The Effects of Minimum Wages on Poverty in the United States, 2008-2013

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ABSTRACT

This econometric study examines the effect of minimum wage increases on poverty and public program participation using individual-level data from the 2008 panel of the Survey of Income and Program Participation (SIPP), covering 2008 through 2013. Although many prior theoretical and empirical studies have sought to determine this relationship, economists have not reached a general consensus about the effects of minimum wage policies on poverty. Furthermore, the prior studies used data that predate the Great Recession. Using linear probability models and ordinary least squares, my analysis concludes that minimum wage increases may help reduce poverty for certain workers, but it has found little statistically significant evidence that minimum wages affect the likelihood of living in poverty or receiving public assistance for most of the population.

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CHAPTER 1

INTRODUCTION

Since the enactment of the Fair Labor Act of 1938, the United States government has implemented a labor market price floor called the minimum wage. While early political contentions arose about employers' rights to freely negotiate contracts, many recent economic debates concern whether minimum wages actually fulfill their main purpose, which is to help low-income workers. In this paper, I seek to examine whether minimum wage increases are an effective policy for decreasing poverty and financial hardship in the United States.

Policies to increase the minimum wage have received significant public attention in recent years. In his State of the Union Addresses in 2013, 2014, and 2015, President Barack Obama urged Congress to raise the federal minimum wage from $7.25, which has been the prevailing rate since 2010. As of July 1, 2015, twenty-nine states and Washington D.C. have instituted higher state minimum wages, fifteen of which have also enacted further increases that will go into effect over the next several years (National Conference of State Legislatures, 2015). The Council of Economic Advisers

(CEA) estimates that increasing the minimum wage to $10.10 could benefit about 28 million workers either directly or indirectly (Executive Office of the President, 2014). In contrast, political opponents to minimum wage legislation argue that adverse labor effects and other economic forces would counteract these benefits and actually exacerbate income inequality. Thus, determining the relationship between minimum wages and poverty could have important policy implications.

This study uses the 2008 panel of the Survey of Income and Program Participation, which includes individual-level data from the years 2008 through 2013, during the height of the Great Recession. After controlling for unobserved time heterogeneity, the results show little statistically significant evidence that minimum wages affect the probability of living in poverty or receiving government subsidies. However, when using workers as the sample, the results are statistically significant and indicate that minimum wages reduce poverty, except for when the sample is further restricted to demographics of workers who are the most likely to earn minimum wages, based on prior literature. For these latter models, the estimated minimum wage effects are statistically insignificantly different from zero. These findings, which are consistent with several other recent studies, suggest that minimum wages help some workers but are overall ineffective at alleviating poverty.

CHAPTER 2

LITERATURE REVIEW

Most prior studies about the effects of minimum wages on poverty rely upon theoretical predictions regarding changes in the labor market. Like politicians, economists are divided about these effects. Predictions of adverse labor effects often rely on models of perfectly competitive labor markets. Since Card and Krueger (1994) and several other studies in the early 1990's presented empirical evidence that employment levels sometimes increase in response to an increase in the minimum wage, more economists began to propose alternatives to the standard competitive model. They developed theories about monopsonistic and oligopsonistic labor markets, efficiency wages, effort adjustment models, and spillover effects. Each of these theoretical models, as well as their implications for poverty, will be discussed.

2.1 Labor Effects Under Perfect Competition

Levin-Waldman (2014) describes how the standard model of labor markets is characterized by a large number of perfectly competitive firms, making them price takers. **Figure 1a** shows the labor supply and demand for a single firm, whereas **Figure 1b** shows the entire perfectly competitive market.

If there is excess labor supply or demand, the employment level and wages adjust until the market returns to equilibrium (point A in **Figure 1a** and point C in **Figure 1b**), at which point firms pay workers their marginal revenue product (otherwise changing the employment level would increase their profits).

When the government sets a wage floor (W_{min}) above the market equilibrium, firms lay off low-wage workers whose productivity is lower than the minimum wage (point B in **Figure 1a**) while the market attracts surplus workers and increases labor hours supplied. In **Figure 1b**, the market comes to point D and the excess supply of labor is $Q^{S}_{min} - Q_{min}$. In the long run, firms will substitute capital for labor where possible; this substitution effect results in an inefficient underutilization of the workforce. Furthermore, firms' production costs will increase due to the minimum wage, forcing them to increase output prices, and thus the quantity demanded for that output will decrease (assuming they are normal goods). Consequently, firms will further reduce employment levels in response to their lower level of production, also known as a scale effect.

Figure 1a
Minimum Wage Effects for a Single Firm in a Perfectly Competitive Market

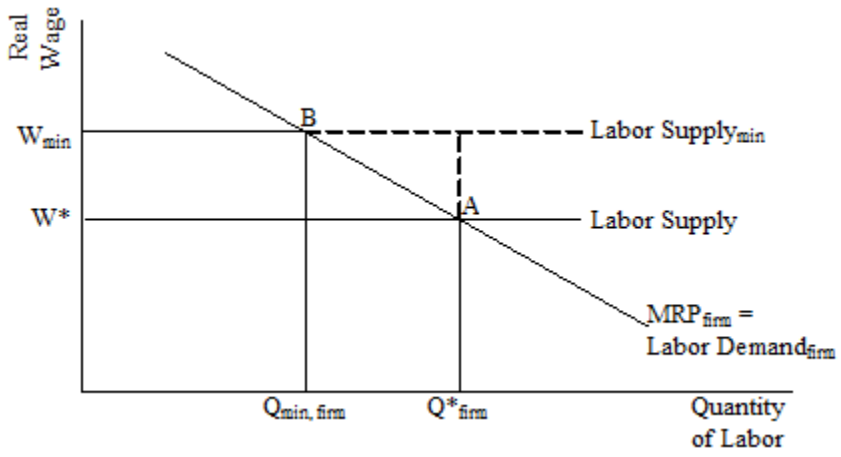
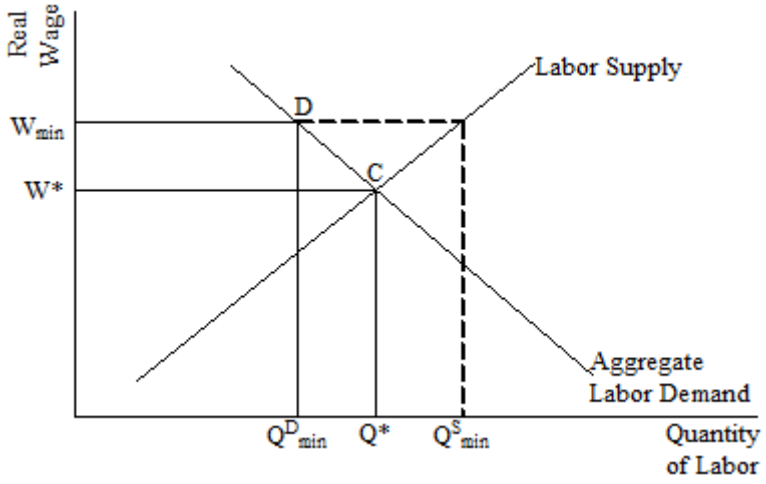


Figure 1b
Minimum Wage Effects for a Labor Market with Perfect Competition



According to the predictions from the standard model, minimum wages actually hurt some of those same low-wage workers whom they were intended to help. However, the magnitude of these effects depends on several

key assumptions. The substitution effect increases as the elasticity of labor demand increases or if labor accounts for a large share of firms' production costs, while the scale effect is greater if the elasticity of demand for output is more inelastic. In particular, a large scale effect would hurt the poor because they have relatively low disposable income, so raising prices would further constrain their already-tight budgets. The substitution effect, however, may not harm the poor to the same extent: descriptive statistics have shown that the majority of minimum wage earners are second or third earners in households whose income is already above the poverty threshold, while most poor workers earn wages higher than the legal minimum (Sabia and Burkhauser, 2010; Sabia and Nielsen, 2015). Consequently, if the low-skill workers whom firms lay off due to their lower productivity are not poor, minimum wage increases will not directly impact poverty.

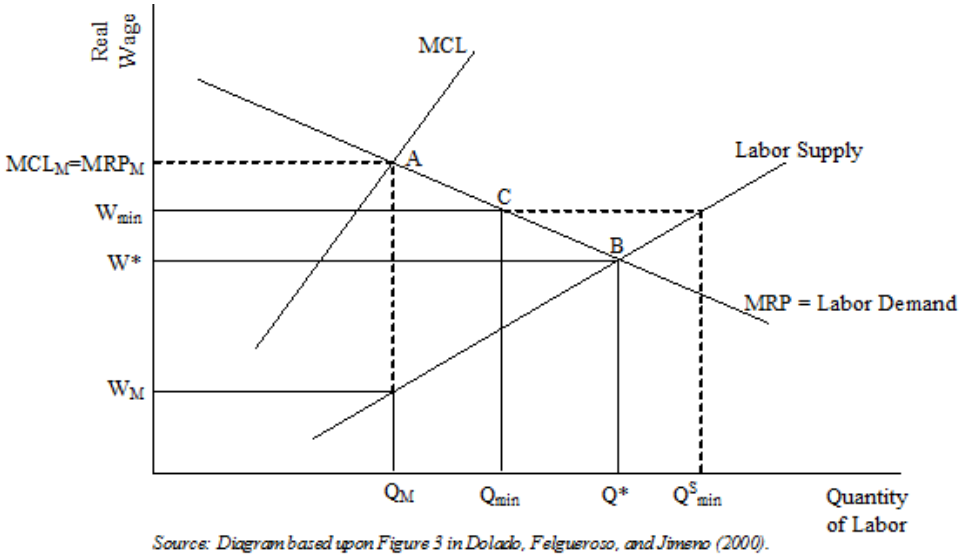
2.2 Monopsonistic and Oligopsonistic Labor Markets

Empirical evidence from several studies in the early 1990's failed to support the adverse labor effects that minimum wages were predicted to induce in perfectly competitive labor markets (Card and Krueger, 1994; Katz and Krueger, 1992; Machin and Manning, 1994). Economists began to postulate other models to explain the effects of minimum wages. One alternative theory to perfect competition that economists commonly study is monopsonistic labor markets. These include a single, wage-setting firm facing

the entire (upward-sloping) market supply curve (Ashenfelter, Farber, and Ransom, 2010). If the firm must pay all of its workers the same rate, then the marginal cost of labor (MCL) curve lies above and is steeper than the labor supply curve, as shown in **Figure 2**. As usual, the firm maximizes its profits by choosing the employment level where the marginal revenue product (MRP) equals the MCL (point A). The resulting wage rate and quantity of labor (W_M and Q_M) are both lower than they would be under perfect competition at point B.

If the government sets a minimum wage higher than this monopsony wage but lower than the point where MRP equals MCL, then the firm once again becomes a wage taker (Dolado, Felgueroso, and Jimeno, 2000). It increases employment and pays the statutory minimum. However, point D shows that when the minimum wage (W_{min}) rises above the intersection of the supply and demand curves, the employment level Q_{min} is below the perfectly competitive level and there is an excess supply of labor ($Q^S_{min} - Q_{min}$). Furthermore, if the minimum is higher than where the MRP and MCL curves intersect, employment decreases to below the regular monopsony level. Both of these situations have an excess supply of labor. Thus, the efficiency of minimum wage policies relies crucially upon the rate the government chooses to set.

Figure 2
Minimum Wages Effects in Monopsonistic and Oligopsonistic Markets



Source: Diagram based upon Figure 3 in Dolado, Felgueroso, and Jimeno (2000).

Economists commonly criticize both perfect competition and monopsony theories due to their limited applicability to only a few real-world labor markets (Bhaskar, Manning, and To, 2002; Dolado, Felgueroso, and Jimeno, 2000). With respect to the former model, it seems implausible to expect all employees to leave a firm offering only slightly lower wages and seek work at other firms. On the other hand, every firm has some degree of competition for workers, perhaps from firms in other geographic areas or other industries with jobs requiring similar skills. Hence, it also seems implausible that a single firm would face the entire labor supply curve as is assumed in monopsonistic markets.

