MINIMUM WAGES AND INCOME INEQUALITY IN THE AMERICAN STATES, 1960–2000

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ABSTRACT

Income inequality is one of the central concerns of sociologists and stratification researchers. While most of the analyses in sociology cover the economic and demographic influences on income inequality, less research has sought to understand the impact of public policies. A major factor absent from the research in both economics and sociology is the role of state-level minimum wages. Neoclassical economic theorists hypothesize that a minimum wage will increase income inequality, while institutional economists argue that a minimum wage reduces economic inequality. This paper uses decennial state data covering 1960–2000 to test the hypothesis that states with higher minimum wages have lower levels of family income inequality. The results confirm the institutional hypothesis that state minimum wages reduce family income inequality. Estimates presented in the paper indicate that the effect of the state minimum wage is non-linear and it should be greater than $4.00 (2001 CPI) to be redistributive.
Income inequality is one of the primary manifestations of social stratification. The increasing concentration of the income distribution in the United States during the latter part of the 20th century has put this topic into especially acute perspective (Nielsen & Alderson, 1997; Ryscavage, 1999; Nielsen & Alderson, 2001; Alderson & Nielsen, 2002). Existing sociological studies have examined cross-national, cross-sectional, and temporal data (e.g. Treas, 1983; Nelson, 1984; Jacobs, 1985; Braun, 1988; Nielsen, 1994; Nielsen & Alderson, 1997; Firebaugh, 1999; Goesling, 2001; Kenworthy, 2001; Brady, 2002). These inquiries have considered many hypotheses concerning the economic and demographic influences on income inequality.

However, few studies have considered the effects of public policies on income inequality. A notable exception is Treas (1983), who looked at the relation between U.S. national welfare policies and their influence on the distribution of income among different family types in the post-war years. One important policy analysts have not considered, on the other hand, is the state minimum wage. The minimum wage is important to look at because it has been a popular public policy for reducing poverty and redistributing income (Levin-Waldman, 2001). Most of the research that does look at the minimum wage only considers its potential disemployment impact (e.g. Neumark & Wascher, 1992). This is probably attributable to neoclassical economic theory, which predicts that higher minimum wages reduce employment opportunities and hurt the working poor.

Despite this long held contention, the minimum wage seems increasingly salient as the controversy about the direction and significance of unemployment effects has been brought to attention in recent years (see Card & Krueger, 1995). In addition, institutional economists have long argued in favor of the minimum wage as a means of income redistribution (e.g. Blue-stone & Harrison, 2001; Levin-Waldman, 2001). Sociologists and institutional economists have long challenged standard economic theory by arguing that wages, prices, and employment levels are influenced by non-market factors such as power and norms of fairness. As is the case with most institutional economic perspectives, the minimum wage is pertinent and attractive as a sociological issue, since it concerns issues of fairness and equity as well as the power of the state in setting wage rates in the labor market.

As an analytical matter, the state minimum wage is important because family income primarily consists of wage income and not all workers are covered by the federal minimum wage. If family income is primarily composed of wages earned in the labor market and not all workers are covered
by the federal minimum wage, then the distribution of family income is potentially affected by the state minimum wage. Given the current limitations in the literature, this analysis attempts to estimate the impact of the state minimum wage on family income inequality in the states over the period 1960–2000. In light of the push for the “devolution” of welfare state activities to individual states, such a study provides insight into trends regarding the effectiveness of a particular state-level policy on income inequality as well as contributes to the debate about the importance of the minimum wage. The next section presents an overview of theoretical considerations regarding minimum wage effects.

**NEOCLASSICAL AND OTHER THEORIES OF MINIMUM WAGE EFFECTS**

The minimum wage is seen as one way of making the distribution of wages and income more equal (Levin-Waldman, 2001). Neoclassical economic theory, however, suggests that a minimum wage should have the exact opposite consequences for the income distribution. A minimum wage sets a non-market determined wage floor in the labor market, which raises the price of labor (Stigler, 1946). By increasing the price of labor, a minimum wage generates a reduction in the demand for labor (Brown, 1940; Pierson, 1940). Reduced demand for labor due to the increase in its price means that some workers will suffer unemployment. As George Stigler stated, “The higher the minimum wage, the greater will be the number of covered workers who are discharged.” (1946, p. 361)

If laborers are paid according to their marginal productivity, those workers whose marginal productivity falls below the minimum wage will be discharged, while those workers whose productivity is above the minimum wage will be maintained (Meyer & Wise, 1983, p. 73). The minimum wage has adverse consequences for low-wage workers because they are typically less skilled. The wage benefits those who do not lose their jobs because their pay increases while less skilled workers are priced out of the labor market as employers do not value their labor at the new wage. Hence, the minimum wage will benefit some low-wage workers but hurt other low-wage workers. Specifically, the least qualified or attractive workers will be laid off. An example would be if employers decide to retain such “attractive” workers as white middle class teenagers rather than working poor minorities (Levin-Waldman, 2001, p. 29).
Furthermore, production input needs once fulfilled by labor stimulates the substitution of technology for labor (Stigler, 1946). The increased cost of labor is translated into increased unemployment. Since the cost of production is increased another possible consequence of the minimum wage is an increase in prices (Brown, 1940; Pierson, 1940; Stigler, 1946). An increase in prices could reduce the demand for goods and trigger a reduction in the demand for the labor needed to produce those goods. Thus, Brown (1940) concludes, “Legal minimum wages, except in rare cases of extreme exploitation, are therefore inimical to the interests of workers and society at large.” (p. 100)

In short, the textbook model suggests low-paid workers will actually be made worse off by an increase in the minimum wage. The minimum wage is therefore Pareto non-optimal in that it increases the welfare of some at the expense of others. More than 50 years ago George Stigler stated, “The manipulation of individual prices is neither an efficient nor an equitable device for changing the distribution of personal income.” (1946, p. 362) The neoclassical models make a strong theoretical case against the minimum wage in that it will exacerbate income inequality rather than reduce it.

