Price, and Saez (2015), Frank (2009), and Bureau of Labor Statistics. Various variables included in this study, along with their definition, predicted relationship, and rationale are shown in Exhibit 1.
### Exhibit 1: Definitions and Expected Relationship

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Definition</th>
<th>Predicted Relationship</th>
<th>Rationale/Previous Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y1</td>
<td>Gini</td>
<td>N/A</td>
<td>Frank, 2009; Dabla-Norris, et. al., 2015</td>
</tr>
<tr>
<td>X1</td>
<td>HigherOvertimeThreshold</td>
<td>Negative</td>
<td>EPI, 2015</td>
</tr>
<tr>
<td>X2</td>
<td>Top1_adj</td>
<td>Positive</td>
<td>Frank (2009); Dabla-Norris, et. al., 2015</td>
</tr>
<tr>
<td>X3</td>
<td>Avg_Inc</td>
<td>Positive</td>
<td>Ortiz-Ospina &amp; Roser, 2016</td>
</tr>
<tr>
<td>X5</td>
<td>Unemp</td>
<td>Positive</td>
<td>Frank, 2009; Dabla-Norris, et. al., 2015; Conceição, et. al., 1999</td>
</tr>
<tr>
<td>(a_i)</td>
<td>State</td>
<td>N/A</td>
<td>Frank, 2009</td>
</tr>
</tbody>
</table>

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3 A tax unit is an individual, or a married couple who files a tax return jointly, along with all dependents of that individual or married couple.
**Justification of the Model**

First, several studies, such as Frank (2009) and IMF (2015) use the Gini Coefficient to measure the level of income inequality, in which 0 represents perfect equality and 1 represents perfect inequality. Compared to other measures of level of income inequality, such as the Atkinson Index, Theil Index, and Relative Mean Deviation, the Gini Coefficient is easily interpretable and can be compared across different populations. While the Gini is widely used in academics, it has limitations. For instance, it is insensitive to income growth at the bottom and top percentile of the income distributions (Alichi, 2016). Information about growth in the income of the top 1 percent is critical in measuring income inequality (Alichi, 2016). Despite limitations, it still effectively demonstrates how the distribution of income has changed within a country over a period of time.

Second, with regards to independent variables, the income shares for the top 1 percent have been found to be of primary concern in several studies, such as Frank (2009) and Dabla-Norris, Kochhar, Suphaphiphat, Ricka, and Tsounta, (2015). This concern is particularly valid, considering that the average annual income of the top 1 percent in the United States is $717,000 per year, which is more than the average annual income of the President of the United States (Dunn, 2012). Whereas, the average annual income for the rest of the population is $51,000 (Dunn, 2012). Unfortunately, this disparity between the top 1 percent and the rest of the population continues to grow, and thus, it is imperative to control for the income shares for the top 1 percent. The same case could have been made for the income shares for the top 5 percent or the top 10 percent, however, including these variables could have resulted in multicollinearity.

Third, average income is included in the model since there is a statistically significant correlation between average income and the level of income inequality. As Ortiz-Ospina and
Roser (2016) emphasized, higher average incomes are associated with higher levels of income inequality.

Fourth, the high school attainment rate is also included in the model since education is related to income. As Gregario and Lee (2002) discussed in their research, higher educational attainment plays a significant role in making the income distribution more equal. The data which were obtained for this research also included the college attainment rate, which could have also been controlled in this model. However, controlling for both high school and college education could result in multicollinearity. In addition, the college attainment rate assumes that individuals have graduated from high school and the percentage of students who graduate from high school is higher than the percentage of students who graduate from college.

Last, as established in the literature review, it is important to account for the unemployment rate as well since past studies, such as Conceição, et. al. (1999), have demonstrated that the unemployment rate correlates with the level of income inequality.