Bhaskar, Manning, and To (2002) describe more realistic labor markets called oligopsony (which has some entry and exit barriers) and

monopsonistic competition (with free entry and exit). These models include perfect competition's characteristic of multiple firms contesting for the same laborers, but also include a monopsonistic-style upward sloping labor supply curve and wage-setting firms. The authors offer several supply-side reasons for how such a market could exist: imperfect information about job opportunities or wage differentials; job finding costs; and heterogeneous preferences for similar jobs at different firms based on working conditions, hours of work, or geographic location. This last explanation applies particularly well to minimum wage laborers. Since these individuals are typically second or third wage earners in their household, they would not want to relocate for a job if that would jeopardize the primary wage earner's job (with a higher salary). In addition, low-skill workers are often teenagers with limited means of transportation. Consequently, they would have heterogeneous job preferences based on geographic location. By exploiting these market imperfections, firms are no longer price takers. They can set wages lower than the perfect competition equilibrium to increase their profits.

Kim (2004) also provides a demand-side explanation for oligopsonistic labor markets: returning to **Figure 2**, in a market with several large, identical firms, the MRP curve is the horizontal sum of the firms' individual labor demand curves. Through collusion (either explicitly as in a cartel or implicitly), the firms can agree to decrease demand for labor. Together, they act like a monopsonist to achieve the result at point A. Each firm employs

$\frac{Q_M}{n}$ workers, where n is the number of firms in the market. The wage and total employment (W_M and Q_M) are below what they would be under perfect competition at point B.

In oligopsonies, the introduction of a minimum wage has a similar effect as in monopsonistic markets, where employment rises if the legal minimum is set modestly above the equilibrium market wage (point C in **Figure 2**). However, free entry and exit in monopsonistic competitive labor markets also causes an "exit" effect, in which some firms are forced to exit the market due to higher production costs and so those employment opportunities are lost. Due to these counteracting effects, minimum wages could result in either increased or decreased unemployment, although the magnitude of this change would be less than in perfectly competitive or monopsonistic markets. The impact on poverty is even more ambiguous, as it also depends on the characteristics of the workers who would gain or lose employment as a result.

2.3 Efficiency Wages and Effort Adjustment Models

Shapiro and Stiglitz (1984) first introduced the idea of efficiency wages in labor markets with a large number of small, identical firms. In equilibrium, workers have little incentive to work hard because even if they are fired, they could easily find another job at a different firm. Raising wages could be beneficial to a firm because it provides an incentive for workers to not shirk. The aggregate effect is that all firms will find it beneficial to

increase wages. Initially, the quantity of labor demanded will decrease and unemployment will increase. Now, workers will not want to shirk since there is no guarantee of finding a new job. This implies that if firms want to hire more workers while also preventing them from shirking, they must offer higher wages, resulting in an upward-sloping MCL curve and no-shirking curve (which can be thought of as the labor supply curve) as in monopsonies (Rebitzer and Taylor, 1995). Hence, even in labor markets with a high degree of competition, minimum wages could have the same effect as in monopsonies by increasing employment, so long as the minimum is not above the intersection of the MCL and MRP curves. Likewise, the consequences to poverty would follow the previous analysis for monopsonies. Additionally, firms would no longer require as much supervision to discourage shirking, which frees up significant funds (supervision is generally thought to be costly) to hire more workers. However, if workers earn minimum wages at a secondary job, shirking in the primary sector might increase, which could mitigate the overall effects of a minimum wage increase.

The effort adjustment model (Ippolito, 2003) is an extension of efficiency wages. In perfectly competitive labor markets, the market supply curve is upward-sloping. Workers lower on the supply curve gain a higher utility (which Ippolito calls a “higher rent”) than workers higher on the supply curve who earn the same wage. When the government imposes a wage floor, the quantity of labor demanded decreases while the quantity supplied

increases. Firms cannot distinguish between high-rent and low-rent workers who are now competing for the scarce number of jobs. However, while employed, high-rent workers will increase their effort in order to keep their job since, by definition, they place a high value on it. In comparison, low-rent workers will not find it worthwhile to increase their effort as much and will thus look like loafers to the firm. Over time, all of the jobs will be distributed to hard-working high-rent laborers.

Theoretically, the effort adjustment model shows that minimum wages should reduce poverty. Because poor workers usually have little disposable income and few savings, they have a lot to lose by being fired. This means that they value their job more, making them high-rent workers, and so they would increase their effort. As a result, poor workers would remain employed and receive a higher wage than without the government-imposed wage floor. Although other, low-rent laborers would be worse off, minimum wages would increase income for poor workers. However, the higher effort required to keep their job could decrease their total utility, and so the net-effect for these workers is ambiguous.

2.4 Spillover Effects

The most obvious effect of minimum wages is to increase the wage for low-skill workers. As previously stated, these workers directly affected by minimum wage increases are not necessarily living in poverty, since most

poor workers already earn above the legal minimum (Sabia and Nielsen, 2015). However, other studies have examined spillover effects, where minimum wage increases also cause higher wages for workers previously higher in the wage distribution. By examining wage contours (groups of workers in a particular industry who are similar with respect to their wages and other characteristics), Levin-Waldman (2014) found that in each year with minimum wage increases, the median wages also increased for the 10 lowest contours of the wage distribution, representing 57 to 70% of the workforce in various years. The wages for most of these affected workers had already been greater than the new statutory minimum. One theory Levin-Waldman proposed for this spillover effect is that some workers' contracts require that their wages automatically increase in order to remain above the minimum by a certain amount.

Alternatively, a game theory experiment conducted by Falk, Fehr, and Zehnder (2006) offers another possible reason for the spillover effects of minimum wages. In their laboratory setup, people representing firms and workers bargained over wages, first without and then with a statutory minimum. The authors found that at first the participants bargained wages below the minimum, yet after the minimum wage law was introduced, the bargained level dramatically increased to far above the statutory minimum. The reservation wages of the "workers," which were recorded prior to the bargaining in each trial, followed a similar pattern. This result suggests that

minimum wages affect what workers perceive as fair and thus increase their reservation wages, even if they were initially earning above the minimum: this behavior effect drives the spillover effects observed after minimum wage increases.

Regardless of whether contractual obligations or behavioral fairness perceptions are the root cause of spillover effects, the model predicts that many workers, including the poor, would receive higher wages no matter where they had been in the wage distribution prior to the introduction of the legal minimum. Income would rise for a majority of the labor force and consumption would increase. This would raise prices and induce firms to hire more workers to increase production in order to accommodate the higher aggregate demand (Levin-Waldman, 2014). Although there would be higher output prices, low-skill and poor workers could potentially receive beneficial employment effects and higher income due to spillover wages.

2.5 Empirical Studies about Minimum Wages

The different theoretical models described above predict various contrasting outcomes from minimum wages. The disparities result from different assumptions about labor market conditions, behavioral responses to the increased wage floor, and whether the rate the government chooses to set is above the intersection of the MCL and MRP curves. Since the theoretical

effect of wage floors is ambiguous, the question remains for empirical research to show what occurs after the government increases minimum wages.

In a seminal labor economics study, Card and Krueger (1994) evaluated the impact of New Jersey's increased 1992 minimum wage on the fast food industry, which employs the largest percentage of minimum wage earners; they used Pennsylvania as a control group as it did not change its minimum wage at the time but is also in close proximity to New Jersey. Their results showed that minimum wages could result in positive minimum wage effects on employment in the fast-food industry, although their results about the effects on prices were more ambiguous.

Comparisons of the price changes between Pennsylvania and New Jersey supported the standard model's predictions that firms would transfer the increased production costs to consumers by raising output prices. However, most firms within New Jersey changed their prices similarly, no matter if their initial wages started above or below the new minimum. These contradictory findings could reflect that firms in the fast food output market compete with each other within New Jersey but not with Pennsylvania. Nevertheless, Card and Krueger's results countered the substitution and scale effects that should have occurred according to the standard model of perfectly competitive labor markets.

Fast-food workers tend to find jobs based on geography (rather than moving due to employment opportunities at another location), and so they

would have heterogeneous job preferences. This is one of the supply-side explanations for oligopsonistic markets (Bhaskar, Manning, and To, 2002), which could account for the positive employment effects from Card and Krueger's study. Contrary to this, since fast-food restaurants presumably compete with other types of retail firms for low-skill workers, there are likely to be a large number of firms as in perfectly competitive labor markets. Considering the fairly rapid promotion schedule in many fast-food restaurants, these firms would likely have a larger proportion of managers than in other industries. If minimum wage increases provide an incentive for workers to not shirk, then restaurants would require fewer supervisors and could use the extra resources to hire more employees for other tasks that more directly increase production. Under these assumptions, the efficiency wage model is also a plausible explanation for the New Jersey case study results.

Card and Krueger justified their choice of the fast-food industry for analysis because the job requirements are fairly homogenous for these restaurants. However, the labor markets of other industries are not always characterized by such homogeneity. For example, firms in most industries might perhaps replace low-skilled workers with higher-skilled laborers with greater productivity in order to comply with minimum wage legislation. Consequently, caution should be taken when making out-of-sample generalizations from Card and Krueger's findings.

Since the early 1990's, significant empirical research has been conducted using national samples to study the effects of federal and state minimum wage increases on employment (Hoffman, 2014; Zavodny, 2000; Dube, Lester, and Reich, 2010; Sabia, Burkhauser, and Hansen, 2010) and on poverty (Burkhauser and Finegan, 1993; Vedder and Gallaway, 2002; Sabia and Burkhauser, 2010; Sabia and Nielsen, 2015; Stevans and Sessions, 2001). Table A1 in the Appendix summarizes this literature. These studies used nationally-representative data from the Current Population Survey (CPS), the Quarterly Census of Employment and Wages (QCEW), or the Survey of Income and Program Participation (SIPP). The time periods studied range from 1996 through 2007. The SIPP's recently released panel covering 2008 through 2013 could be especially useful because the Great Recession began at the end of 2007. This period burdened individuals of numerous socioeconomic classes with financial distress and brought significant attention to poverty-alleviating policies such as minimum wages.

Various econometric methods were used in the surveyed literature, including ordinary least squares (Burkhauser and Finegan, 1993), generalized least squares (Zavodny, 2000), differences-in-differences estimators (Sabia, Bukhauser, and Hansen, 2010; Hoffman, 2014; Vedder and Gallaway, 2002), and fixed or random effects models (Dube, Lester, and Reich, 2010; Sabia and Burkhauser, 2010; Sabia and Nielsen, 2015; Stevans and Sessions, 2001). Differences-in-differences strategies have been used primarily in case studies

where a particular state or city instituted a minimum wage increase, and surrounding areas without minimum wage changes could be used as counterfactuals. As my analysis uses a national panel data set with individuals as the unit of observation, prior literature suggests using ordinary least squares with fixed effects to control for unobserved time heterogeneity, with standard errors clustered on the state (Donald and Lang, 2007; Dube, Lester, and Reich, 2010; Sabia and Nielsen, 2015; Sabia, Burhkhauser, and Hansen, 2010). In addition, most of the studies have also examined the impact of minimum wages for subpopulations of workers who traditionally have the highest incidence of earning low wages (teens, blacks, and less educated workers without a high school diploma).

Of the surveyed literature, Zavodny (2000) found modest negative employment effects for teens, while Sabia, Burkhauser, and Hansen (2001) concluded that minimum wages have large statistically significant negative effects on employment among younger, less-educated workers in New York State. Hoffman (2015) later discredited this latter finding by replicating their study using the full CPS file (rather than the CPS-Merged Outgoing Rotation Group, which has a much smaller sample size) and by including additional treatment and control states. This more recent study concluded that minimum wage increases have either positive or no adverse employment effects, similar to the findings of Card and Krueger (1994) and Dube, Lester, and Reich (2010). Notably, these last two studies focused on workers in the restaurant or

fast food industry, while the studies concluding that minimum wages have negative employment effects focused on teen workers. There might be some overlap between these subpopulations, but they are not identical. As previously discussed, the efficiency wage model could potentially explain the results from studies of the fast food industry. However, teenagers have less experience. They might require more help and supervision even if higher minimum wages increase their incentives to work hard. Either this reason or differences in the studies' methodological approaches could potentially explain the discrepancies between their findings.

Many of the studies looking at poverty found that minimum wages have either no effect or worsen the financial well-being of the poor (Burkhauser and Finegan, 1993; Sabia and Nielsen, 2015; Sabia and Burkhauser, 2010; Vedder and Gallaway, 2002). However, Stevans and Sessions (2001) found statistically significant evidence that minimum wage increases (in conjunction with other policies) effectively reduce poverty rates. This suggests that, while federal and state minimum wage policies help the overall workforce, they may not be as well targeted at reducing poverty as political proponents often claim. Nevertheless, the contradicting evidence of these empirical studies necessitates further study.