On the other hand, institutional economists have argued that the minimum wage is an effective means of raising the earnings of low-paid workers (Webb, 1912; Lester, 1947; Freeman, 1996; Levin-Waldman, 2001). A minimum wage results in a redistribution of income by lowering profits and increasing the wages of the lowest paid workers (Levitan & Belous, 1979).2 Thus, the minimum wage, by setting a higher standard for wages, creates a more equitable distribution of wages and income (Galbraith, 1998; Bluestone & Harrison, 2001). In addition there are a number of other reasons why a minimum wage may redistribute income.

First, a minimum wage has the potential to create an incentive for firms to reduce supervisory personnel or pay without reducing the number of production workers (Calvo & Wellisz, 1979). One reason why the minimum wage may have this effect is by reducing the incentive for production workers to shirk thereby decreasing the need for non-productive supervisory personnel. As early as 1912, Sidney Webb suggested that a higher wage would promote an increase in work effort and a decrease in the propensity to shirk (Webb, 1912; Lester, 1947; Prasch, 1996).3 Also part of Webb’s argument is the notion that raising wages allows workers to sustain themselves in better health thus making them more efficient and more productive.

Second, the minimum wage may induce an investment in capital, which would increase overall productivity (Lavoie, 1992). In the absence of the minimum wage and a lower value placed on labor, firms have less incentive to invest in capital that would increase worker productivity (Levitan &
Belous, 1979; Bluestone & Harrison, 2001).4 Another potential impact from a Keynesian perspective is that a higher minimum wage, if it redistributes income, increases purchasing power and thus results in increased demand for consumer goods (Levitan & Belous, 1979; Prasch, 1996). According to this view, redistributing income increases society’s propensity to consume, which has the effect of raising employment, since the central way to satisfy an increase in aggregate demand is through hiring more workers (Brown, 1940, p. 101). As a precondition for this to occur, the distribution of income must first be altered in order to increase the purchasing power of the low-wage worker.5 If such is the case, then employers would be better off because of the increased demand for their goods (Brown, 1940; Prasch, 1996).

Third, aside from raising the wages of the lowest paid workers is that the minimum wage influences wages of workers above the minimum through a “ripple effect” (Card & Krueger, 1995; Gordon, 1996). The “ripple effect” is when workers whose wages are above the minimum increase in response to an increase in the minimum wage (see Card & Krueger, 1995). Some occupations or industries may have their wage standards set in reference to the minimum wage so that they increase when the minimum wage does. These insights suggest that empirical evidence is important to any discussion of the minimum wage.

**RECENT EMPIRICAL STUDIES**

Since much of the reasoning from the neoclassical view against the minimum wage builds on deductive arguments, much less attention has been paid to empirical processes associated with the minimum wage and income redistribution. Most of the research has looked at employment effects (e.g. Neumark & Wascher, 1992). As Card and Krueger point out, “Economists’ fascination with the minimum wage arises in large part because it provides such a clear test of the standard neoclassical model.” (1995, p. 11) To the contrary, their analyses show the contention that a higher minimum wage will increase unemployment is inconsistent with evidence from both the state and national level.

An extensive reanalysis of previous studies shows that the link between minimum wage increases and disemployment is largely spurious (Card & Krueger, 1995). Card and Krueger’s research benefits from using a “natural experiment” approach of comparing minimum wage increases between states. In a telling statement, they conclude:

The findings...suggest that the direct test posed by the minimum wage fails to confirm the predictions of the conventional model...We believe there is a need to reformulate the
set of theoretical models that are applied to the low-wage labor market, taking into account the fact that increases in the minimum wage do not necessarily lead to decreases in employment... (1995, p. 397).

Although this research has spawned some debate (e.g. Kennan, 1995; Burkhauser, Couch, & Wittenburg, 1996) Card and Kruger’s overall findings cast much doubt on the neoclassical model that predicts employment losses from minimum wage increases. Since most analyses and discussions of the minimum wage focus on its impact on unemployment (Levitan, Gallo, & Shapiro, 1993; Freeman, 1994, 1996), much less research has focused on the main social goal of the minimum wage: income redistribution.

Studies of the effects of the minimum wage on income and wage distribution has primarily been carried out at the national level (e.g. Horrigan & Mincy, 1993; Galbraith, 1998). Such research has focused on specific time periods such as the 1980s, when the real value of the federal minimum wage was eroded rapidly by inflation.

Horrigan and Mincy (1993), for example, set out to answer the question of what would have happened to wage and family income inequality had the federal minimum wage been indexed for inflation after 1981. The study uses a simulation procedure that imputes labor demand elasticities from previous studies on workers with different levels of earnings. Horrigan and Mincy’s simulation finds that federal minimum wage increases have almost no effect on family income inequality, but federal minimum wage increases have some effect on reducing earnings inequality (Horrigan & Mincy, 1993, p. 272). One might make sense of their finding is that family income is composed of various sources minimum wage income may only be a small proportion. Thus, minimum wages may only affect a small proportion of the wage income that families receive and this explanation could account for their null finding. Therefore, the minimum wage may not have much of an impact on the distribution of the family income. Other studies have come to different conclusions.

Galbraith (1998) making use of purely empirical data, estimates a national time-series equation covering the post-war years using Gini’s index as a dependent variable. The results from his specifications demonstrate that the federal minimum wage is an effective device for reducing manufacturing wage inequality as well as overall family income inequality. Galbraith finds the effect stronger for family incomes than the manufacturing wages. He suggests that the strength of the effect outside manufacturing is because minimum wages affect the overall structure of wages and income and not just minimum wage earners nor merely those employed in manufacturing.
One popular line of thought argues that minimum wage earners are spread too far throughout the income distribution which reduces the potential of the minimum wage for reducing family income inequality (Horrigan & Mincy, 1993). Card and Krueger, however, present strong evidence that minimum wage earners are located mainly in lower income families (1995, p. 298). Comparing states before and after the 1990–1991 federal minimum wage increases, Card and Krueger find a modest reduction in family income inequality due to federal increases. Others have come to similar conclusions.

One argument based on historical data contends that keeping the minimum indexed for inflation in the post-World War II years until the 1970s was partially responsible for the reduction in income inequality over that time-period (Bluestone & Harrison, 2001). Accepting this argument, one implication is that the falling real value of the minimum wage in the 1980s contributed to the increase in income inequality (Gordon, 1996; Galbraith, 1998). Prior research suggests that increasing the federal minimum wage reduces overall wage inequality and that the rapid expansion of wage inequality in the 1980s is partially attributable to the falling real value of the federal minimum wage (DiNardo, Fortin, & Lemieux, 1996; Lee, 1999). Since there remains some controversy, examining states is particularly helpful as it allows for the examination of a cross-section of units with varying levels of the minimum wage and can span over a longer period of time.