**Database**

The study utilizes data from Frank, Sommeiller, Price, and Saez (2015), Frank (2009), and the Bureau of Labor Statistics. In Frank et. al. (2015), the study incorporates data from the World Top Income Database, which presents the top income shares for each U.S. State from 1917 to 2013. All the income values are reported in current dollars. In addition, the study reports the four measures of income inequality, which includes the Gini Index, Atkinson Index, Theil Index, and the Relative Mean Deviation for each U.S. State from 1917 to 2013. Similarly, Frank (2009) presents the high school and college attainment rate for each U.S. State from 1940 to 2015. The data obtained from the Bureau of Labor Statistics display the overall unemployment rate for each U.S. State from 2003 to 2013.
Limitations of the Study

It should be acknowledged that there are several limitations with the database constructed in this study. It does not include all economic determinants of income inequality, such as the gross domestic product (GDP) and poverty rate for each state. In addition, it does not include other subjective measures, such as ability and discrimination. For example, O’Neill (1987) discusses how several individuals have exceptional mental qualities that are essential to high-paying professions, such as medicine and engineering. Unfortunately, many do not possess these qualities, and, as a result, they earn extremely low wages, and this gap in wages contributes to the growing level of income inequality. Furthermore, O’Neil (1987) discusses how discrimination in education and hiring contributes to income inequality. When discrimination reduces the competition that certain group of people face in occupations in which they are predominant, the level of income inequality increases (O’Neill, 1987). While it may be desirable to control for discrimination, many unfortunately do not report such incidents, which would create difficulty for the analysis.
ANALYSIS

Average Income and Gini Index

The results of this dataset are particularly interesting, considering it dispels many preconceived notions. For instance, from 1917 to 2013, the annual average income has steadily increased. In 1917, the average annual income was about $19,000 and, in contrast, the average income in 2014 was about $52,000. It should be noted that these numbers are adjusted for inflation. However, the Gini Index followed a similar upward trend, implying that the higher the annual average income, the higher the Gini Index (See Figure 5). Most importantly, annual earnings increased for everyone, both at the top and the bottom, but the income gap generally remained the same.

Source: Frank, Sommeiller, Price, & Saez (2015)

Figure 5: Average Income and Gini Index in the United States from 1917 to 2013
High School Graduation Rate and Gini Index

The high school graduation rate and the Gini Index follow a similar pattern. The high school graduation rate in the United States has also steadily increased over time from 1940 to 2015. In 1940, the high school graduation rate was 19.4 percent and, in contrast, in 2015, it was 66.2 percent. Comparably, the relationship between the high school graduation rate and income distribution seems to be like the relationship between annual average income and income distribution, the higher the high school graduation rate, the higher the Gini Index (See Figure 6). Again, one would have expected that if more people are educated, they are more likely to gain the training and skills they need to find the job they need. Indeed, educational attainment and income are positively related, but the gap in the income distribution continues to widen. However, it should be noted that as technology and globalization increased over time, a high school graduation degree was not sufficient to find a well-paying job, and, as a result, many were unemployed, which could explain for the rise of income inequality. Another possible explanation is that as the high school graduation rate increased, the rate of people getting college and advanced degrees increase as well.

Source: Frank (2009)

Figure 6: High School Graduation Rate and Gini Index in the United States from 1940 to 2013
Unemployment Rate and Gini Index

Furthermore, the relationship between the unemployment rate and the Gini Index was also examined (See Figure 7). From 2003 to 2013, the unemployment rate follows the business cycle, falling in recoveries and rising in recessions. Income inequality on the other hand is not cyclical. As Figure 7 shows, a recognizable correlation does not exist; however, it looks like that as the unemployment rate decreased, the gap in income distribution increased. From this figure, one may infer that better employment rate does not necessarily translate to improved income equality.

![Figure 7: Unemployment Rate in the United States from 2003 to 2013](image)

Source: Bureau of Labor and Statistics

Overtime Hours and Income Share held by Top 1 Percent

Working overtime hours means higher monthly earnings. So, conceivably, it could influence income inequality by giving wage and salary workers an opportunity to boost their income. Thus, the association between the number of overtime hours worked and the income
share received by the top 1 percent was examined.\(^1\) In 1938, before World War II, approximately 18 percent of all income received by Americans went to the top 1 percent. After that, until the 1980s, the share of the top 1 percent decreased substantially. However, after the 1980s, the income share began to increase again, as did the number of overtime hours (See Figure 8). This is a surprise, as our thought was that more overtime hours would lower income inequality. It is possible that those who worked overtime, were low-wage individuals who were trying to make ends meet. Thus, if there is a rise in the number of overtime hours, it could be a sign that there is a rise in the number of people struggling in the economy, which could explain for the increase in income inequality. However, the rise of income inequality could possibly be offset or reduced by the rise in the minimum wage, which will be discussed further in the regression results.