Like Sabia and Nielsen (2015), in this paper I use data from the SIPP[1] to examine public program participation (food stamps, housing assistance, energy assistance, and public health insurance) as indicators of poverty, in addition to the income-to-poverty threshold ratio that is customarily used. Their regressions estimated linear probability models, where the dependent variable equaled 1 for poor individuals. Following prior literature, in the regressions using the income-to-poverty ratio to define whether an individual was poor, 100, 125, and 150% were used as cutoffs. After controlling for individual demographics; other state policies; and time, state, and month fixed effects, their results failed to show any statistically significant evidence that minimum wages affect the likelihood that an individual will live in poverty.

Building upon Sabia and Nielsen's earlier work, I suggest several modifications to improve the precision and interpretation of their results. According to the SIPP 2008 Panel General Income User Note (2009), monthly total personal earnings include business profits, which could be either negative or positive. This causes many self-employed workers to have lower earned income values in the survey, and some are even negative, which makes them seem poor according to their income-to-poverty ratio. However, business owners rarely fit the standard image of impoverished individuals. Furthermore, minimum wage policies seldom determine the earnings of self-

[1] Sabia and Nielsen's data covered the years from 1996 through 2007 as they used the 1996, 2001, and 2004 panels of the SIPP, while this study will use the most recent panel from 2008 which includes data from 2008 through 2013.

employed workers. If anything, they might have to pay employees of their business more due to minimum wage increases, which would cause their business profits and reported earned income to decrease. Hence, Sabia and Nielsen's model might suffer from omitted variable bias that could be mitigated by a control variable for business ownership or by excluding business owners from the samples.

Another possible improvement to Sabia and Nielsen's study concerns their definition of minimum wages. Since some minimum wage policies changed mid-year, they calculated the weighted average of the state or federal (whichever was higher) minimum wage for each year. However, they used that value for each monthly observation within a given state in the particular year. This limits the variance of the minimum wage variable. In contrast, my analysis will use the prevailing minimum wage for each state, month, and year. In this way, the prevailing minimum wage in each state at a given time will be more precisely measured in this analysis than in Sabia and Nielsen's study. Measurement error might have caused attenuation bias in their estimates. My proposed improvement could be particularly important since the minimum wage is the variable of interest.

CHAPTER 3

DATA & DESCRIPTIVE STATISTICS

3.1 Survey of Income and Program Participation

The main purpose of this study is to examine whether minimum wage increases reduce the likelihood of living in poverty. To measure this effect, I used the 2008 panel of the Survey of Income and Program Participation (SIPP), covering the years from 2008 through 2013. To compile this data set, the U.S. Census Bureau drew a nationally-representative random sample of the non-institutionalized, civilian population, and it interviewed each adult in the sample households once every four months for the duration of the panel. The Census Bureau calls each four-month interval a "wave." My study uses waves 2, 5, 8, 11, and 14, which together cover 35 months[2]. These waves are the most likely to capture the impact of minimum wage changes because they include observations from September through March of the following year, and new minimum wage policies most often took effect on January 1.

[2] Each wave covers seven months, but individuals have observations for only four of those months since the Census Bureau divided the sampled household among four rotation groups per wave. Surveyors interviewed one group per month about the preceding four months. For example, respondents in the first rotation group of wave 2 were interviewed in January and have separate observations for each month from September through December.

Surveyors asked individuals "core" questions each wave, such as demographic information (race, gender, etc.), employment, income, participation in public assistance programs, and educational attainment. The SIPP includes separate entries for each individual in the household each month. This analysis utilizes the observations for all adults in the data set as most of the demographic and public program participation variables are specific to the individual, and so they can vary within a household. However, the observations for certain variables (earned income, poverty threshold, non-cash benefits receipt, state code, and metro status) have the same value for all individuals in a given household.

This analysis uses several measures to determine an individual's poverty status. First, I calculated an individual's income-to-poverty ratio for each month using their household earned income (excluding government subsidies) and their SIPP-provided poverty threshold. The Current Population Survey determines this threshold for households each month based on family size. If an individual's income-to-poverty ratio was below a fixed percentage (using 100, 125, and 150% as cutoffs), I coded their value of $Poverty_{ismt}$ to 1 and to 0 otherwise. However, some research suggests that other measures might better describe a household's well-being than these poverty thresholds (Hadenaars and de Vos, 1988; Cauthen and Fass, 2008). As such, I also used public program participation (food stamps, general assistance, Medicaid, and

household non-cash benefits[3]) to define poverty. I recoded the SIPP-provided binary variables so they equal 1 for individuals who received assistance and 0 otherwise.

3.2 Limitations with Using the SIPP

According to its website, the SIPP provides "the most extensive information available on how the nation's economic well-being changes over time" (2014). Some researchers believe that this data is measured more accurately with less recall error than in other surveys since SIPP respondents were interviewed once every four months (Sabia and Nielsen, 2015). However, one drawback of the SIPP is that, due to the sensitive nature of many of the questions (such as those about income and financial assistance), state of residence is the lowest geographic level provided in the public-use file. This maintains confidentiality for survey participants. Although I include a variable for the average cost of living in a state, unobserved differences in the cost of living between regions within a state could influence a household's poverty status. The use of public program participation as the dependent variable in some of the models takes these cost of living differences into account. Furthermore, in order to mitigate the potential bias, the estimated

[3] General assistance provides aid to adults without dependents. Non-cash benefits indicates whether anybody in the household received food stamps; assistance from the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC); Medicaid; rent for public housing; government rent subsidies; government energy assistance; and/or reduced-price lunches or breakfasts.

models for this study includes a control variable for whether the household is located in a metropolitan area.

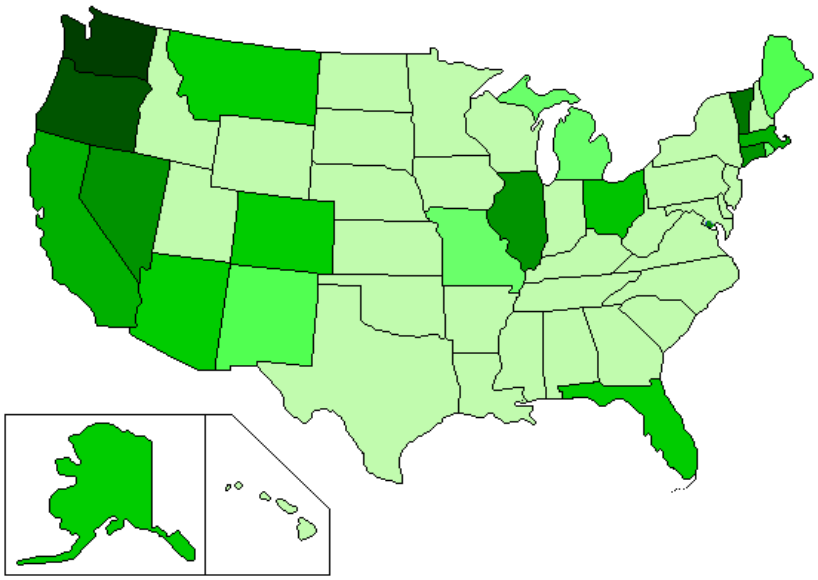
Although the metropolitan variable controls for whether an individual lives in a city, not knowing which city creates measurement error in the minimum wage variable. Since the mid-1990's, numerous cities across the United States have enacted living wage requirements, which are wage floors set above the state or federal minimum to reflect the higher cost of urban living[4] (National Employment Law Project, 2015). Consequently, the minimum wage rate matched with an individual based on their state is not the actual legal wage floor in their labor market. However, living wage ordinances cover only a narrow sector involving city employees and businesses providing services to the city or receiving assistance from the city through economic development programs. Therefore, this study assumes that living wage ordinances only minimally affect the minimum wage variable.

Another downside to the SIPP is that it only includes the state in which a person lives, but workers may have jobs in a different state, especially if their home is located near a state border. **Figure 3** depicts a map of the United States, with darker shading representing states with higher 2013 minimum wages. Although setting higher wage rates appears to be somewhat regional,

[4] Only a few economic studies thus far have focused on city living wage legislation, but they have consistently shown statistically significant evidence that low-wage workers and urban families living in poverty receive the benefits from living wage policies (Neumark and Adams, 2003; Dube, Naidu, and Reich, 2007). Furthermore, one medical study concluded that living wages would improve the health and educational attainment for the children of covered workers previously living in poverty (Bhatia and Katz, 2001).

there are many state borders along which the state minimum wages differ, most notably between Idaho and Washington. This could cause measurement error in the minimum wage variable. Nevertheless, no known public-use national data set includes this information for respondents and no surveyed minimum wage study accounts for this error. Like the prior literature, this analysis requires the assumption that most respondents work in a state with similar minimum wage policies as where their household is located.

Figure 3
Map of Minimum Wage Rates in the United States, 2013



Darker shading represents higher state minimum wage rates.
Map created by author.

3.3 Supplemental Data

This study incorporates several sources of supplemental data (See Table A2 in the Appendix). States' minimum wage information came from state labor office websites, news releases and articles, and the U.S. Department of Labor (Wage and Hour Division). Table A3 in the Appendix shows all minimum wage changes from 2006 through 2013. During this time, minimum wages have ranged from $5.15 to $9.19. The federal rate increased three times, the most recent of which brought the prevailing wage up $7.25 in 36 states in July 2009. Although this was a 10.7% increase, most other state minimum wage increases ranged from 1 to 5%. Colorado's change from $7.28 to $7.25 in 2010 was the only rate decrease; this occurred due to a decrease in the Consumer Price Index. As of 2013 (the last year of this analysis), 19 states have enacted a higher minimum wage than $7.25.

For the purposes of this analysis, new policies apply to a month if they went into effect on any day from the 1st through the 15th. Changes that occurred after the 15th are recorded for the succeeding month. The federal minimum wage applies to states which have not enacted their own minimum or have set it below the federal rate. Several states have various provisions for laborers such as tipped workers or firms with few employees. Following Sabia and Nielsen (2015) and other prior literature, this study uses the highest prevailing minimum wage as it usually covers the most workers.

Using data from the Bureau of Labor Statistics, I calculated the prime age male annual unemployment rates for each state by dividing the sum of unemployed men aged 25 to 54 years by the size of the civilian labor force for this same group. In addition, Brookings Institution provided access to IRS data on federal individual income tax filers for the EITC variables. For each state and year, I divided the sum of the EITC payments by the number of recipients in order to calculate the average annual EITC amounts given to taxpayers in each state. State EITC policy information came from The Hatcher Group via Tax Credits for Working Families.

Lastly, I compiled the states' average annual cost of living data from Amy K. Glasmeier's Living Wage Calculator. I then calculated the states' average cost of living per month for consistency with the minimum wage and income units. Cost of living data was only available for 2014. However, the relative costs between states likely remain the same over a short time period. Thus, my analysis uses the available 2014 data as proxies for the states' average cost of living from 2008 through 2013. The data includes food, child care, medical, housing, transportation, taxes, and "other" expenses. Because most households in the sample had two adults and either no children or two children, I collected the data for both household sizes. The regression results are nearly identical (except for the constant term) regardless of which size I included, and so I arbitrarily chose to use the cost of living for households with two adults and two children.

3.4 Descriptive Statistics

Table 1 shows descriptive statistics (means with standard errors in parentheses) for the dependent variables, the key explanatory variable (minimum wage), the average annual amount given to taxpayers through the EITC program, and the cost of living for two adults and two children. The sample is limited to those individuals who have indicated whether they live in a metropolitan area as metro status is a control variable in this study. Columns (2) through (6) restrict the data to individuals who are between the ages of 15 (the legal minimum for having a paid job) and 65 years (after which workers tend to retire). They also exclude business owners and members of their household since business owners include business profits or losses in their reported income for the SIPP. Thus, their income-to-poverty ratio would make them seem poor even when they do not actually live in poverty. Additionally, columns (3), (4), (5), and (6) show the statistics for youths aged 15-24, blacks, the less educated non-youths (aged 25-65, since many youths likely lack a high school degree because of age rather than merit), and workers, as minimum wage studies often focus on these subpopulations. In general, the descriptive statistics reveal higher rates of poverty for blacks, the less educated, and workers. Overall, regardless of the sample restrictions, more people fall below the poverty threshold than participate in public programs, with the exception of the non-cash benefits category, which encompasses

numerous government assistance programs such as rent subsidies, energy assistance, and reduced-price lunches.