**CROSS-SECTIONAL EVIDENCE FROM STATES**

The evidence regarding the effect of the state minimum wage on family income inequality is limited to one study. Partridge and Partridge (1999) look at family income inequality for one point in time and find no significant effects. One potential drawback of Partridge and Partridge’s minimum wage measure is that it assumes the lowest wage paid in each state is the federal rate unless the state’s minimum wage is higher. Such a measure dismisses the actual variation in state minimum wage rates. This is especially important since not all workers are covered by the federal minimum wage (United States of Department of Labor, 1990; Schiller, 1994; Card & Krueger, 1995). Considerable variation exists in minimum wage rates as some states have a rate above the federal, the same as the federal, below the federal, and some do not have a minimum wage at all. The historical legacy of the minimum wage is such that states have played a considerable role in the determination of minimum wage rates.
In 1912, Massachusetts was the first state to enact a minimum wage law. The minimum wage laws were originally established in order to protect women and minors from exploitative practices (McCammon, 1995; Levin-Waldman, 2001). Massachusetts’s institutionalization of a minimum wage law occurred long before the Fair Labor Standards Act of 1938 established a federal minimum wage focused mainly on women and minors. State minimum wage rates are also important to consider because not all workers are covered under the minimum wage provisions of the federal Fair Labor Standards Act.

Coverage of the federal minimum wage varies across states. Approximately 20% of the non-supervisory U.S. labor force was not covered by the minimum wage provisions of the Fair Labor Standards Act in 1990 (United States Department of Labor, 1990), while some estimate that up to 30% were not covered (see Schiller, 1994). Certain industries, occupations, and firm sizes are exempt from coverage. States play a role in setting minimum wage rates and these rates likely set a standard for workers whose wages are not mandated by federal provisions. In this sense, states play a role in setting a social wage floor.

If family income primarily consists of wages earned in the labor market, not all workers are covered by the federal minimum wage, and some evidence indicates that the federal minimum wage reduces overall wage and income inequality, then one may reason that the state minimum wage reduces family income inequality. Given the evidence and arguments from the institutionalist position, I test the hypothesis: Higher levels of the state minimum wage are associated with lower levels of family income inequality. The next section describes the data, controls, and methods necessary to test this hypothesis.

DATA, CONTROLS, AND METHODS

The demographic and economic data used in this analysis come from published Census sources. Most of the data were obtained from various issues of the State and Metropolitan Area Data Books (1979, 1986, 1991, 1998). The dependent variable and measure of income inequality used in this analysis is the Gini coefficient of family income. Choice of the Gini coefficient was based on its availability and widespread use in previous studies of inequality (e.g. Nelson, 1984; Nielsen & Alderson, 1997).

The Gini coefficient, based on the Lorenz curve, is a measure of the degree to which the income distribution deviates from total equality (see Allison
(1978) for a comprehensive overview of inequality measures). Numerically it is bounded between 0 and 1. If the Gini coefficient were 0, every family would have the same income. If the Gini coefficient were 1, then a single family would have all the income. For example, in 1990 New Hampshire had a low Gini of 0.387 whereas Mississippi had a high Gini of 0.475. This indicates a higher degree of income inequality in Mississippi than in New Hampshire. The Gini coefficients for 1960 were calculated by Langer (1999), the Gini coefficients for 1970–1990 were calculated by the Census Bureau (United States Census Bureau, 2000a), while the Gini coefficients for 2000 were computed by the author from a 16 category income distribution from Summary File 3 of the 2000 Census. The 2000 Gini computations were made using a computer program that uses Pareto-interpolation (Gini.exe) written by Edward Welniak of the United States Census Bureau (see Welniak (1988) and also Nielsen and Alderson (1997)).

The data on the state minimum wage came from The Book of the States 2000–2001 (Council of State Governments, 2001) and January issues of the Monthly Labor Review for the years 1970–1990. State minimum wages for 1960 came from Minimum Wage and the Woman Worker (United States Department of Labor, 1960) as well as Campbell and Campbell (1969). The actual state minimum wages are for 1959, 1969, 1979, 1989, and 1999 in order to correspond to the Census Bureau’s definition of income which asks respondents to report their incomes from the previous year. In order to test the hypothesis that state minimum wages reduce family income inequality, we control for various characteristics that have been found to influence family income inequality in the previous research.

In line with previous studies (Nielsen & Alderson, 1997), we use median family income to control for economic development (United States Census Bureau, 2000b). The relation has been shown to be nonlinear and consistent, with previous research we use a quadratic term to estimate the effect of economic development on income inequality in the U.S. (Nelson, 1984; Levernier, Rickman, & Partridge, 1995; Morrill, 2000). We expect economic development, measured as median family income, to exhibit a nonlinear decreasing, then increasing relation to income inequality.

Another component of economic development, which plays an important role in the distribution of income, is the level of human capital. Education is one of the main components of human capital influencing income. Prior analyses of states have shown that the percent of the population over age 25 with a high school degree reduces inequality, while the percent of the population aged 25 years and over with a college degree increases inequality (Levernier et al., 1995; Partidge, Partridge, & Rickman, 1998). In effect,
more diversity in educational attainment should be associated with more family income inequality.

Female labor force participation is also likely to influence inequality. The direction of the effect is theoretically ambiguous likely because it depends on whether the person is from a high or low-income family. Nielsen and Alderson (1997) find that female labor force participation was associated with higher inequality in 1970 but the pattern reverses in 1980 and 1990 when increased female labor force participation seems to reduce family income inequality. The expectation about the direction of the effect of female labor force participation on family income inequality is ambiguous.