\[ \text{Source: Frank, Sommeiller, Price, & Saez (2015)} \]

\[ \text{Figure 8: Income Share Received by the Top 1 Percent and the Number of Overtime Hours worked in the Manufacturing Industries in the United States from 1917 to 2013} \]

\(^1\) It should be noted that the number of overtime hours was not controlled in the regression since including it would cause perfect collinearity with whether states are above the federal overtime threshold.
Overtime Threshold and Minimum Wage

The relationship between the minimum wage and overtime hours is more straightforward. States which are above the federal overtime threshold, such as California and New York, on average, have a higher minimum wage than states which are at the federal overtime threshold, such as Arizona and South Carolina (See Figure 9). If states are willing to expand overtime coverage, they are also more likely to increase the minimum wage. From Figure 9, it can be seen that during the period of 2003 to 2008 the states that had a slightly higher overtime threshold above $23,660 had a minimum wage of $5.92 compared to $5.83 for the states that had an overtime threshold equal to the federal overtime threshold of $23,660. A similar trend can be noted for the period of 2008 to 2013. During this period, the states that had an overtime threshold above $23,660, had a minimum wage of $7.39 compared to $7.26 for the states that had an overtime threshold equal to the federal overtime threshold of $23,660.

Source: U.S Bureau of Labor Statistics

Figure 9: Overtime Threshold and Minimum Wage, 2003 to 2013
Overtime Threshold and Gini Index

It would be expected that states which are above the threshold would have lower levels of income inequality, since on average, they have higher minimum wage and potentially higher earnings; however, it did not appear to be the case. From 2003 to 2013, U.S. States with an overtime threshold above $23,660 per year, overall, had a higher level of income inequality, as measured by the Gini Index, than U.S States with an overtime threshold equal to $23,660 per year. This shows that income was more equally distributed in states at the threshold, a very surprising finding (See Figure 10).

However, the findings are not as surprising if the period of 2003 to 2013 is divided into two periods, one from 2003 to 2008 and the other from 2008 to 2013. The period of 2003 to 2008, which was largely the second term of President George W. Bush, can be characterized as a period of extreme uncertainty the nation was going through in the aftermath of the tragic events of 9/11, starting with the wars in Afghanistan and Iraq and leading to the financial meltdown in 2008. Whereas, the period of 2008 to 2013, which was largely the first term of President Barack Obama, can be characterized as the beginning of a period of recovery.

From 2003 to 2008, the Gini Index for states with an overtime threshold equal to $23,660 per year was lower than the Gini Index for states with an overtime threshold above $23,660 per year, implying that income was more equally distributed in states at the threshold. (See Figure 11). In contrast, from 2008 to 2013, the Gini Index for states with an overtime threshold equal to $23,660 per year was higher than the Gini Index for states with an overtime threshold above $23,660 per year, which suggests that income was less equally distributed in states at the threshold.
This phenomenon may be explained by the unusual economic conditions of the nation, as noted above. In 2009, when President Obama started his first term, the nation lost about 800,000 private sector jobs and 500,000 public sector jobs. During this period of economic downturn, there were numerous people who either did not have jobs or even if they had jobs, they did not work 40 hours a week. This high unemployment rate might have skewed the income gap regardless of the overtime threshold.

The hypothesis of this study, that higher overtime wage laws would be related to lower income inequality is not supported by the data. Between 2003 and 2013, U.S. States with an overtime threshold higher than the 2003 federal overtime threshold of $23,600 per year had higher levels of income equality. This surprising fact will be further analyzed in the regression results, which will be elaborated later.

Source: Frank, Sommeiller, Price, & Saez (2015)

Figure 10: U.S States’ Overtime Threshold and Gini Index, 2003 to 2013

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2 Shaun Donovan, Director, Office of Management and Budget, Cabinet Exit Memo, January 5, 2017
In this study, the overall model is an OLS regression in which the dependent variable is the log of the Gini Index. The primary independent variable is a dummy variable, in which a number “1” means that the state overtime threshold is above the federal overtime threshold, while a number “0” means that the state overtime threshold is equal to the federal overtime threshold. Furthermore, three OLS regressions were performed, where one of the regressions controlled for the income share of the top 1 percent, and the other two regressions controlled for the income share of the top 5 percent and the top 10 percent, respectively (See Figure 11).