Table 1.
Descriptive Statistics – (Means with Standard Errors in Parentheses)

(Observations with Unknown Metro Status Have Been Omitted from All Samples)	(1) Full Sample°	(2) Working Age & No Household Member Owns a Business°	(3) Youth Age & No Household Member Owns a Business°	(4) Working Age, Black & No Household Member Owns a Business°	(5) Non-Youth Working Age, No HS Diploma, & No Household Member Owns a Business°	(6) Working Age, Has a Job, & No Household Member Owns a Business°
Monthly Earned Household Income	4976.48 (5.032)	5200.23 (6.686)	5156.38 (15.786)	3466.06 (14.290)	2562.03 (12.463)	3184.86 (10.212)
Income-to-Poverty Ratio	3.0240 (.0032)	3.3319 (.0044)	2.8239 (.0084)	2.2210 (.0091)	1.4365 (.0074))	1.7851 (.0058)
Below Poverty Threshold	0.3159 (.0004)	0.2452 (.0005)	0.2685 (.0012)	0.3710 (.0016)	0.4772 (.0022)	0.5138 (.0011)
Below 125% Poverty Threshold	0.3568 (.0004)	0.2850 (.0006)	0.3229 (.0013)	0.4240 (.0017)	0.5510 (.0022)	0.5594 (.0011)
Below 150% Poverty Threshold	0.3995 (.0004)	0.3287 (.0006)	0.3800 (.0014)	0.4802 (.0017)	0.6195 (.0021)	0.6063 (.0010)
Received Food Stamps	0.1252 (.0003)	0.1178 (.0004)	0.1566 (.0010)	0.2476 (.0015)	0.2777 (.0019)	0.2216 (.0009)
Received General Assistance	0.0015 (.0000)	0.0017 (.0001)	0.0025 (.0001)	0.0050 (.0002)	0.0039 (.0003)	0.0040 (.0001)
Received Medicaid	0.1497 (.0003)	0.1129 (.0004)	0.2043 (.0011)	0.2231 (.0014)	0.2255 (.0018)	0.2461 (.0009)

Table 1.
Descriptive Statistics – (Means with Standard Errors in Parentheses) (Continued)

(Observations with Unknown Metro Status Have Been Omitted from All Samples)	(1) Full Sample°	(2) Working Age & No Household Member Owns a Business°	(3) Youth Age & No Household Member Owns a Business°	(4) Working Age, Black & No Household Member Owns a Business°	(5) Non-Youth Working Age, No HS Diploma, & No Household Member Owns a Business°	(6) Working Age, Has a Job, & No Household Member Owns a Business°
Received Non-Cash Benefits	0.3408 (.0004)	0.3284 (.0006)	0.4446 (.0014)	0.5401 (.0017)	0.6576 (.0021)	0.4868 (.0011)
Minimum Wage	7.40 (.0004)	7. ° (.0006)	7.41 (.0012)	7.31 (.0014)	7.42 (.0020)	7.41 (.0009)
Average EITC Amount	2250.58 (.1623)	2247.47 (.2336)	2249.62 (.5254)	2305.76 (.6313)	2266.83 (.8099)	2261.97 (.3934)
Cost of Living for 2 Adults + 2 Children	5139.99 (.4354)	5146.38 (.6418)	5150.61 (1.4506)	5122.94 (1.9027)	5136.95 (2.1371)	5145.43 (1.1064)
Number of Individuals	117,246	56,158	12,242	8,306	4,935	18,328
Number of Observations	1,632,264	783,019	155,264	114,244	65,267	271,173

°All samples exclude individuals with unknown metropolitan status.

Means calculated using the 2008 panel of the SIPP, covering the years 2008 through 2013. Person survey weights provided by the SIPP account for different state populations.

CHAPTER 4

MODEL & METHODOLOGY

In order to study the effects of minimum wages on poverty, this analysis employs a linear probability model (similar to Sabia and Nielsen, 2015). The population model is:

$$(1)\ Poverty_{ismt} = \alpha + \beta \log(MW_{smt}) + \boldsymbol{\delta Demographics}_{ismt} + \lambda Unemployment_{st} + \boldsymbol{\varepsilon EITC}_{st} + \kappa CostOfLiving_{s} + \boldsymbol{\tau}_{t} + u_{ismt}.$$

The binary dependent variable $Poverty_{ismt}$ equals 1 if individual *i* in state *s*, month *m*, and year *t* lives in poverty, and it equals 0 otherwise. As previously discussed, I created three versions of this variable using different cutoffs to define poverty: the official poverty threshold ($Poverty100_{ismt}$), 125% of the threshold ($Poverty125_{ismt}$), and 150% of the threshold ($Poverty150_{ismt}$). Other regressions use $Foodstamps_{ismt}$, $GenAssist_{ismt}$, $Medicaid_{ismt}$, and $Benefits_{ismt}$ as the dependent variables, which equal 1 if individual *i* in state *s*, month *m*, and year *t* receives food stamps, general assistance, Medicaid, or household non-cash benefits, respectively. Thus, each of these regressions estimates a linear probably model to predict the likelihood that an individual is living in

poverty. In addition, I estimated the model using OLS with the income-to-poverty ratio (measured as a proportion) as the continuous dependent variable ($PovRatio_{ismt}$).

Since $\log(MW_{smt})$ is the natural log of the higher of the state or federal minimum wage in state *s*, month *m*, and year *t*, the main parameter of interest is β. For the linear probability models, this coefficient (divided by 100) is the change in the likelihood that an individual lives in poverty as a result of a 1% increase to the minimum wage, *ceteris paribus*. The main objective of minimum wages is to decrease poverty, so β should be negative. In the models with $PovRatio_{ismt}$ as the dependent variable, β predicts the percentage point increase in an individual's income-to-poverty ratio when the legal minimum increases by 1%.

Other control covariates include the vector $\boldsymbol{Demographics}_{ismt}$, which describes individual *i*'s age and age-squared, race, gender, educational attainment (two variables indicating whether they received a high school diploma/GED equivalent and a bachelor's degree), their marital status, and whether they live in a metropolitan area during month *m* and year *t.* I expect non-whites will more likely live in poverty. Based on economic theory, I predict negative parameters on the variables for males, the higher-educated, married couples, and urban dwellers (wages are usually higher in cities but the official poverty thresholds are the same).

The variable $Unemployment_{st}$ is the prime age (25 to 54 years) male unemployment rate for state *s* in year *t*. This controls for state economic trends related to the labor market, since higher unemployment is usually associated with higher poverty rates. $Unemployment_{st}$ is superior to use rather than the regular state unemployment rate because not many prime age males work for the minimum wage and so policy changes should only minimally affect $Unemployment_{st}$ (Sabia and Nielsen, 2015; Zavodny, 2000).

The vector $\boldsymbol{EITC}_{st}$ includes two policy variables for the Earned Income Tax Credit, which provides subsidies to low-income working families based on their earnings and number of dependent children. The first variable in the vector is the natural log of the average annual amount given to EITC recipients (sum of the EITC paid to taxpayers in state *s* and year *t* divided by the number of taxpayers in that state receiving EITC). The other policy variable is the fixed percentage of the federal credit that the state EITC program offered to taxpayers in state *s* and year *t.* These could be important variables to include since legislative decisions about these policies relate to minimum wage policies as both are part of their overall poverty-alleviation program. Furthermore, several empirical studies have found evidence that the EITC targets poverty reduction better than minimum wages (Neumark and Wascher, 2001; Sabia and Nielsen, 2015; Burkhauser and Finegan, 1993). This suggests that the variables in $\boldsymbol{EITC}_{st}$ should have negative coefficients.

The main objective of minimum wage policies is for workers to earn enough income to support themselves. I am including $CostOfLiving_s$ as a control variable because policymakers in states with higher average costs of living will likely implement higher minimum wages. In addition, the higher costs of living should cause household income to rise. This would cause the income-to-poverty ratio to increase (the official poverty thresholds used to calculate the income-to-poverty ratios are the same across states). Hence, I expect κ to be negative in the linear probability models estimating the likelihood of living in poverty or receiving public assistance.

Although the analysis does not currently account for the panel nature of the SIPP data, all of the regressions include $\boldsymbol{\tau}_t$ as fixed effects for the 35 time periods. This controls for unobserved time heterogeneity, especially considering that the 2008-2013 period spanned the Great Recession. Some prior studies have included state fixed effects (Dube, Lester, and Reich, 2010; Sabia and Nielsen, 2015). Theoretically, the primary reasons that states might affect the analysis are differences in the cost of living and labor market conditions, both of which this study controls for directly. Thus, this model omits state fixed effects. Lastly, u_{ismt} is the error term for individual *i* in state *s* during month *m* and time *t.*

All models in this study use the person survey weights provided by the SIPP, which account for differences in state populations. This corrects for biases that could occur if poverty rates or minimum wages differ for states

that are over- or under-sampled.[5] As previously discussed, the samples exclude individuals who did not indicate whether they live in a metropolitan area, which is only a small fraction of the total surveyed sample. In addition, all reported standard errors are fully robust and clustered on the state since minimum wages primarily reflect state policies.

[5] Results from regressions without using the survey weights are included in **Tables A4** through **A7** of the Appendix. A comparison to the corresponding results in **Tables 4** through **7** of the Results & Analysis section reveals that the survey weights do not extensively affect the regressions in this study.

CHAPTER 5

RESULTS & ANALYSIS

Tables 2 and **3** show the ordinary least squares estimated effects on poverty and public program participation, respectively, with the sample further restricted to include individuals of working age (15-65) and whose household does not include any business owner. The first three columns in **Table 2** and all columns of **Table 3** provide estimates of linear probability models as the dependent variables are dichotomous; column (4) in **Table 2** uses the income-to-poverty ratio as a continuous dependent variable.

The estimated parameters for most of the demographic control variables are consistent with economic theory and Sabia and Nielsen's (2015) results. Except for Asians (who represent only a small fraction of the sample and comprise a range of nationalities), non-white individuals have a higher probability of living in poverty or receiving government assistance. In contrast, male gender, older age, marriage, higher education, employment, and living in a city all decrease the likelihood of living in poverty or participating in public programs.

Table 2
Regression Results - Poverty Dependent Variables, 2008-2013

	(1) Below Poverty Threshold		(2) Below 125% Cutoff		(3) Below 150% Cutoff		(4) Income-to-Poverty Ratio	
log(Minimum Wage)	-0.070		-0.043		-0.038		2.164	***
	(.0456)		(.0453)		(.0551)		(.5437)	
Male	-0.003		-0.008	**	-0.012	***	0.110	***
	(.0033)		(.0035)		(.0035)		(.0303)	
White-Hispanic	0.074	***	0.110	***	0.143	***	-1.192	***
	(.0100)		(.0109)		(.0125)		(.0913)	
Black-Hispanic	0.129	***	0.156	***	0.174	***	-1.466	***
	(.0324)		(.0363)		(.0394)		(.1757)	
Black-Nonhispanic	0.103	***	0.122	***	0.140	***	-1.003	***
	(.0116)		(.0106)		(.0098)		(.0589)	
Asian-Hispanic	0.092		0.111		0.117		-1.380	***
	(.1163)		(.0982)		(.0841)		(.2029)	
Asian-Nonhispanic	-0.019	**	-0.010		0.002		0.014	
	(.0092)		(.0104)		(.0119)		(.2458)	
Other Race-Hispanic	0.072	***	0.130	***	0.187	***	-1.331	***
	(.0202)		(.0221)		(.0269)		(.1165)	
Other Race-Nonhispanic	0.050	***	0.060	***	0.073	***	-0.465	***
	(.0123)		(.0128)		(.0126)		(.0767)	
Age	0.013	***	0.014	***	0.014	***	-0.102	***
	(.0008)		(.0008)		(.0008)		(.0070)	
Age^2	< -0.001	***	< -0.001	***	< -0.001	***	0.001	***
	(< .0001)		(< .0001)		(< .0001)		(.0001)	

Table 2
Regression Results - Poverty Dependent Variables, 2008-2013 (Continued)