One of the key factors associated with increasing inequality has been the rising proportion of female-headed families (Thurow, 1987; Levy, 1998). Many studies have shown that the percent of female-headed families is associated with increased income inequality (Levernier et al., 1995; Nielsen & Alderson, 1997; Partidge et al., 1998; Levernier, 1999). Female-headed households usually have lower incomes and the increase in the proportion of female-headed households since the 1970s may have intensified the trend toward increasing income inequality (Thurow, 1987). This leads us to expect that the states with a greater share of female-headed families have higher levels of income inequality. Another factor is immigration.

Some argue that immigration influences inequality by increasing the supply of low-wage labor (Borjas, Freeman, & Katz, 1992). Levernier et al. (1995) discovered that state income inequality is positively associated with the percent of recent international immigrants. It is probable that this increases inequality by both increasing the supply of labor and also increasing the proportion of dependents. We expect the percent of recent international migrants to have a positive impact on family income inequality.

Manufacturing employment has been associated with lower inequality and most say it is responsible for increasing the equality of the family income distribution from the post World War II era to the late 1960s (e.g. Ryscavage, 1999). Manufacturing employment in most cases provides high-wage jobs for people with lower skill levels or educational attainment. The percent of a region’s labor force employed in manufacturing is a standard control in income inequality studies (e.g. Nelson, 1984; Nielsen & Alderson, 1997). Consistent with past research, manufacturing employment should exert a strong inverse impact on family income inequality. The age of the population also plays a role.

Greater inequality has historically been associated with the proportion of the population over the age of 65. Elderly families, in the past, fell below the poverty line but by the 1960s greater coverage and increased Social Security
benefits contributed to a substantial reduction in the proportion of elderly families in poverty (Levy, 1998). Nielsen and Alderson’s (1997) study found the direction of the effect of county population over 65 shifting from positive to negative over 1970–1990. Some studies find a positive impact of the percent over age 65 on inequality (e.g. Levernier et al., 1995). Hence, there is no expectation about the direction of the impact of the percent of a state’s population over the age of 65 on income inequality.

In addition to the age composition of a state’s population, the state’s racial composition is also important. Some studies have found a larger relative black population is associated with more income inequality (Nelson, 1984; Morrill, 2000), while others have found no effect (Levernier et al., 1995; Partidge et al., 1998). However, most studies that find an effect have not controlled for female-headed families. Aside from statistical significance, the effect is generally positive. Therefore, we expect the greater the percent of a state’s population black, the greater the income inequality.

Few income inequality studies control for unemployment. Levernier et al. (1995) found insignificant results and did not include the measure in final models. Nielsen and Alderson (1997) did not find a clear pattern when controlling for county-level variation in unemployment. Since unemployed persons have lower incomes, it is likely that unemployment increases inequality. Unemployment can be considered an intervening variable since the neoclassical theory implies unemployment increases with higher levels of the minimum wage. Since unemployment can be considered an intervening variable with respect to the minimum wage, we will also provide estimates without the unemployment variable. The first step is to estimate the effect of the state minimum wage with a pooled linear regression model:

\[ Y_{it} = \beta_1 + \beta_2 X_{it} + \beta_3 D_{it} + \beta_4 MW_{it} + \epsilon_{it} \]

The following OLS equation is estimated where \( Y_{it} \) is the Gini coefficient for state \( i \) at time \( t \), \( \beta_1 \) is the intercept, \( X_{it} \) represents a series of control variables for state \( i \) at time \( t \), \( D_{it} \) are a series of dummy variables for year and \( \epsilon_{it} \) is an error term. The dummy variables for years are for 1960, 1970, 1990, and 2000 with 1980 left out as a reference category since most observers say the greatest increase in income inequality began around 1980. \( MW_{it} \) is the state minimum wage in 2001 CPI dollars for state \( i \) at time \( t \). Alaska is dropped as an outlier because of extremely high values on most of the variables as is common in state-level studies (e.g. Levernier et al., 1995). This regression model estimates family income inequality utilizing an evenly spaced balanced panel of 245 observations covering five points in time spanning 40 years (1960–2000).
Although we first estimate linear equations, there is no reason to assume the relation between the minimum wage and income inequality is necessarily linear. Some states may have minimum wages too low to be effective at reducing inequality. Potential employees might not enter the labor market when the minimum wage is set too low and thus having a low minimum wage might render it ineffective at reducing family income inequality. Another possibility, consistent with neoclassical theory, is that the minimum wage in some states is set too high making the cost of production too much for the market to bear generating unutilized capacity in the form of higher unemployment. A minimum wage is likely to have an effect, for better or worse, after it rises above the going rate for low-wage workers.

An examination of a scatter-plot of the state minimum wage and the Gini suggested that the relation between the minimum wage and income inequality is non-linear. As a first step in approaching non-linear effects, we attempted to see if a quadratic term fit better than the linear minimum wage. This method did not describe the data better, so the next option was to try and fit a cubic term. Again, this did not seem to give a conclusive answer as to how the state minimum wage and the Gini coefficient are related.

Instead of fitting quadratic or cubic terms, we use a slightly different nonlinear estimation method to determine if the minimum wage has some threshold value where it begins to have an effect on income inequality. Such an estimate is obtained with a piecewise linear variable (Pindyck & Rubinfeld, 1981; Gujarati, 1995). The variable estimated is the difference between the state minimum wage and some value, if the state minimum wage is greater than that value. Hence, the model estimated is

$$Y_{it} = \beta_1 + \beta_2 X_{it} + \beta_3 D_{it} + \beta_4 \left( MW_{it} - MW_{t0} \right) D_t + \varepsilon_{it}$$

This model is the same as the previous specification except $MW_{t0}$ is the minimum wage rate at which a shift in the slope occurs, while $D_t$ is 1 if $t > t_0$ and 0 if $t < t_0$. For example, if the node ($MW_{t0}$) is set at 2.00 a state with a minimum wage of 3.00 would get a value of 1.00 while a state with a minimum wage of 1.75 would get a value of zero.