Theoretically, a fixed-effect model should be utilized since the data in this study is panel of state and years data. However, in order to utilize the fixed-effect model, the variables need to be time-varying. For example, the unemployment rate is time-varying, however, the main independent variable, which is a dummy variable, is constant. Since the fixed effect model accounts for characteristics fixed over time, including a variable of whether states are above the federal overtime threshold or not, based on the year implemented, would cause an error. In other
words, it is already accounted for by the time variable in a fixed effect model and does not need to be included.

**Regression Results**

After regressing the OLS models, they showed that the overtime threshold refuted the hypothesis of this study. Essentially, the regressions indicate that states whose overtime threshold are above the federal overtime threshold are associated with higher levels of income inequality. More specifically, on average, the Gini Index for states above the threshold is 12.4 percent higher than states equal or below to the threshold. It should be noted that these results are statistically significant for the first and third regression (See Figure 11).

These results are similar to the results found by Bell and Hart (2003), who examined British firms which offer overtime pay. They found that firms that pay “higher-than-average” overtime premiums pay lower base wages (Bell & Hart, 2003). In addition, they discovered that the average hourly earnings remain constant despite the number of overtime hours the employee worked (Bell & Hart, 2003). Trejo (1991) and Barkume (2010) also found similar results, in that they discovered that the Fair Labor Standard Act (FLSA) overtime pay requirement forced employers to provide lower wages to compensate for the additional costs incurred due to overtime. Overall, these studies demonstrate that mandatory overtime pay has negatively impacted employers and employees, which can possibly explain for the increase in the level of income inequality.

---

3 Summary: Based on the diagnostics, there is indication that the model has heteroscedasticity, no multicollinearity, and no model specification error. It should be noted that some of the coefficients have a variance inflation factor greater than 10, however, it can be attributed to the addition of state dummies. (See Appendix for details)
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<td>(3.95)</td>
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<td>0.427***</td>
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<td>(8.69)</td>
<td>(7.84)</td>
<td>(11.33)</td>
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<td>.766</td>
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<td>(-14.37)</td>
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* p<0.05, ** p<0.01, *** p<0.001

Figure 12: Regression Results
While these results were surprising at first, they are explainable. According to a report released by the Heritage Foundation in 2015, it was stated that employers would be compelled to take steps, in order to offset the overtime payment requirement, which may harm employees. This can be explained by the “fixed-wage” and “fixed-job” model. The fixed-wage model states that employers determine hourly wage rates by outside market forces. Under the fixed-wage model, mandatory overtime pay makes it expensive for employers to afford decent hourly wages (Sherk, 2015).

The high costs of overtime pay would force employers to find cheaper alternatives, as discussed by Trejo (1991) and Barkume (2010). For example, employers could convert their employees from salaried to hourly wages. Employers could also continue to pay their employees at the same salary as long as they do not work over 40 hours per week. Another option which employers may take, that many do not want to admit, is that they could make capital technological investments that would reduce the need for human labor (Sherk, 2015). Some argue that overtime payment requirement may force employers to hire additional employees that would eventually help reduce unemployment and improve economy. However, several economists stated that increasing the overtime eligibility threshold would not increase employment in the long term (Hamermish, 1996, p. 176).

In contrast to the “fixed-wage” model, the “fixed-job model” states that the hourly wages fairly depend on the number of hours worked, including overtime (Sherk, 2015). More specifically, according to this model, employers only care about the total number of hours worked and the total pay for that work (Sherk, 2015). Under the fixed-job model, the model predicts that employers can pay employees less if they expect that this would compensate for the loss due to overtime pay (Sherk, 2015). Using this notion, the total earnings would remain
unchanged (Sherk, 2015). It should be noted that if employees earn near the minimum wage, employers cannot offset costs with lower wages (Sherk, 2015). While this model suggests overtime pay does not affect total earnings, workers may not be willing to be paid less, but there may be some days where they can afford to work overtime. Employers reducing the basic pay of the employees for avoiding losses due to overtime payment would exacerbate the level of income inequality.