	(1) Below Poverty Threshold		(2) Below 125% Cutoff		(3) Below 150% Cutoff		(4) Income-to-Poverty Ratio	
Married	-0.129	***	-0.131	***	-0.128	***	0.770	***
	(.0043)		(.0046)		(.0051)		(.0369)	
High School Diploma	-0.378	***	-0.377	***	-0.373	***	1.863	***
	(.0093)		(.0085)		(.0084)		(.0538)	
Bachelor's Degree	-0.048	***	-0.063	***	-0.072	***	0.237	***
	(.0091)		(.0101)		(.0115)		(.0452)	
Job	-0.064	***	-0.086	***	-0.114	***	1.997	***
	(.0037)		(.0045)		(.0050)		(.0647)	
Metropolitan Area	-0.056	***	-0.066	***	-0.073	***	0.684	***
	(.0082)		(.0091)		(.0095)		(.0647)	
Unemployment Rate	0.006	***	0.006	***	0.006	***	-0.080	***
	(.0012)		(.0015)		(.0019)		(.0277)	
EITC State Policy Percentage	0.000		0.000		0.000		0.011	**
	(.0004)		(.0004)		(.0004)		(.0060)	
log(EITC Average)	-0.023		-0.018		-0.007	***	0.833	
	(.0482)		(.0504)		(.0583)		(.7847)	
log(Cost of Living)	-0.107	**	-0.152	***	-0.193	***	2.154	**
	(.0432)		(.0446)		(.0498)		(.8724)	
Time Fixed Effects	Yes		Yes		Yes		Yes	
n	783,019		783,019		783,019		783,019	
R^2	0.2483		0.2416		0.2374		0.2174	

Sample restricted to individuals whose metropolitan status is known, who are of working age (15-65), and who do not have any business owner in their household.
Estimated coefficients are based on weighted data from the 2008 panel of the SIPP.
Standards errors corrected for heteroskedasticity and clustered on the state are in parentheses.
Statistically significant at the: *10% level **5% level ***1% level.

Table 3
Regression Results – Public Assistance Receipt Dependent Variables, 2008-2013

	(1) Food Stamp Recipient		(2) General Assistance Recipient		(3) Medicaid Recipient		(4) Non-Cash Benefits Recipient	
log(Minimum Wage)	-0.026		0.009	*	0.028		0.045	
	(.0821)		(.0051)		(.0637)		(.0691)	
Male	-0.039	***	< -0.001		-0.033	***	-0.038	***
	(.0025)		(.0002)		(.0038)		(.0036)	
White-Hispanic	0.040	***	< -0.001		0.021	***	0.266	***
	(.0114)		(.0004)		(.0067)		(.0207)	
Black-Hispanic	0.185	***	0.002		0.139	***	0.352	***
	(.0498)		(.0041)		(.0423)		(.0283)	
Black-Nonhispanic	0.126	***	0.003		0.098	***	0.248	***
	(.0110)		(.0015)		(.0092)		(.0134)	
Asian-Hispanic	0.039		-0.003	***	0.106		0.210	***
	(.1153)		(.0005)		(.0697)		(.0636)	
Asian-Nonhispanic	0.006		< -0.001		0.006		0.069	***
	(.0078)		(.0006)		(.0110)		(.0160)	
Other Race-Hispanic	0.121	***	< -0.001		0.023		0.294	***
	(.0311)		(.0012)		(.0199)		(.0436)	
Other Race-Nonhispanic	0.057	***	0.002		0.040	***	0.122	***
	(.0108)		(.0015)		(.0086)		(.0171)	
Age	0.018	***	< 0.001	***	0.006	***	0.025	***
	(.0014)		(.0001)		(.0013)		(.0010)	
Age^2	< -0.001	***	< -0.001	***	< -0.001	***	< -0.001	***
	(< .0001)		(< .0001)		(< .0001)		(< .0001)	
Married	-0.064	***	-0.002	***	-0.068	***	-0.058	***
	(.0067)		(.0004)		(.0039)		(.0084)	

Table 3
Regression Results – Public Assistance Receipt Dependent Variables, 2008-2013 (Continued)

	(1) Food Stamp Recipient		(2) General Assistance Recipient		(3) Medicaid Recipient		(4) Non-Cash Benefits Recipient	
High School Diploma	-0.133	***	-0.003	***	-0.159	***	-0.176	***
	(.0110)		(.0008)		(.0087)		(.0075)	
Bachelor's Degree	-0.095	***	-0.002	***	-0.110	***	-0.170	***
	(.0073)		(.0006)		(.0071)		(.0082)	
Job	-0.063	***	-0.001	***	-0.045	***	-0.171	***
	(.0046)		(.0002)		(.0044)		(.0048)	
Metropolitan Area	-0.041	***	< -0.001		-0.021	***	-0.069	***
	(.0071)		(.0003)		(.0069)		(.0113)	
Unemployment Rate	0.002		< 0.001		0.003		0.003	
	(.0021)		(.0001)		(.0020)		(.0030)	
EITC State Policy Percentage	0.001		< 0.001		< 0.001		-0.001	
	(.0006)		(< .0001)		(.0005)		(.0006)	
log(EITC Average)	-0.112	**	-0.004		-0.099	*	< -0.001	
	(.0632)		(.0032)		(.0555)		(.0790)	
log(Cost of Living)	-0.153	**	0.005	**	0.175	***	0.077	
	(.0858)		(.0022)		(.0540)		(.0719)	
Time Fixed Effects	Yes		Yes		Yes		Yes	
n	783,019		783,019		783,019		783,019	

Sample restricted to individuals whose metropolitan status is known, who are of working age (15-65), and who do not have any business owner in their household.
Estimated coefficients based on weighted data from the 2008 panel of the SIPP.
Standards errors corrected for heteroskedasticity and clustered on the state are in parentheses.
Statistically significant at the: *10% level **5% level ***1% level

As expected, there is a positive relationship between the prime age male unemployment rate and poverty (p-values are 0.006 or less), although the unemployment parameters are not statistically significant at any traditional level when public program participation is the dependent variable. The estimated effects of the EITC policies on poverty and public assistance are rarely statistically significant. However, I continued to include these variables in further regressions to control for other policy changes related to minimum wage policy decisions, based on prior literature (Neumark and Wascher, 2001; Sabia and Nielsen, 2015; Burkhauser and Finegan, 1993). In addition, I conducted partial F-tests for the joint significance of the time fixed effects. All p-values were less than 0.0001.

The first line of results in **Tables 2** and **3** indicate that I cannot reject the null hypothesis that minimum wage increases do not affect the probability of living in poverty or receiving government assistance. However, column (4) shows that a 1% increase in minimum wages raises the income-to-poverty ratio by 2.2 percentage points (p-value is less than 0.001), *ceteris paribus*. From 2008 to 2013, most of the minimum wage increases ranged between 1 to 5%. These changes would cause the income-to-poverty ratio to increase by 2.2 to 11 percentage points. This represents a higher earned income of about $35.59 to $177.95 per month, based on the average monthly poverty threshold of $1,617.73 for this subpopulation.

Tables 4 and **5** include the estimated effects of minimum wage increases on poverty and public program participation for the full sample and various subpopulations of people without business owners in their household, including youths, blacks, individuals without a high school diploma, and workers. Column (2) replicates the estimates from **Tables 2** and **3** for comparison to the other subpopulations. Overall, **Table 4** shows the effects of minimum wage increases on poverty are statistically insignificant. However, when the income-to-poverty ratio is the dependent variable, the minimum wage parameter is positive and statistically significant at the 1% level in columns (1) and (2), but not in the remaining columns. These results indicate that minimum wages increase households' income-to-poverty ratio, but not enough to raise them above the poverty thresholds (which are somewhat arbitrary).

The estimates from **Table 5** are consistent with **Table 3** and with Sabia and Nielsen's (2015) results. The minimum wage effects are only statistically significant at the 10% level when general assistance receipt is the dependent variable, and only for certain subpopulations. The largest statistically significant parameter (0.034 for people without a high school diploma) means that a 1% increase in minimum wages causes the likelihood of receiving general assistance to increase by 0.00034. Thus, the statistically significant results are practically insignificant.

Table 4
Estimated Minimum Wage Effects on Poverty for Various Subpopulations, 2008-2013

	(1) Full Sample°	(2) Working Age (15-65) & No Household Member Owns a Business°	(3) Youth Age (15-24) & No Household Member Owns a Business°	(4) Working Age, Black, & No Household Member Owns a Business°	(5) Non-Youth Working Age (25-65), No High School Diploma, & No Household Member Owns a Business°
Dep. Variable: Below Poverty Threshold					
log(Minimum Wage$_{smt}$)	-0.086*	-0.070	-0.058	0.082	0.186
	(.0466)	(.0456)	(.1079)	(.1727)	(.1648)
Dep. Variable: Below 125% of Poverty Threshold					
log(Minimum Wage$_{smt}$)	-0.072	-0.043	-0.007	0.136	0.0265
	(.0461)	(.0453)	(.1043)	(.1804)	(.1777)
Dep. Variable: Below 150% of Poverty Threshold					
log(Minimum Wage$_{smt}$)	-0.062	-0.038	0.007	0.161	0.305*
	(.0533)	(.0551)	(.1216)	(.1483)	(.0780)

Table 4
Estimated Minimum Wage Effects on Poverty for Various Subpopulations, 2008-2013

	(1) Full Sample°	(2) Working Age (15-65) & No Household Member Owns a Business°	(3) Youth Age (15-24) & No Household Member Owns a Business°	(4) Working Age, Black, & No Household Member Owns a Business°	(5) Non-Youth Working Age (25-65), No High School Diploma, & No Household Member Owns a Business°
Dependent Variable: Income-to-Poverty Ratio					
log(Minimum Wage$_{smt}$)	2.110***	2.164***	0.974	1.606	-0.417
	(.5446)	(.5437)	(.7234)	(1.1564)	(.6594)
Control Covariates	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
n	1,308,038	783,019	155,264	114,244	65,267

The income-to-poverty ratio dependent variable is continuous, while the other dependent variables are binary variables in linear probability models. All regressions use OLS.

°All regressions exclude individuals with unknown metropolitan status.

Estimated coefficients are based on weighted data from the 2008 panel of the SIPP. Standards errors are corrected for heteroskedasticity and clustered on the state are in parentheses.

Statistically significant at the: *10% level **5% level ***1% level.

Table 5
Estimated Minimum Wage Effects on Public Assistance Receipt for Various Subpopulations, 2008-2013

	(1) Full Sample°	(2) Working Age (15-65) & No Household Member Owns a Business°	(3) Youth Age (15-24) & No Household Member Owns a Business°	(4) Working Age, Black, & No Household Member Owns a Business°	(5) Non-Youth Working Age (25-65), No High School Diploma, & No Household Member Owns a Business°
Dep. Variable: Food Stamps Receipt					
log(Minimum Wage$_{smt}$)	-0.038	-0.026	-0.043	0.053	-0.028
	(.0727)	(.0821)	(.1060)	(.2834)	(.2541)
Dep. Variable: General Assistance Receipt					
log(Minimum Wage$_{smt}$)	0.008*	0.009*	0.016	0.030	0.058**
	(.0038)	(.0051)	(.0106)	(.0352)	(.0236)
Dep. Variable: Medicaid Receipt					
log(Minimum Wage$_{smt}$)	0.040	0.028	0.011	0.078	0.122
	(.0608)	(.0637)	(.1002)	(.1570)	(.2628)

Table 5
Estimated Minimum Wage Effects on Public Assistance Receipt for Various Subpopulations, 2008-2013
(Continued)

	(1) Full Sample°	(2) Working Age (15-65) & No Household Member Owns a Business°	(3) Youth Age (15-24) & No Household Member Owns a Business°	(4) Working Age, Black, & No Household Member Owns a Business°	(5) Non-Youth Working Age (25-65), No High School Diploma, & No Household Member Owns a Business°
Dependent Variable: Non-Cash Benefits Receipt					
log(Minimum Wage$_{smt}$)	0.057	0.045	0.046	-0.068	0.394*
	(.0786)	(.0691)	(.1088)	(.2849)	(.1990)
Control Covariates	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
n	1,308,038	783,019	155,264	114,244	65,267

The OLS regressions estimate linear probability models as the dependent variables are binary.
°All regressions exclude individuals with unknown metropolitan status.
Estimated coefficients are based on weighted data from the 2008 panel of the SIPP. Standards errors are corrected for heteroskedasticity and clustered on the state are in parentheses.
Statistically significant at the: *10% level 5% level.