A common problem in applications of OLS to time series cross sections is autocorrelation and heterogeneity bias. Heterogeneity bias may occur because an unmeasured state-specific effect influences the dependent variable (Wooldridge, 2002). Autocorrelation, in this case, likely occurs because the error terms for observations at different points in time are correlated. Similarly, the error for observation $i$ at time $t$ is probably correlated to the error for the same observation at time $t + 1$. This problem is likely to occur when pooling state-level observations over time, since unmeasured factors are
likely to influence the same observations at different points in time (e.g. Hicks & Kenworthy, 1998; Alderson & Nielsen, 2002). In order to correct for autocorrelation and heterogeneity bias we obtain estimates from Restricted Error Maximum Likelihood (REML) models that place different restrictions on the error correlations (SAS Institute, 1999). Both OLS and the Maximum Likelihood models are reported below. As a means of examining model fit we present the Bayesian Information Criterion (Raftery, 1995). The Bayesian Information Criterion (BIC) is a measure of model fit that takes into account goodness of fit and the number of parameters used to achieve the fit. Lower values of BIC indicate a better model fit than higher values of BIC.

**RESULTS AND ANALYSIS**

Descriptive statistics and variable descriptions are reported in Table 1. OLS results are presented in Table 2. The dependent variable is the Gini coefficient for families multiplied by 100. Model 1 estimates the change in inequality over time.

With reference to 1980 and in the absence of controls, the 1960, 1990, and 2000 intercept coefficients are positive indicating income inequality is higher in these years than in 1980. The 1990 coefficient is positive and highly significant indicating the distribution of income became less equal between 1980 and 1990, which is consistent with the claims of most observers. The increasing magnitude of the 2000 slope coefficient relative to the 1990 slope coefficient indicates that income inequality continued to grow in the average state between 1990 and 2000. There appears to be no difference between 1970 and 1980 as the coefficient is negative but not significantly different from zero. In Model 2 the state minimum wage is added and the intercepts for 1960, 1970, 1990, and 2000 get slightly weaker. This indicates that part of the trend over time is accounted for by the state minimum wage. Additionally, the BIC statistic strongly supports the inclusion of this variable in the model as the Bayesian statistic decreases in value (from −99.500 to −163.276) indicating a better model fit.

Model 3 adds the control variables. These controls partially lessen the mean difference in state income inequality between 1960 and 1980, but the dummy slopes for the other years increase when controlling for factors hypothesized to influence income inequality.

Most of the variables in Model 3 are in the expected direction and as such replicate results from previous studies using similar specifications (Levernier
et al., 1995; Nielsen & Alderson, 1997). Since these variables are in the expected direction and have been addressed in previous empirical analyses, we restrict our attention to the variable of interest. Consistent with our hypothesis, Model 3 suggests that the state minimum wage reduces family income inequality. The estimate for the minimum wage is statistically significant at \( p < 0.01 \) (two-tailed test). The coefficient \(-0.124\) implies that for each $0.81 increase in the state minimum wage, the predicted change in the Gini coefficient is about \(-0.100\).\(^{11}\) For example, a state with a Gini of 35.6

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**Table 1.** Descriptive Statistics for Variables Used in the Analysis 1960–2000.

<table>
<thead>
<tr>
<th>Variable Descriptions</th>
<th>Mean (standard deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gini coefficient for families (multiplied by 100)</td>
<td>38.34 (3.30)</td>
</tr>
<tr>
<td>Median family income divided by 1,000</td>
<td>$33,560 (11.56)</td>
</tr>
<tr>
<td>Percent 25 years and over college graduates</td>
<td>15.47 (6.69)</td>
</tr>
<tr>
<td>Percent 25 years and over high school graduates</td>
<td>63.87 (16.27)</td>
</tr>
<tr>
<td>Female labor force participation rate</td>
<td>47.79 (11.54)</td>
</tr>
<tr>
<td>Female-headed families</td>
<td>12.82 (3.91)</td>
</tr>
<tr>
<td>Recent international migrants</td>
<td>1.51 (1.03)</td>
</tr>
<tr>
<td>Labor force employed in manufacturing</td>
<td>19.41 (8.61)</td>
</tr>
<tr>
<td>Percent of the population over age 65</td>
<td>11.06 (2.26)</td>
</tr>
<tr>
<td>Percent black of state population</td>
<td>9.36 (9.55)</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>5.37 (1.45)</td>
</tr>
<tr>
<td>Minimum wage</td>
<td>$3.97 (2.46)</td>
</tr>
</tbody>
</table>

\( N = 245. \)

Table 2. Unstandardized Coefficients from OLS Models for the Effect of the State Minimum Wage on Family Income Inequality (Gini’s Index times 100), 1960–2000.