Surprisingly, overtime pay and income inequality move in tandem. That is, having higher overtime pay was associated with higher income inequality. In addition, the minimum wage was negatively related to income inequality, meaning it helped decrease the Gini Index or income inequality (See Figure 11). On average, increasing the minimum wage is associated with a decrease the Gini Index by 1.43 percent. Furthermore, minimum wage was statistically significant for all of the three regressions, which was not surprising. Heather Boushey, Executive Director and Chief Economist of the Washington Center, who testified before the U.S Senate Committee on Health, Education, Pension, and Labor, discussed how raising the minimum wage has positive economic effects beyond reducing the poverty rate. A higher minimum wage boosts productivity and addresses the growing rise in income inequality (Boushey, 2014)

Furthermore, these results corroborated with the findings of others. For example, according to Litwin (2015), who studied countries that are part of the Organization for Economic Development, found that increasing the minimum wage can decrease income inequality. While these results were statistically significant as well, it should be noted in Litwtn (2015) that income inequality can be reduced until the minimum wage reaches its “maximum effectiveness value.” Likewise, Dinardo, Forton, Lieumx (1996) discovered that the decrease in the minimum wage from 1979 to 1988 has a statistically significant effect on the distribution of wages in the
United States. The decline in the minimum wage attributed for a fourth of the increasing wage inequality for men and up to three-tenth of the increasing wage inequality for women (DInardo, Forton, Lieumx, 1996). Similarly, MIT economist, David Autor; Federal Reserve Board economist, Christoper Smith, and London School of Economics economist, Alan Manning, discovered that from 1979 to 2009, the decline in the minimum wage explains about 45 percent of the increase in the income inequality (2016).

In addition, as expected, unemployment has a positive, statistically significant relationship with the Gini Index (See Figure 11). A high unemployment rate indicates that a country is not using its resources in an effective manner in helping individuals from low-socioeconomic households in entering the labor market. Research has shown that unemployment can explain the rise in income inequality: Lee (2015) also found that an increase in unemployment rate is associated with an increase in the Gini Index in the United States. Unemployment even appears to be a significant factor in the rise in income inequality during the 1990s, as discovered by González and Menendez (2000). Björklund (1991) who studied the labor market in Sweden, corroborates these findings.

Surprisingly, while the high school graduation rate appears to be positively related with the Gini Index, the results were not statistically significant. Other researchers, such as Martin and Pereira (2003), who studied male workers in 16 countries, found that schooling has a statistically significant, positive impact upon wage inequality. Furthermore, Gregario and Lee (2002), who studied a broad range of countries from 1960 to 1990, also found that educational attainment plays a significant role in making the income distribution more equal.

Last, the GDP is negatively related, but statistically significant for the top 10 percent, with the level of income inequality. It should be noted that these results are not statistically
significant. The literature in this area is mixed. While Forbes (2000) finds that greater income inequality is associated with faster economic or GDP growth, Alesina and Rodrik (1994) and Persson and Tabellini (1991) found that higher GDP growth is associated with lower levels of income inequality.
POLICY IMPLICATIONS

Hours worked more than regular hours, which are 8 hours a day and 40 hours a week, are generally at the expense of the health and happiness of the workers and the wellbeing of their families and thus warrant higher wages. Salaried workers, whether at their own will or at the exploitation of their employers, end up working many more hours beyond their regular hours. An overtime threshold of $23,660 per year, which has been in place for so many years, essentially says that if a salaried person earns $23,660 per year or higher gets the same amount of compensation, on a weekly, bi-weekly or monthly basis, regardless of the number of hours worked during that period. Considering that $23,660 per year is equivalent to $11.38 per hour, almost no salaried worker is eligible for overtime pay.

The new higher U.S. Department of Labor rule for an overtime threshold of $47,476 had good intentions with the wellbeing of a regular person in mind and to control the exploitation of workers by the employers. An argument was made by many, including Dr. Jared Bernstein, the Chief Economist of then Vice President Joe Biden, that a higher overtime threshold, would help reduce income inequality. However, it seems that this link between higher overtime threshold and income inequality was not well grounded into a large volume of data and a systematic analysis of such data. A more realistic explanation is that this large volume of data, linking overtime threshold and income inequality, was just not there, which was essentially the justification and motivation behind this research.