Theoretically, minimum wages increases might hurt some individuals who lose their job while helping others who remain employed. This could cause the net effect on poverty to be statistically indistinguishable from 0. **Table 6** presents the estimates of regressions with similar subpopulations as in **Table 4** but excluding individuals without a job. All results are statistically significant in column (2); the signs on the parameters from the linear probability models are negative and the model using the income-to-poverty ratio as the dependent variable has a positive minimum wage parameter. Hence, these regressions suggest that minimum wage increases benefit the households of workers, which is encouraging for the claims of minimum wage policy supporters that rate increases would decrease poverty rates for workers and their families. Less attention is directed toward the effects on non-workers as these individuals are outside the target population of minimum wage policies.

The subpopulations in columns (3), (4), and (5) of **Table 6** are workers of youth age, black, and the less educated, respectively. No results from these regressions are statistically significant at any traditional level, which suggests that, surprisingly, minimum wages least affect the workers who are the most likely to earn minimum wages (according to traditional thought and prior empirical studies). However, the results for youth workers is less surprising since income is measured at the household level, and teens usually do not contribute substantially to their household's total earned income. The

comparison of these results with the statistically significant parameters in column (2) could support the theories of spillover effects of minimum wages, that higher wage floors indirectly increase income and reduce poverty for workers who are already above the legal minimum on the wage distribution.

Table 7 shows the effects of minimum wages on participating in public welfare programs for workers and various subpopulations of workers. Similar to **Table 5**, the results are only statistically significant (at the 5% level) and positive for the general assistance regressions with the full sample of workers and with less educated workers. Nevertheless, these estimates of the effects (0.004 and 0.113) are still not much different than zero, from a practical perspective. The fact that general assistance repeatedly seems to be the only public program that is affected by minimum wages relates to one potential limitation to this analysis: the restrictions for welfare policies might have changed concurrently with minimum wages. For example, some states changed their work requirements to receive public assistance. The change in the likelihood of receiving public assistance due to welfare eligibility changes would be entangled with the change due to minimum wage increases. The welfare state generally expanded during the Great Recession, which would bias the estimates from this analysis upward. However, the expansion of public assistance was not consistent across different programs (Haskins, Albert, and Howard, 2014). Consequently, the results of this analysis could be sensitive to the choice of public programs for the dependent variables.

Table 6
Estimated Minimum Wage Effects on Poverty for Various Subpopulations of Workers, 2008-2013

	(1) Full Sample with a Job°	(2) Working Age (15-65), No Household Member Owns a Business, & Has a Job°	(3) Youth Age (15-24), No Household Member Owns a Business, & Has a Job°	(4) Working Age, Black, No Household Member Owns a Business, & Has a Job°	(5) Non-Youth Working Age (25-65), No High School Diploma, No Household Member Owns a Business, & Has a Job°
Dep. Variable: Below Poverty Threshold					
log(Minimum Wage$_{smt}$)	-0.026	-0.208**	-0.188	-0.086	0.074
	(.0397)	(.1108)	(.1632)	(.2207)	(.1467)
Dep. Variable: Below 125% of Poverty Threshold					
log(Minimum Wage$_{smt}$)	-0.022	-0.154*	-0.129	-0.030	0.153
	(.0434)	(.0824)	(.1470)	(.2059)	(.1657)
Dep. Variable: Below 150% of Poverty Threshold					
log(Minimum Wage$_{smt}$)	-0.022	-0.142*	-0.137	0.007	0.184
	(.0538)	(.0780)	(.1615)	(.1971)	(.1369)

Table 6
Estimated Minimum Wage Effects on Poverty for Various Subpopulations of Workers, 2008-2013
(Continued)

	(1) Full Sample with a Job°	(2) Working Age (15-65), No Household Member Owns a Business, & Has a Job°	(3) Youth Age (15-24), No Household Member Owns a Business, & Has a Job°	(4) Working Age, Black, No Household Member Owns a Business, & Has a Job°	(5) Non-Youth Working Age (25-65), No High School Diploma, No Household Member Owns a Business, & Has a Job°
Dependent Variable: Income-to-Poverty Ratio					
log(Minimum Wage$_{smt}$)	2.421***	1.505***	1.183	0.629	-0.324
	(.7524)	(.4565)	(.9441)	(0.8144)	(.3926)
Control Covariates	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
n	768,997	271,173	88,705	49,706	32,114

The income-to-poverty ratio dependent variable is continuous, while the other dependent variables are binary variables in linear probability models. All regressions use OLS.
°All regressions exclude individuals with unknown metropolitan status.
Estimated coefficients based on weighted data from the 2008 panel of the SIPP. Standard errors corrected for heteroskedasticity and clustered on the state are in parentheses.
Statistically significant at the: *10% level **5% level ***1% level.

Table 7
Estimated Minimum Wage Effects on Public Assistance Receipt for Various Subpopulations of Workers, 2008-2013

	(1) Full Sample with a Job°	(2) Working Age (15-65), No Household Member Owns a Business, & Has a Job°	(3) Youth Age (15-24), No Household Member Owns a Business, & Has a Job°	(4) Working Age, Black, No Household Member Owns a Business, & Has a Job°	(5) Non-Youth Working Age (25-65), No High School Diploma, No Household Member Owns a Business, & Has a Job°
Dep. Variable: Food Stamps Receipt					
log(Minimum Wage$_{smt}$)	0.024	-0.155	-0.161	-0.090	-0.231
	(.0416)	(.1482)	(.1373)	(.4415)	(.3202)
Dep. Variable: General Assistance Receipt					
log(Minimum Wage$_{smt}$)	0.004**	0.022	0.026	0.046	0.113**
	(.0014)	(.0150)	(.0177)	(.0863)	(.0489)
Dep. Variable: Medicaid Receipt					
log(Minimum Wage$_{smt}$)	0.052	-0.033	0.025	-0.029	-0.069
	(.0403)	(.1358)	(.1564)	(.2345)	(.3573)

Table 7
Estimated Minimum Wage Effects on Public Assistance Receipt for Various Subpopulations of Workers, 2008-2013 (Continued)

	(1) Full Sample with a Job°	(2) Working Age (15-65), No Household Member Owns a Business, & Has a Job°	(3) Youth Age (15-24), No Household Member Owns a Business, & Has a Job°	(4) Working Age, Black, No Household Member Owns a Business, & Has a Job°	(5) Non-Youth Working Age (25-65), No High School Diploma, No Household Member Owns a Business, & Has a Job°
Dependent Variable: Non-Cash Benefits Receipt					
log(Minimum Wage$_{smt}$)	0.090	-0.039	-0.032	-0.135	0.292
	(.0625)	(.1084)	(.1505)	(.3076)	(.2091)
Control Covariates	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
n	768,997	271,173	88,705	49,706	32,114

The OLS regressions estimate linear probability models as the dependent variables are binary.
°All regressions exclude individuals with unknown metropolitan status.
Estimated coefficients based on weighted data from the 2008 panel of the SIPP. Standard errors corrected for heteroskedasticity and clustered on the state are in parentheses.
Statistically significant at the: *10% level **5% level.

CHAPTER 6

CONCLUSION

This paper has examined the effects of minimum wage increases on the likelihood that individuals will live in poverty, measured both by income and participation in public assistance programs. The theoretical effects of minimum wages are ambiguous depending on the structure of the labor market, behavior of employers and workers, and the level of the wage floor relative to the equilibrium outcome without regulation. Using data from the 2008 panel of the Survey of Income and Program Participation (SIPP), this empirical analysis has found little statistically significant evidence that minimum wage increases lower the risk that households will live in poverty. Conversely, the results indicate that minimum wage increases benefit the households of workers, which is promising as these are the individuals whom minimum wages intend to help primarily. However, the regressions using workers as the sample do not take into account the potential negative effects on individuals who were laid off as a result of minimum wage increases. Furthermore, when restricting the sample to groups of workers (youths, blacks, and the less educated) who are most likely to earn minimum wages,

based on prior economic literature, the effects of minimum wages on poverty are statistically insignificant. Thus, while minimum wage increases do not appear to worsen households' economic well-being and may in fact help some workers, these policies overall seem to be an ineffective method for decreasing poverty for most segments of the general population. The findings of this study are consistent with Sabia and Nielsen (2015), who estimated a similar model as in this paper but instead used the 1996, 2001, and 2004 panels of the SIPP.

One limitation of this analysis is that the model does not account for the panel nature of the SIPP data. A suggestion for further study is to use a differences-in-differences approach once more recent data becomes available, as more states have enacted higher minimum wage rates since 2013 (the last year of SIPP data in this study), and several have plans to increase rates through 2022. Most notably, lawmakers in California and New York have recently decided to increase their minimum wages to $15, which are increases of 50% and 56% from the current rates of $10 and $9, respectively (as of April 2016). Furthermore, $15 is more than twice the current federal rate of $7.25. The increased variation in prevailing minimum wages should facilitate the use of panel data methods to examine the effects on poverty. In addition, the theoretical models show that labor market effects can vary drastically depending on the size of the minimum wage increase and on the level of the rate relative to the equilibrium wage without government intervention. The

largest rate increase during the relevant range of this study was about 17%. Thus, once data for the next several years has been compiled, a reanalysis of the model used in this paper could produce different results about minimum wage effects.

Since this study as well as several other recent papers have concluded that minimum wage increases are ineffective for reducing poverty, alternative policies should also be considered, such as the Earned Income Tax Credit (EITC). This program provides subsidies to low-income working families through state and federal tax credits based on the family's earnings and the number of dependent children. One common critique of the EITC is that, contrary to the minimum wage, it increases the government's budget deficit; others laud the policy for directly helping those in need while also encouraging labor participation (unlike welfare programs without work requirements). Although the coefficients on the EITC variables in this analysis were not statistically significant, the data used for these variables were state aggregates because EITC information for the individuals in the SIPP survey sample was not available. Hence, the results from this study do not provide valid evidence about the effectiveness of EITC policies. Prior empirical studies comparing the effects of minimum wages to the EITC have found overwhelming evidence that the latter policy is better targeted at helping impoverished workers (Neumark and Wascher, 2001; Sabia and Nielsen, 2015; Burkhauser and Finegan, 1993).

In addition, since the mid-1990's, many cities across the United States have enacted living wage requirements, which are wage floors set above the state or federal minimum (National Employment Law Project, 2015). These policies could potentially be superior to minimum wages as city governments could choose localized rates that reflect the higher cost of urban living. Currently, living wage ordinances only apply to a narrow sector including city employees and businesses which receive government funds, either for services provided to the city or for assistance through economics development programs. Although only a few economic studies thus far have focused on city living wage legislation, they have consistently shown statistically significant evidence that low-wage workers and urban families living in poverty receive the benefits from living wage policies (Neumark and Adams, 2003; Dube, Naidu, and Reich, 2007). Furthermore, one medical study concluded that living wages would improve the health and educational attainment for the children of covered workers previously living in poverty (Bhatia and Katz, 2001). Consequently, living wage ordinances enacted by city governments are a viable alternative to state and federal minimum wages in order to reduce urban poverty.