<table>
<thead>
<tr>
<th></th>
<th>Intercepts</th>
<th>Linear</th>
<th>Linear</th>
<th>Piecewise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Median family income</td>
<td>-0.559***</td>
<td>-0.560***</td>
<td>(8.58)</td>
<td>(8.71)</td>
</tr>
<tr>
<td></td>
<td>(6.37)</td>
<td>(6.38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College graduates</td>
<td>0.192***</td>
<td>0.195***</td>
<td>(4.28)</td>
<td>(4.41)</td>
</tr>
<tr>
<td></td>
<td>(6.84)</td>
<td>(6.43)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school graduates</td>
<td>-0.159</td>
<td>-0.149***</td>
<td>(6.37)</td>
<td>(6.38)</td>
</tr>
<tr>
<td></td>
<td>(6.37)</td>
<td>(6.43)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female labor force participation</td>
<td>-0.034</td>
<td>-0.027</td>
<td>(1.00)</td>
<td>(0.98)</td>
</tr>
<tr>
<td></td>
<td>(6.37)</td>
<td>(6.38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female headed families</td>
<td>0.220**</td>
<td>0.252***</td>
<td>(3.48)</td>
<td>(3.95)</td>
</tr>
<tr>
<td></td>
<td>(6.37)</td>
<td>(6.38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recent international migrants</td>
<td>0.585***</td>
<td>0.628***</td>
<td>(5.43)</td>
<td>(5.87)</td>
</tr>
<tr>
<td></td>
<td>(6.37)</td>
<td>(6.38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent employed in manufacturing</td>
<td>-0.093***</td>
<td>-0.087***</td>
<td>(7.05)</td>
<td>(6.57)</td>
</tr>
<tr>
<td></td>
<td>(6.37)</td>
<td>(6.38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population over age 65</td>
<td>0.043</td>
<td>0.069</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.88)</td>
<td>(1.44)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population black</td>
<td>0.025</td>
<td>0.024</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.56)</td>
<td>(1.57)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>3.291***</td>
<td>2.384***</td>
<td>2.070*</td>
<td>-1.479</td>
</tr>
<tr>
<td></td>
<td>(6.27)</td>
<td>(5.10)</td>
<td>(2.47)</td>
<td>(1.73)</td>
</tr>
<tr>
<td>1970</td>
<td>-0.169</td>
<td>-0.491</td>
<td>-1.710**</td>
<td>-1.237</td>
</tr>
<tr>
<td></td>
<td>(0.32)</td>
<td>(1.07)</td>
<td>(2.69)</td>
<td>(1.91)</td>
</tr>
<tr>
<td>1990</td>
<td>3.493***</td>
<td>3.102***</td>
<td>3.943***</td>
<td>3.558***</td>
</tr>
<tr>
<td></td>
<td>(6.66)</td>
<td>(6.76)</td>
<td>(10.40)</td>
<td>(8.99)</td>
</tr>
<tr>
<td>2000</td>
<td>5.028***</td>
<td>4.797***</td>
<td>7.659***</td>
<td>7.286***</td>
</tr>
<tr>
<td></td>
<td>(9.58)</td>
<td>(10.49)</td>
<td>(14.49)</td>
<td>(13.47)</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.118</td>
<td>0.149</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.50)</td>
<td>(1.90)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State minimum wage</td>
<td>-0.534***</td>
<td>-0.124**</td>
<td>-0.396***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.85)</td>
<td>(3.19)</td>
<td>(4.05)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>36.014***</td>
<td>38.510***</td>
<td>55.977***</td>
<td>53.865***</td>
</tr>
<tr>
<td></td>
<td>(97.02)</td>
<td>(89.83)</td>
<td>(23.23)</td>
<td>(21.74)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.391</td>
<td>0.541</td>
<td>0.898</td>
<td>0.901</td>
</tr>
<tr>
<td>BIC</td>
<td>-99.500</td>
<td>-163.276</td>
<td>-471.262</td>
<td>-478.328</td>
</tr>
</tbody>
</table>

Note: Unstandardized regression coefficients with t-statistics in parentheses. Data are for 49 states for the years 1960, 1970, 1980, 1990 and 2000 (excluding Alaska). Models 2 and 3 use the linear state minimum wage, while Model 4 utilizes a piecewise variable for the state minimum wage with the node set at $4.00 in 2001 adjusted dollars. Median family income divided by 1000 for purposes of presentation.

\*p < 0.05; \**p < 0.01; \***p < 0.001 (two-tailed tests).
would see its Gini index reduced to 35.5, ceteris paribus, for each $0.81 increase in the minimum wage. This is the estimated average effect over the whole time period of 1960 to 2000. A standard deviation increase in the minimum wage, all else constant, would reduce Gini’s index from 35.3 to 35.0 (for each $2.46 increase). Tests for interactions between the year dummies and the minimum wage were not significant which suggests that the effect has not changed over time.

Model 4 uses the piecewise specification mentioned above to estimate the potential nonlinear effect of the state minimum wage. The $R^2$, t-statistic for the partial regression coefficient, and Bayesian Information Criterion (BIC) for the model with a piecewise linear specification suggest a better fit than for models using the linear minimum wage. The piecewise variable implies that the state minimum wage has no effect until it rises above a certain value. In this analysis, the best fit for the piecewise variable (Model 4) is the value of $4.00. At all values below $4.00, the effect of the minimum wage on income inequality is zero, while for each $1.00 increase above $4.00, it changes the Gini by $-0.396$.

Analyses such as these are usually prone to autocorrelation and heterogeneity bias (Wooldridge, 2002). We estimated models to account for correlated errors and unobserved effects. The best fit by Akaike’s Information Criterion and the Bayesian Information Criterion was obtained with no restrictions on the error correlations. Table 3 presents Maximum Likelihood models with unstructured errors correcting for autocorrelation and heterogeneity bias.

Some of the variables are less significant (e.g. percent college graduates and female-headed families) while others become significant (e.g. percent black). The coefficient for the effect of the linear minimum wage decreases slightly from $-0.124$ (Model 3, Table 1) in the OLS model to $-0.107$ (Model 1, Table 3) in the Maximum Likelihood model. The coefficient from the Maximum Likelihood model produces the estimate that each $1.00 increase in the state minimum wage produces a $-0.107$ predicted change in the Gini coefficient. With the piecewise variable, the coefficient changes to $-0.276$ in the Maximum Likelihood model (Model 2, Table 3) from $-0.396$ in the OLS model (Model 4, Table 2). For each $1.00 increase in the state minimum wage above $4.00 the estimated change in the Gini coefficient is $-0.276$. All else constant, a state with a Gini score of 35.6 and a minimum wage increase from $4.00 to $6.00 would see their Gini index decrease to 35.1.

In Table 3, the last two models (3 and 4) drop the unemployment rate as a potential intervening variable. Since neoclassical economic theory suggests higher levels of the minimum wage leading to unemployment, it is possible
Table 3. Unstandardized Coefficients from Maximum Likelihood Mixed Models with Unstructured Errors for the Effect of the State Minimum Wage on Family Income Inequality (Gini’s Index times 100), 1960–2000.