It is not uncommon for policymakers to make a policy decision on socio-economic issues based on the information that is available at that time, rather than waiting for more detailed and comprehensive information, which may take months or years. The risk they have is if they wait, they might not even be in a policymaking position, for example the administration may change,
as was the case with this overtime rule. Thus, the implications of a policy are not known or clear until long after those policy decisions are made and the policymakers are gone.

The results of this research suggest that increasing the overtime eligibility threshold will not probably decrease income inequality. The Gini Index for states which had an overtime threshold above the federal threshold was found to be 12.4 percent higher than that of the states which kept their overtime threshold at the same level as federal threshold. Based on the regression analysis of this research, this is considered statistically significant. While these results were not expected, they are rational, considering that income inequality has not correlated expectedly with many economic determinants such as average annual income, high school graduation rate or even the unemployment rate.

The findings of this research should be considered in the context of the limitations of the study. This study analyzed the level of income inequality between 2003 to 2013 for a limited number of states that had their overtime threshold higher than the federal threshold. Also, this was the timeframe, when the country went through a historic financial crisis (2003 to 2008) and then recovered from this financial crisis (2008 to 2013). It is conceivable that the economic conditions during this timeframe biased the effect of the overtime threshold. If a longer timeframe was utilized, the results might have been different. Also, if this study was conducted 5 to 10 years after the U.S. Department of Labor rule went into effect, and a nationwide comparison was made before and after the implementation of the higher overtime threshold, there would have been a larger volume of data available for analysis, and the results might have been different.

Additionally, the results of this research do not specifically indicate the effect the rule had on employees. More specifically, it is unknown whether the rule was negatively associated
with the number of overtime hours worked. It is possible that employers continued to pay their employees at the same salary, ensuring that employees did not work more than 40 hours per week, which would have decreased the number of overtime hours worked. It would have been interesting to include the number of overtime hours worked in this regression analysis. Unfortunately, including this variable would cause perfect collinearity with the main independent variable, which is whether states are above the overtime threshold. Essentially, the variable would have been kicked out of the model. Further research in this area should be conducted.

Workers

The implications of the new higher overtime rule are expected to be positive, regardless of their impact on income inequality, assuming that the employers responded and acted in good faith and considered the welfare of their employees an important part of their business. The salaried employees that were in the range of $23,660 per year and $47,476 would have benefited significantly if they were working overtime hours without compensation. Also, those salaried employees that were slightly below the new overtime threshold of $47,476 might have benefited if their employers adjusted their salaries upward and brought them just above the threshold to avoid paying overtime. In the scenario where the employer did not want to pay overtime, did not make an upward adjustment, and simply stopped employees working more than 8 hours a day or 40 hours a week, it would have again benefited the employees. They would have been paid the same amount, but now working less hours, just the regular hours.

A negative implication of this policy would have been if the employers converted salaried employees to an hourly status, for example someone making $40,000 per year, considering that they are going to pay overtime anyway, but they can save some money by not paying for benefits or paying for lesser benefits. Generally, salaried employees have paid
benefits like holidays, vacations, health insurance, etc., compared to hourly employees. Also, salaried employment is more satisfying and uplifting to many compared to hourly employment.

**Employers**

This U.S. Department of Labor overtime rule probably came as a shock to many employers. First, the change was quite large, from $23,660 per year to $47,476, a two-times increase. Any change of this magnitude is never taken as positively, rather perceived as overregulation and control exercised by the government. Second, the employers were not given enough time to adjust and adopt to the new rule. The rule was introduced in June 2016 and the employers were required to comply by December 2016. At this stage, the data on how the employers reacted to this rule and what actions they took to comply is not known. It is possible that some employers acted, but others waited it out to see the outcome of the 2016 Presidential election. Generally, small businesses react differently than large businesses and they do not take regulations positively, but, ultimately, they do comply. Large businesses do not take regulations positively either, but they have resources to fight it out and find loop holes to go around the regulations.