APPENDIX

Table A1
Summary of Surveyed Empirical Research Literature

Author (Date)	Primary Data Source	Target Population	Dependent Variable	Methodology	Findings/Conclusions
Burkhauser & Finegan (1993)	1% samples of the 1940 & 50 censuses; .1% samples of the 1960, 70, & 80 censuses; March 1988 Current Population Survey (CPS)	U.S. wage and salary workers aged 17-64 who worked at least 14 weeks in the preceding year and at least 15 hours in the census or survey week	Family income-to-poverty ratio	Ordinary least squares (OLS)	There is only a weak link between an individual's wage and the economic well-being of their household, which also weakens the argument for the target efficiency of minimum wages
Card & Krueger (1994)	Personally constructed telephone survey, February to March & November to December, 1992 (n=409)	Fast food restaurants in NJ (with PA as a counterfactual)	Firm employment level; employee meal benefits; prices for soda, french fries, and entrees	Differences-in-differences	Minimum wage increases caused employment to increase; no statistically significant change to employee meal benefits; NJ output prices rose compared with PA, but all prices rose at a similar rate within NJ no matter if their wage rates were affected by the new minimum

APPENDIX

Table A1
Summary of Surveyed Empirical Research Literature (Continued)

Author (Date)	Primary Data Source	Target Population	Dependent Variable	Methodology	Findings/Conclusions
Zavodny (2000)	NBER extracts of the (CPS) outgoing rotation groups, 1979-93	U.S. teens aged 16-19 (excluding those employed in agriculture, unpaid jobs, or self-employed)	State annual averages of the teen employment-to-population ratio and of the usual weekly hours of worked	Differences-in-differences	Minimum wage increases do not significantly reduce hours worked, but may have modest negative employment effects for teens
Stevans & Sessions (2001)	U.S. Census Bureau, 1984-98	All families for 48 states in the U.S.	Log of state poverty rates	Fixed effects (OLS) & random state effects (generalized least squares)	Raising the minimum wage reduces poverty, but other policies are more effective, such as expanding minimum wage coverage and increasing labor force participation

Table A1
Summary of Surveyed Empirical Research Literature (Continued)

Author (Date)	Primary Data Source	Target Population	Dependent Variable	Methodology	Findings/Conclusions
Vedder & Gallaway (2002)	Census Bureau provided data to the National Conference Board, 1966-98	U.S. full-time, year-round workers	Aggregated poverty rates, hours worked in manufacturing, and hours for all private nonagricultural industries	Differences-in-differences and ordinary least squares	Statistically insignificant positive relationship between minimum wages and poverty rates; statistically significant negative hours worked effects of minimum wage increases. Overall, their results suggest the strong substitution effect nullifies positive income effects.
Dube, Lester, & Reich (2010)	Quarterly Census of Employment & Wages (QCEW), 1990 (Quarter 1)-2006 (Quarter 2)	U.S. restaurant workers; matched contiguous counties across state borders as controls	Average earnings and total employment of restaurant workers	State, county, & year fixed effects	Strong positive wage effects but statistically insignificant (at all conventional levels) employment effects
Sabia & Burkhauser (2010)	Pooled March CPS Outgoing Rotation Groups, 2004-08	U.S. workers aged 16-64	Natural log of annual state poverty rates	State & year fixed effects	Statistically insignificant negative poverty elasticities

Table A1
Summary of Surveyed Empirical Research Literature (Continued)

Author (Date)	Primary Data Source	Target Population	Dependent Variable	Methodology	Findings/Conclusions
Sabia, Burkhauser, & Hansen (2010)	Pooled monthly cross-sections of the CPS Outgoing Rotation Groups, 2004 & 06	NY teen workers aged 16-29 without a high school degree; formed a synthetic comparison group from other states	Binary variable for whether the individual was employed	Differences-in-differences	No spillover wage effects for workers initially earning above the new minimum; median employment elasticity is around -0.7, which is larger than most other studies have found
Hoffman (2014)	Full annual CPS, 2004 & 06	U.S. teen workers aged 16-29 without a high school degree; used geographically proximate states for a comparison	Binary variable for whether the individual was employed	Differences-in-differences	No evidence of a negative employment impact for young, less-educated workers in NY & a positive employment effect in FL, IL, NJ, & DC; larger impacts for workers aged 20-24 without a high school degree

Table A1
Summary of Surveyed Empirical Research Literature (Continued)

Author (Date)	Primary Data Source	Target Population	Dependent Variable	Methodology	Findings/Conclusions
Sabia & Nielsen (2015)	Survey of Income & Program Participation (SIPP), 1996-2007	U.S. non-institutionalized, civilian population	Binary variables for whether an individual's household was in poverty (measured using the income-to-poverty ratio); had financial, housing, health, or food insecurity; had durable good deprivation; or received public program assistance	State, month, & year fixed effects	Statistically insignificant evidence that minimum wage increases reduce poverty or material hardship, even when the sample was restricted to workers or the less-educated. Findings showed a modest redistribution of poverty and public program assistance among low-skilled individuals.

Table A2
Sources for Supplemental Data

Minimum Wage Data	
State	**Link to Source[6]**
Alabama	http://www.labor.alabama.gov/Wage_and_Hour_Info.pdf
Alaska	http://live.laborstats.alaska.gov/wage/index.cfm?at=01&a=000000
Arizona	http://www.azleg.gov/FormatDocument.asp?inDoc=/ars/23/00363.htm&Title=23&DocType=ARS
Arkansas	http://www.labor.ar.gov/divisions/Documents/Fact%20Sheet%20on%20the%20Increase%20of%20the%20Arkansas%20Minimum%20Wage.pdf
California	http://www.dir.ca.gov/iwc/MinimumWageHistory.htm
Colorado	https://www.colorado.gov/pacific/cdle/wage-order-archive
Connecticut	http://www.ctdol.state.ct.us/wgwkstnd/faqs-employees.htm
Delaware	https://www.laborlawcenter.com/blog/news/delaware-minimum-wage-increases-to-715-january-1-2008/ http://dia.delawareworks.com/labor-law/documents/Labor%20Law%20Poster.pdf
Washington, DC	https://hrnt.jhu.edu/policies/Posters/DC/minimum_wage.pdf http://does.dc.gov/sites/default/files/dc/sites/does/page_content/attachments/DC%20Minimum%20Wage%20Poster%20-%20English.pdf https://www.laborlawcenter.com/blog/news/district-of-columbia-minimum-wage-increase/
Florida	http://sitefinity.floridajobs.org/docs/default-source/2015-minimum-wage-increases/florida-minimum-wage-history-2000-2015.pdf
Georgia	http://dol.georgia.gov/minimum-wage
Hawaii	http://labor.hawaii.gov/wsd/minimum-wage/
Idaho	http://labor.idaho.gov/dnn/Default.aspx?tabid=693
Illinois	http://www.news-gazette.com/news/local/2010-06-30/minimum-wage-increase-825-takes-effect-thursday-illinois.html
Indiana	http://www.in.gov/dol/

[6] For states where the federal minimum wage applies, data was provided by the U.S. Department of Labor, Wage and Hour Division: http://equalitystate.org/assets/pdfs/fact_sheets/ESPC_Minimum_Wage_Fact_Sheet.pdf.

Table A2
Sources for Supplemental Data (Continued)

Minimum Wage Data	
State	**Link to Source**
Iowa	http://www.iowadivisionoflabor.gov/wage-frequently-asked-questions https://www.laborlawcenter.com/blog/news/iowa-minimum-wage-increases-to-725/
Kansas	https://www.dol.ks.gov/Laws/FAQwages.aspx
Kentucky	http://labor.ky.gov/dows/doesam/Pages/Divisions-of-Employment-Standards-Apprenticeship-and-Mediation.aspx
Louisiana	http://www.nola.com/politics/index.ssf/2014/12/20_states_raising_minimum_wage.html
Maine	http://www.maine.gov/labor/labor_laws/minwagehistory.html
Maryland	https://www.dllr.state.md.us/labor/wages/minimumwagelaw.pdf http://www.wagecollection.com/2007/07/minimum-wage-increases-to-585-per-hour.html
Massachusetts	http://www.mass.gov/lwd/docs/dol/public-message-explaining-mw-increases-effective-1-1-15.pdf http://www.massaflcio.org/2005-increase-minimum-wage-massachusetts
Michigan	http://www.michigan.gov/lara/0,4601,7-154--194795--,00.html
Minnesota	http://www.doli.state.mn.us/RS/PDF/11minwage.pdf
Mississippi	http://www.nola.com/politics/index.ssf/2014/12/20_states_raising_minimum_wage.html
Missouri	http://labor.mo.gov/DLS/MinimumWage https://www.visionpayroll.com/kb/2008/10/missouri-minimum-wage-to-increase-january-1-2009/
Montana	http://erd.dli.mt.gov/labor-standards/wage-and-hour-payment-act/minimum-wage-history
Nebraska	http://www.omaha.com/news/politics/nebraska-joins-states-with-minimum-wage-above-federal-government-mandate/article_299d19b4-6449-11e4-89fb-001a4bcf6878.html

Table A2
Sources for Supplemental Data (Continued)

Minimum Wage Data	
State	**Link to Source**
Nevada	http://www.leg.state.nv.us/Division/Research/Publications/Factsheets/MinimumWage.pdf http://www.reviewjournal.com/business/minimum-wage-rate-increasing
New Hampshire	http://www.nhfpi.org/research/state-economy/issue_nh-minimum-wage.html
New Jersey	https://ballotpedia.org/New_Jersey_Minimum_Wage_Increase_Amendment,_Public_Question_2_(2013)#New_Jersey_minimum_wage_history
New Mexico	http://www.dws.state.nm.us/Labor-Relations/Resources/Minimum-Wage-Information
New York	https://www.labor.ny.gov/stats/minimum_wage.asp
North Carolina	http://www.nclabor.com/wh/fact%20sheets/minimum_wage_rate_history_072407.pdf
North Dakota	http://www.nd.gov/labor/laws/46-02.html
Ohio	http://www.cleveland.com/datacentral/index.ssf/2012/12/ohios_minimum_wage_increase_fr.html
Oklahoma	https://www.ok.gov/odol/Services/Wage_and_Hour/
Oregon	http://www.wageclaim.org/oregon-minimum-wage/
Pennsylvania	http://www.inc.com/news/articles/200607/pennsylvania.html http://www.upenn.edu/almanac/volumes/v54/n01/wage.html http://www.portal.state.pa.us/portal/server.pt?open=514&objID=553566&mode=2
Rhode Island	http://www.dlt.ri.gov/lmi/news/quickref2007a.htm http://www.washingtontimes.com/news/2014/dec/30/rhode-island-minimum-wage-to-rise-to-9-per-hour/
South Carolina	http://poverty.ucdavis.edu/faq/what-history-minimum-wage
South Dakota	https://dlr.sd.gov/wagehrs/minimumwage.aspx http://money.cnn.com/2008/07/24/smallbusiness/state_minimum_wages.fsb/index.htm?postversion=2008072411 http://dlr.sd.gov/news/releases09/nr071409minimum_wage.pdf
Tennessee	https://doe.state.wy.us/LmI/trends/0814/a1.htm

Table A2
Sources for Supplemental Data (Continued)

Minimum Wage Data	
State	**Link to Source**
Texas	http://www.bls.gov/regions/southwest/news-release/MinimumWageWorkers_Texas.htm
Utah	http://www.minimum-wage.org/states.asp?state=Utah
Vermont	http://labor.vermont.gov/wordpress/wp-content/uploads//Minimum-Wage-Rules.pdf https://www.visionpayroll.com/kb/2008/11/vermont-minimum-wage-to-increase-january-1-2009/ http://www.minimum-wage.org/states.asp?state=Vermont
Virginia	http://www.minimum-wage.org/states.asp?state=Virginia
Washington	http://www.lni.wa.gov/WORKPLACERIGHTS/WAGES/MINIMUM/HISTORY/DEFAULT.ASP
West Virginia	http://www.wvlabor.com/newwebsite/Documents/wageforms/newer%20forms/MinWageHis1.pdf
Wisconsin	http://www.timetoast.com/timelines/the-history-of-minimum-wage-in-wisconsin
Wyoming	http://equalitystate.org/assets/pdfs/fact_sheets/ESPC_Minimum_Wage_Fact_Sheet.pdf
Other Data	
SIPP	http://www.census.gov/sipp/
Prime Age Male Unemployment Rates	http://www.bls.gov/lau/
Average Annual EITC Amounts	http://www.brookings.edu/research/interactives/eitc https://app.box.com/s/iclttq6zl5dnwen43p4c
State EITC Policies	http://www.taxcreditsforworkingfamilies.org/earned-income-tax-credit/
State Average Cost of Living	http://livingwage.mit.edu/