<table>
<thead>
<tr>
<th></th>
<th>Linear 1</th>
<th>Piecewise 2</th>
<th>Linear 3</th>
<th>Piecewise 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median family income</td>
<td>-0.388***</td>
<td>-0.391***</td>
<td>-0.406***</td>
<td>-0.416***</td>
</tr>
<tr>
<td></td>
<td>(8.56)</td>
<td>(8.80)</td>
<td>(9.13)</td>
<td>(9.38)</td>
</tr>
<tr>
<td>Median family income</td>
<td>0.002***</td>
<td>0.003***</td>
<td>0.003***</td>
<td>0.003***</td>
</tr>
<tr>
<td></td>
<td>(6.23)</td>
<td>(6.27)</td>
<td>(7.10)</td>
<td>(7.28)</td>
</tr>
<tr>
<td>College graduates</td>
<td>0.101*</td>
<td>0.102*</td>
<td>0.083</td>
<td>0.079</td>
</tr>
<tr>
<td></td>
<td>(2.28)</td>
<td>(2.39)</td>
<td>(1.91)</td>
<td>(1.89)</td>
</tr>
<tr>
<td>High school graduates</td>
<td>-0.124***</td>
<td>-0.116***</td>
<td>-0.122***</td>
<td>-0.116***</td>
</tr>
<tr>
<td></td>
<td>(5.85)</td>
<td>(5.72)</td>
<td>(5.71)</td>
<td>(5.55)</td>
</tr>
<tr>
<td>Female labor force participation</td>
<td>0.033</td>
<td>0.034</td>
<td>0.023</td>
<td>0.020</td>
</tr>
<tr>
<td></td>
<td>(1.65)</td>
<td>(1.80)</td>
<td>(1.27)</td>
<td>(1.11)</td>
</tr>
<tr>
<td>Female headed families</td>
<td>0.138*</td>
<td>0.132*</td>
<td>0.182**</td>
<td>0.192***</td>
</tr>
<tr>
<td></td>
<td>(2.30)</td>
<td>(2.31)</td>
<td>(3.37)</td>
<td>(3.67)</td>
</tr>
<tr>
<td>Recent international migrants</td>
<td>0.278**</td>
<td>0.323****</td>
<td>0.238*</td>
<td>0.260***</td>
</tr>
<tr>
<td></td>
<td>(2.94)</td>
<td>(3.55)</td>
<td>(2.57)</td>
<td>(2.90)</td>
</tr>
<tr>
<td>Percent employed in manufacturing</td>
<td>-0.134***</td>
<td>-0.128***</td>
<td>-0.132***</td>
<td>-0.126***</td>
</tr>
<tr>
<td></td>
<td>(9.82)</td>
<td>(9.59)</td>
<td>(9.60)</td>
<td>(9.28)</td>
</tr>
<tr>
<td>Population over age 65</td>
<td>-0.015</td>
<td>0.001</td>
<td>-0.050</td>
<td>-0.040</td>
</tr>
<tr>
<td></td>
<td>(0.27)</td>
<td>(0.03)</td>
<td>(0.87)</td>
<td>(0.73)</td>
</tr>
<tr>
<td>Population black</td>
<td>0.050*</td>
<td>0.053**</td>
<td>0.041*</td>
<td>0.043*</td>
</tr>
<tr>
<td></td>
<td>(2.64)</td>
<td>(3.03)</td>
<td>(2.24)</td>
<td>(2.47)</td>
</tr>
<tr>
<td>1960</td>
<td>-0.257</td>
<td>-0.018</td>
<td>-0.645</td>
<td>-0.591</td>
</tr>
<tr>
<td></td>
<td>(0.38)</td>
<td>(0.03)</td>
<td>(0.97)</td>
<td>(0.92)</td>
</tr>
<tr>
<td>1970</td>
<td>-0.898*</td>
<td>-0.682</td>
<td>-1.227**</td>
<td>-1.172**</td>
</tr>
<tr>
<td></td>
<td>(2.10)</td>
<td>(1.64)</td>
<td>(3.13)</td>
<td>(3.08)</td>
</tr>
<tr>
<td>1990</td>
<td>3.600***</td>
<td>3.462****</td>
<td>3.550***</td>
<td>3.410***</td>
</tr>
<tr>
<td></td>
<td>(12.56)</td>
<td>(12.27)</td>
<td>(12.63)</td>
<td>(12.07)</td>
</tr>
<tr>
<td>2000</td>
<td>7.381***</td>
<td>7.332***</td>
<td>7.337***</td>
<td>7.286***</td>
</tr>
<tr>
<td></td>
<td>(13.54)</td>
<td>(14.04)</td>
<td>(13.51)</td>
<td>(13.89)</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.074</td>
<td>0.106*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.50)</td>
<td>(2.16)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State minimum wage</td>
<td>-0.107**</td>
<td>-0.276***</td>
<td>-0.104**</td>
<td>-0.247***</td>
</tr>
<tr>
<td></td>
<td>(3.28)</td>
<td>(4.39)</td>
<td>(3.17)</td>
<td>(3.96)</td>
</tr>
<tr>
<td>Constant</td>
<td>50.983***</td>
<td>48.879***</td>
<td>55.392***</td>
<td>51.931***</td>
</tr>
<tr>
<td></td>
<td>(26.09)</td>
<td>(26.25)</td>
<td>(27.95)</td>
<td>(28.49)</td>
</tr>
<tr>
<td>BIC</td>
<td>779.6</td>
<td>772.1</td>
<td>777.4</td>
<td>772.1</td>
</tr>
</tbody>
</table>

Note: Unstandardized regression coefficients with t-statistics in parentheses. Data are for 49 states for the years 1960, 1970, 1980, 1990 and 2000 (excluding Alaska). Models 1 and 3 use the linear state minimum wage, while Models 2 and 4 utilize a piecewise variable for the state minimum wage with the node set at $4.00 in 2001 adjusted dollars. Median family income divided by 1000 for purposes of presentation.

*p < 0.05; **p < 0.01; ***p < 0.001 (two-tailed tests).
that its effects on income inequality will be less favorable. In fact, there is little change in the minimum wage coefficients for the linear and piecewise models.\(^{17}\)

One possible concern is omitted variable bias. One may argue that the models do not take into account state variation in average monthly AFDC benefits and the relation between the minimum wage and the income inequality is spurious. In equations not reported here, average monthly family AFDC payments were added to the models and did not affect the results. Another possible criticism is that these models do not account for the percent of the state’s labor force covered by the federal minimum wage. Data for the percent of the state’s non-supervisory labor force covered by the federal minimum wage were only available for 1970–1990 (United States Department of Labor, 1971, 1979, 1990).\(^{18}\) In models not reported here, we controlled the share of the state’s non-supervisory labor force covered by the minimum wage provisions of the Fair Labor Standards Act (federal minimum wage) and the inclusion of this variable had no influence on the estimates. Another reasonable counter-argument is the lack of a control for union membership. Union data was again available only for 1970–1990 and inclusion of the union variable had no impact on the estimates.\(^{19}\)

**HOW LARGE IS THE EFFECT?**

One way to understand the magnitude of the state minimum wage effect is to compare it with the effect of other variables associated with lower inequality. For instance, the greater the state’s share of people aged 25 and over who are high school graduates, the lower the degree of income inequality. Conceivably, increasing the share of high school graduates over age 25 might be seen as another policy for reducing inequality. If such is the case, it is worth comparing it to the minimum wage effect. Using the Maximum Likelihood estimates from Model 2 in Table 3, a $1.00 increase in the state minimum wage above $4.00 is equivalent to about a 2.4% increase in the state’s share of high school graduates. Arguably, increasing the share of high school graduates aged 25 and above by 2.4% would take time to have an effect on income inequality whereas a minimum wage could be instituted relatively quicker.