The economic conditions of the country also control the impact of regulations. In tough economic conditions, the employers tend to do more with less, and these are generally salaried employees who do more. On the other hand, in good economic conditions, the employers generally do not care too much about regulations like this when they are struggling to find good workers. The economic conditions the time this regulation was implemented were neither too good nor too bad, it was a steadily improving economy. Probably, this was the reason, this regulation did not make headlines and draw widespread opposition.
Public policies have implications on government as well. Policies affect people and people can change governments. On the other hand, governments can change policies. However, it does not seem that the overtime rule of the U.S. Department of Labor had any significant impact on the 2016 Presidential Election. Ironically, in November of 2016, a federal judge stated that the overtime rule is unlawful. According to the judge, the Department of Labor does not have the power to determine whether employees are eligible for overtime pay, solely based on salary level. As a result, the judge issued a nationwide injunction, blocking the final overtime rule. It will be interesting to see how the new administration handles the matter. It is completely possible that the overtime regulation might be eliminated, considering President Trump’s position that for any new regulation to go into effect, two existing regulations must be eliminated. However, if this occurs, states still have the power to determine the overtime eligibility pay and further research on the effect of overtime pay can still be conducted.
RECOMMENDATIONS

This research refutes the hypothesis that a higher overtime threshold helps reduce income inequality. During the period of 2003 to 2013, the states that had an overtime threshold higher than the federal overtime threshold of $23,660, had a slightly higher income inequality compared to states that were at the federal threshold. Based on the findings of this research and an observation of the implications of the overtime regulations of the U.S. Department of Labor, the following recommendations are made:

1. This overtime rule should not be eliminated, rather left in place for at least 10 years. This would allow collection of a large volume of consistent data nationwide and, thus, result in a better assessment of the impact of overtime threshold over income inequality.

2. A nationwide survey should be conducted on the satisfaction and dissatisfaction of employees and employers with this overtime regulation.

3. The U.S. Department of Labor should monitor the compliance of this regulation by the employers.

4. Future studies should be conducted, as more data becomes available, to correlate overtime threshold with income inequality.

5. Further studies should be conducted on any unintended negative consequences of this regulation, for example, reduced base wages or loss of employment benefits such as paid holidays, vacations, and health insurance.

6. The U.S. Department of Labor should revisit this regulation after 10 years, during the period of 2025 and 2030, and make any adjustments in overtime threshold, if needed.
DIAGNOSTICS

Model diagnostics were performed to assure that the model was robust. First, two tests
were performed to diagnose whether the model has heteroscedasticity, meaning the variance of
the error terms differ across observations. If the tests indicate that there is homoscedasticity, it
implies that the standard errors of the estimates are biased. Based on first test, in which the
residuals were plotted against the fitted values, it can be concluded that there is no
heteroscedasticity since it appears that the distribution is random. (See Appendix A).
Furthermore, based on the second test, which was a hypothesis test, assessing whether
homoscedasticity exists, it can be deduced that heteroscedasticity is present (See Appendix B).
Essentially, the null hypothesis was rejected since the p-value, which is 0.000, is less than the .05
alpha level.

Similarly, tests were conducted to determine whether there is multicollinearity, which is
when two independent variables are highly correlated to each other. When multicollinearity is
present, it can increase the variance of the coefficients, making it difficult to interpret the
coefficients. First, the variance inflation factor (vif) test is utilized, which measures how much
the variance of the estimated regression coefficients are inflated and if the coefficients have a
value greater than 10, it indicates there may be a problem. Unfortunately, there were some
coefficients that had a value greater than 10, however, it can be attributed to the inclusion of state
dummies in the regressions (See Appendix C). Furthermore, based on correlation matrix, which
provides the value of the correlation coefficient between each of the independent variables, none
of the correlations have a value greater than 0.80 (See Appendix D). Values greater than 0.8
indicate there is multicollinearity. It should be noted that the correlation between the income
share held by the top 1 percent, top 5 percent, and top 10 percent have a value greater than 0.8, however, these variables were not regressed together at the same time.