Table A3
Minimum Wage Changes, 2006-2013

State	2006[a]	2007	2008	2009	2010	2011	2012	2013
Alabama	5.15	5.85[b]	6.55[b]	7.25[b]				
Alaska	7.15			7.25[b]	7.75			
Arizona	6.75		6.90	7.25		7.35	7.65	7.80
Arkansas	6.25		6.55[b]	7.25[b]				
California	6.75	7.50	8.00					
Colorado	5.15	6.85	7.02	7.28	7.25	7.36	7.64	7.78
Connecticut	7.40	7.65		8.00	8.25			
Delaware	6.15	6.65	7.15	7.25[b]				
District of Columbia	7.00		7.55[b]	8.25[b]				
Florida	6.40	6.67	6.79	7.21 7.25[b]		7.31[c]	7.67	7.79
Georgia	5.15	5.85[b]	6.55[b]	7.25[b]				
Hawaii	6.75	7.25						
Idaho	5.15	5.85[b]	6.55[b]	7.25[b]				
Illinois	6.50	7.50[d]	7.75[d]	8.00[d]	8.25[d]			
Indiana	5.15	5.85[b]	6.55[b]	7.25[b]				
Iowa	5.15	6.20[e]	7.25					
Kansas	5.15	5.85	6.55	7.25[b]				
Kentucky	5.15	5.85[b]	6.55[b]	7.25[b]				
Louisiana	5.15	5.85[b]	6.55[b]	7.25[b]				

Table A3
Minimum Wage Changes, 2006-2013

State	2006[a]	2007	2008	2009	2010	2011	2012	2013
Maine	6.50 6.75[f]	7.00[f]	7.25[f]	7.50[f]				
Maryland	5.15 6.15[g]		6.55[b]	7.25[b]				
Massachusetts	6.75	7.50	8.00					
Michigan	5.15 6.95[f]	7.15[d]	7.40[d]					
Minnesota	6.15		6.55[b]	7.25[b]				
Mississippi	5.15	5.85	6.55[b]	7.25[b]				
Missouri	5.15	6.50	6.65	7.05 7.25[b]				7.35
Montana	5.15	6.15	6.25 6.55[b]	6.90 7.25[b]		7.35	7.65	7.80
Nebraska	5.15	5.85[b]	6.55[b]	7.25[b]				
Nevada	6.15[h]	6.33[d]	6.85[d]	7.55[d]	8.25[d]			
New Hampshire	5.15	5.85[b] 6.50[i]	6.55[b] 7.25[i]					
New Jersey	6.15 7.15[f]			7.25[b]				
New Mexico	5.15	5.85	6.50 6.55	7.50				

Table A3
Minimum Wage Changes, 2006-2013

State	2006[a]	2007	2008	2009	2010	2011	2012	2013
New York	6.75	7.15		7.25[b]				
North Carolina	5.15	6.15	6.55[b]	7.25[b]				
North Dakota	5.15	5.85[b]	6.55[b]	7.25[b]				
Ohio	5.15	6.85	7.00	7.30		7.40	7.70	7.85
Oklahoma	5.15	5.85[b]	6.55[b]	7.25[b]				
Oregon	7.50	7.80	7.95	8.40		8.50		8.95
Pennsylvania	5.15	6.25 7.15[d]		7.25[b]				
Rhode Island	6.75	7.40						
South Carolina	5.15	5.85[b]	6.55[b]	7.25[b]				
South Dakota	5.15	5.85[b]	6.55[b]	7.25[b]				
Tennessee	5.15	5.85[b]	6.55[b]	7.25[b]				
Texas	5.15	5.85[b]	6.55[b]	7.25[b]				
Utah	5.15	5.85[b]	6.55[b]	7.25[b]				
Vermont	7.25	7.53	7.68	8.06		8.15	8.46	8.60
Virginia	5.15	5.85[b]	6.55[b]	7.25[b]				
Washington	7.63	7.93	8.07	8.55		8.67	9.04	9.19
West Virginia	5.15 5.85[d]	6.55[d]	7.25[d]					
Wisconsin	6.50			7.25[b]				
Wyoming	5.15	5.85[b]	6.55[b]	7.25[b]				

All changes were effective January 1 unless otherwise noted.
[a] The values for 2006 (or the first one when there are multiple) indicate the prevailing minimum wages on January 1, 2006, which were not necessarily changes from the previous year.
[b] July 24
[c] June 1
[d] July 1
[e] April 1
[f] October 1
[g] February 16
[h] November 28
[i] September 1

Table A4
Estimated Minimum Wage Effects on Poverty, 2008-2013, without Survey Weights

	(1) Full Sample°	(2) Working Age (15-65) & No Household Member Owns a Business°	(3) Youth Age (15-24) & No Household Member Owns a Business°	(4) Working Age, Black, & No Household Member Owns a Business°	(5) Non-Youth Working Age (25-65), No High School Diploma, & No Household Member Owns a Business°
Dep. Variable: Below Poverty Threshold					
log(Minimum Wage$_{smt}$)	-0.094 **	-0.087 *	-0.038	0.053	0.116
	(.0449)	(.0439)	(.1104)	(.0000)	(.1559)
Dep. Variable: Below 125% of Poverty Threshold					
log(Minimum Wage$_{smt}$)	-0.094 **	-0.074	-0.015	0.136	0.156
	(.0459)	(.0457)	(.1026)	(.0000)	(.1612)
Dep. Variable: Below 150% of Poverty Threshold					
log(Minimum Wage$_{smt}$)	-0.089 *	-0.072	0.009	0.107	0.175
	(.0516)	(.0556)	(.1137)	(.0000)	(.1625)

Table A4
Estimated Minimum Wage Effects on Poverty, 2008-2013, without Survey Weights (Continued)

	(1) Full Sample°	(2) Working Age (15-65) & No Household Member Owns a Business°	(3) Youth Age (15-24) & No Household Member Owns a Business°	(4) Working Age, Black, & No Household Member Owns a Business°	(5) Non-Youth Working Age (25-65), No High School Diploma, & No Household Member Owns a Business°
Dependent Variable: Income-to-Poverty Ratio					
log(Minimum Wage$_{smt}$)	2.052 ***	2.065 **	0.630	1.284	-0.146
	(.6068)	(.6104)	(.7504)	(.0000)	(.5912)
Control Covariates	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
n	1,308,038	783,019	155,264	114,244	65,267

°All regressions exclude individuals with unknown metropolitan status.
Standard errors corrected for heteroskedasticity and clustered on the state are in parentheses.
Statistically significant at the: *10% level **5% level ***1% level.

Table A5
Estimated Minimum Wage Effects on Public Assistance Receipt, 2008-2013, without Survey Weights

	(1) Full Sample°	(2) Working Age (15-65) & No Household Member Owns a Business°	(3) Youth Age (15-24) & No Household Member Owns a Business°	(4) Working Age, Black, & No Household Member Owns a Business°	(5) Non-Youth Working Age (25-65), No High School Diploma, & No Household Member Owns a Business°
Dep. Variable: Food Stamps Receipt					
log(Minimum Wage$_{smt}$)	-0.039	-0.027	-0.039	0.019	-0.069
	(.0936)	(.0715)	(.0936)	(.2644)	(.2266)
Dep. Variable: General Assistance Receipt					
log(Minimum Wage$_{smt}$)	0.007*	0.008*	0.014*	0.020	0.053***
	(.0034)	(.0045)	(.0083)	(.0289)	(.0192)
Dep. Variable: Medicaid Receipt					
log(Minimum Wage$_{smt}$)	0.019	0.006	-0.019	0.061	0.114
	(.0621)	(.0647)	(.0968)	(.1727)	(.2423)

Table A5
Estimated Minimum Wage Effects on Public Assistance Receipt, 2008-2013, without Survey Weights (Continued)

	(1) Full Sample°	(2) Working Age (15-65) & No Household Member Owns a Business°	(3) Youth Age (15-24) & No Household Member Owns a Business°	(4) Working Age, Black, & No Household Member Owns a Business°	(5) Non-Youth Working Age (25-65), No High School Diploma, & No Household Member Owns a Business°
Dependent Variable: Non-Cash Benefits Receipt					
log(Minimum Wage$_{smt}$)	0.039	0.021	0.023	-0.060	0.317*
	(.0787)	(.0693)	(.1153)	(.2706)	(.1842)
Control Covariates	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
n	1,308,038	783,019	155,264	114,244	65,267

°All regressions exclude individuals with unknown metropolitan status.
Standard errors corrected for heteroskedasticity and clustered on the state are in parentheses.
Statistically significant at the: *10% level **5% level ***1% level.

Table A6
Estimated Minimum Wage Effects on Poverty for Various Subpopulations of Workers, 2008-2013, without Survey Weights

	(1) Full Sample with a Job°	(2) Working Age (15-65), No Household Member Owns a Business, & Has a Job°	(3) Youth Age (15-24), No Household Member Owns a Business, & Has a Job°	(4) Working Age, Black, No Household Member Owns a Business, & Has a Job°	(5) Non-Youth Working Age (25-65), No High School Diploma, No Household Member Owns a Business, & Has a Job°
Dep. Variable: Below Poverty Threshold					
log(Minimum Wage$_{smt}$)	-0.051	-0.183*	-0.144	-0.007	0.096
	(.0369)	(.0949)	(.1616)	(.1994)	(.1266)
Dep. Variable: Below 125% of Poverty Threshold					
log(Minimum Wage$_{smt}$)	-0.058	-0.153*	-0.126	0.031	0.126
	(.0419)	(.0773)	(.1401)	(.1758)	(.1296)
Dep. Variable: Below 150% of Poverty Threshold					
log(Minimum Wage$_{smt}$)	-0.061	-0.148**	-0.131	0.073	0.131
	(.0513)	(.0728)	(.1477)	(.1706)	(.1054)

Table A6
Estimated Minimum Wage Effects on Poverty for Various Subpopulations of Workers, 2008-2013, without Survey Weights (Continued)

	(1) Full Sample with a Job°	(2) Working Age (15-65), No Household Member Owns a Business, & Has a Job°	(3) Youth Age (15-24), No Household Member Owns a Business, & Has a Job°	(4) Working Age, Black, No Household Member Owns a Business, & Has a Job°	(5) Non-Youth Working Age (25-65), No High School Diploma, No Household Member Owns a Business, & Has a Job°
Dependent Variable: Income-to-Poverty Ratio					
log(Minimum Wage$_{smt}$)	2.519***	1.328***	0.777	0.294	-0.195
	(.8182)	(.4253)	(.8688)	(0.7316)	(.2538)
Control Covariates	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
n	768,997	271,173	88,705	49,706	32,114

The income-to-poverty ratio dependent variable is continuous, while the other dependent variables are binary variables in linear probability models. All regressions use OLS.
°All regressions exclude individuals with unknown metropolitan status.
Estimated coefficients based on weighted data from the 2008 panel of the SIPP. Standard errors corrected for heteroskedasticity and clustered on the state are in parentheses.
Statistically significant at the: *10% level **5% level ***1% level.

Table A7
Estimated Minimum Wage Effects on Public Assistance Receipt for Various Subpopulations of Workers, 2008-2013, without Survey Weights

	(1) Full Sample°	(2) Working Age (15-65) & No Household Member Owns a Business°	(3) Youth Age (15-24) & No Household Member Owns a Business°	(4) Working Age, Black, & No Household Member Owns a Business°	(5) Non-Youth Working Age (25-65), No High School Diploma, & No Household Member Owns a Business°
Dep. Variable: Food Stamps Receipt					
log(Minimum Wage$_{smt}$)	0.016	-0.128	-0.146	-0.096	-0.209
	(.0388)	(.1310)	(.1212)	(.3843)	(.2708)
Dep. Variable: General Assistance Receipt					
log(Minimum Wage$_{smt}$)	0.002*	0.021*	0.022*	0.028	0.094**
	(.0012)	(.0117)	(.0132)	(.0656)	(.0386)
Dep. Variable: Medicaid Receipt					
log(Minimum Wage$_{smt}$)	0.027	-0.045	0.14	-0.037	-0.036
	(.0436)	(.1297)	(.1479)	(.2476)	(.3314)

Table A7
Estimated Minimum Wage Effects on Public Assistance Receipt for Various Subpopulations of Workers, 2008-2013, without Survey Weights (Continued)

Dependent Variable: Non-Cash Benefits Receipt					
log(Minimum Wage$_{smt}$)	0.074	-0.060	-0.041	-0.102	0.24(
	(.0601)	(.1106)	(.1550)	(.2754)	(.1830)
Control Covariates	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
n	768,997	271,173	88,705	49,706	32,114

The OLS regressions estimate linear probability models as the dependent variables are binary.
°All regressions exclude individuals with unknown metropolitan status.
Estimated coefficients based on weighted data from the 2008 panel of the SIPP. Standard errors corrected for heteroskedasticity and clustered on the state are in parentheses.
Statistically significant at the: *10% level **5% level.

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