More importantly, diagnostics were conducted to determine whether there is model specification error, which is when one of the assumptions of the model is incorrect. It can be recognized by plotting the residuals against the observed value of the dependent variable. Based on the plot, it appears there is a random distribution, indicating there is no specification problem in the model (See Appendix E). In addition, it can also be identified by performing the Ramsey’s Test, which evaluates whether there are omitted variables (See Appendix F). The test reveals that there are no omitted variables since the p-value is 0.766, which is significantly greater than the 0.05 alpha level. Last, model specification error can be also detected by performing the linktest, which provides information on whether the correct functional form is utilized (See Appendix G). Based on results, it can be stated that the model was robust.
Appendix A: Heteroscedasticity – Informal Test
Appendix B: Heteroscedasticity – Formal Test

White's test for Ho: homoskedasticity
against Ha: unrestricted heteroskedasticity

\[
\begin{align*}
\text{chi2(43)} &= 180.45 \\
\text{Prob > chi2} &= 0.0000
\end{align*}
\]

Cameron & Trivedi's decomposition of IM-test

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Appendix C: Multicollinearity – Variance Inflation Factor (VIF) Test

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<td>st</td>
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</table>
## Appendix D: Multicollinearity- Correlation Matrix Test

<table>
<thead>
<tr>
<th></th>
<th>loggini</th>
<th>higherover~d</th>
<th>minwage</th>
<th>top01~j</th>
<th>top05~j</th>
<th>top10~j</th>
<th>y90</th>
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<tbody>
<tr>
<td>loggini</td>
<td>1.0000</td>
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<td>higherover~d</td>
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<td>1.0000</td>
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<tr>
<td>minwage</td>
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<td>0.2162</td>
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<tr>
<td>top01~j</td>
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<td>0.0392</td>
<td>1.0000</td>
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<tr>
<td>top05~j</td>
<td>0.5912</td>
<td>0.2702</td>
<td>0.0492</td>
<td>0.0927</td>
<td>1.0000</td>
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<tr>
<td>top10~j</td>
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<td>0.1907</td>
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<td>0.8357</td>
<td>0.8668</td>
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<tr>
<td>y90</td>
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<td>0.3501</td>
<td>0.2154</td>
<td>0.3610</td>
<td>0.3971</td>
<td>0.2448</td>
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<td>highschool</td>
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<td>-0.4224</td>
<td>0.4437</td>
<td>0.0180</td>
<td>0.0180</td>
<td>-0.0079</td>
<td>0.2974</td>
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<td>0.0452</td>
<td>0.5723</td>
<td>-0.1346</td>
<td>-0.1252</td>
<td>0.2084</td>
<td>-0.1232</td>
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<tr>
<td>logavginc</td>
<td>0.0537</td>
<td>0.3220</td>
<td>0.3376</td>
<td>0.4662</td>
<td>0.4820</td>
<td>0.2456</td>
<td>0.8633</td>
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<tr>
<td>loggdp</td>
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<td>0.1599</td>
<td>0.1177</td>
<td>0.2835</td>
<td>0.3351</td>
<td>0.4984</td>
<td>0.3092</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>highsc~l</th>
<th>logunemp</th>
<th>logavg~c</th>
<th>loggdp</th>
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<td>0.3279</td>
<td>0.1912</td>
<td>1.0000</td>
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</table>
Appendix E: Model Error Specification - Residuals Plot
Appendix F: Model Error Specification Test- Omitted Variable Test

Ramsey RESET test using powers of the fitted values of loggini
Ho: model has no omitted variables
F(3, 500) = 0.38
Prob > F = 0.7668
### Appendix G: Linktest

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>Number of obs = 561</th>
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<tbody>
<tr>
<td>Model</td>
<td>1.42697341</td>
<td>2</td>
<td>0.713486706</td>
<td>F(2, 558) = 976.47</td>
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<tr>
<td>Residual</td>
<td>0.407717582</td>
<td>558</td>
<td>0.000730677</td>
<td>Prob &gt; F = 0.0000</td>
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<tr>
<td>Total</td>
<td>1.83469099</td>
<td>560</td>
<td>0.003276234</td>
<td>R-squared = 0.7778</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Adj R-squared = 0.7770</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Root MSE = 0.02703</td>
</tr>
</tbody>
</table>

| loggini | Coef. | Std. Err. | t   | P>|t| | [95% Conf. Interval] |
|---------|-------|-----------|-----|-----|----------------------|
| _hat    | 1.224578 | 0.3471761 | 3.53 | 0.000 | 0.5426464 - 1.90651  |
| _hatsq  | 0.2251992 | 0.3473956 | 0.65 | 0.517 | -0.4571638 - 0.9075622 |
| _cons   | 0.0554027 | 0.0862382 | 0.64 | 0.521 | -0.1139884 - 0.2247938 |
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American Economic Review, 719-740