In order to gain an even more precise picture of the overall effect of the state minimum wage, we conducted an additional analysis (available by request) by regressing quintile share on the explanatory variables with 1990 data.\(^{20}\) States with higher minimum wages have a higher share of income
going to the bottom four quintiles and a lower share going to the top quintile. This analysis suggests that for each dollar increase in the state minimum wage, approximately 0.313% of the total share of income is redistributed from the top to the bottom quintiles. Specifically, the share of the lowest quintile increases by 0.043% for each one dollar increase in the state minimum wage, the second quintile by 0.069%, the third by 0.051%, and the fourth by 0.002%. The fifth quintile (the one with the highest income) receives on average 0.165% less for each one-dollar increase in the state minimum wage. In terms of dollars, the annual income of an average family in the bottom quintile (Mean = $12,815) increases by $240 on average for each two dollar increase in the state minimum wage. The second quintile’s average family income share (Mean = $30,502), increases by approximately $388 for each two dollar increase in the state minimum wage while the third quintile (Mean = $47,550) sees an increase of around $286. The highest quintile (Mean = $122,179) receives, on average, $928 less for each dollar increase in the state minimum wage.

State minimum wages, on average, reduce the degree of income concentration in the top quintile. This brief analysis also suggests support for the “ripple effect” interpretation that the minimum wage carries up to families above the lowest quintile in the distribution if we assume that workers’ wages in these families are above the minimum and respond to minimum wage increases. Since the minimum influences the middle quintiles there is also support for the contention that the minimum wage influences income shares of the middle class. These and the pooled time-series results support the hypothesis that state minimum wages reduce family income inequality.

**SUMMARY AND CONCLUSION**

This paper tests and finds support for the hypothesis that the state minimum wage reduces income inequality. The relation between the minimum wage and income inequality is found to be non-linear. The state minimum wage is ineffective at reducing inequality unless it is set at values greater than $4.00. One may question whether or not there is a contingency wage at which a minimum is set where family income inequality responds. To that end, the piecewise specification suggests the existence of some such contingency wage.

Also, the findings suggest that part of the rise in income inequality can be accounted for by the state minimum wage. With the decline in the purchasing power of the federal minimum wage, most state minimum wages, which are usually set in reference to the federal, declined as well. This
suggests that when the minimum wage is eroded by inflation it may contribute to increasing income inequality. The quintile analysis suggests that the minimum wage redistributes income from the top quintile to the bottom three quintiles.

The conclusions of this analysis apply to the state-level American situation with a range of minimum wages from none at all to approximately $8.00 (2001 CPI). Although considerable time has been spent pointing out the deficiencies of the neoclassical model, the neoclassical predictions about employment losses and higher inequality might quickly bear fruit were minimum wages to be set excessively high. Theoretically, the effect of the minimum wage on family income inequality found in this analysis demonstrates the change in slope of the minimum wage’s effect on income inequality. If some states began setting their minimum wages excessively high, there is theoretical reason to believe that the slope of the relation between the state minimum wage and income inequality would switch from inverse to positive. However, no observed case has a minimum high enough to increase income inequality. The findings in this paper, given the range of evidence considered and the range of state minimum wages at the current range of values, shed much doubt on the neoclassical argument that greater minimum wages increase income inequality. Alternatively, the institutionalist position is supported in that higher minimum wage levels reduce family income inequality.

This analysis contributes to the literature on the importance of the minimum wage. Minimum wages today are generally considered a strictly economic topic, but since minimum wages concern issues of fairness and equity in the labor market as well as the government’s ability to set a price for labor, then the minimum wage is a sociological as well as a stratification issue. Increasing the state minimum wage is one potential way for states to reduce family income inequality. Given the current “devolution” of economic policy power to the states, the results from this study have pointed out a strategy states can follow to reduce inequality. Since attention will be increasingly focused on states in the future with regard to welfare policies, this study demonstrates the effectiveness of one such policy.

NOTES

1. If this is true then most of the gain from a minimum wage might, “...go to surfboards and stereos – not into rent and baby formula” (cited in Card & Krueger, 1995, p. 310).
2. In some sense this can also be considered an element of “bilateral monopoly” (see e.g. Weakliem, 1989, p. 205). Through reducing the wages of the highest paid workers the wage increase shifts pay in favor of the lowest paid workers. Higher paid workers may forgo pay increases or accept pay decreases if they have a substantial interest in maintaining non-wage benefits.

3. The Webb argument, in contrast to marginal productivity theory, where \( Wages = F(\text{Marginal Productivity}) \) basically says that Marginal Productivity = \( F(\text{Wages}) \), which is not necessarily at odds with a neoclassical interpretation (Blaug, 1998, pp. 418–419). The Webb argument is also an early incarnation of efficiency wage theory.

4. The neoclassical school would agree with this, though the outcome of the effect would be the substitution of capital for labor. The institutional school suggests the outcome of a minimum wage order would be the supplementation of labor with productivity-enhancing technology (see Bluestone & Harrison, 2001, p. 176).

5. Kenworthy (2001) has demonstrated that one of the greatest impediments to economic growth both in nations and in the American states is income inequality. Since GDP and other measures of economic growth are partially a product of aggregate consumption, then redistributing income should lead to a higher level of economic growth following the Keynesian microeconomic principle that an increase in income leads to an increase in consumption especially by those with the lowest wages.

6. Income redistribution, as discussed in this paper, refers to a process whereby income is transferred from those with higher incomes to those with lower incomes as in Dalton’s (1920, cited in Allison, 1978) principle of transfers.

7. Other potential drawbacks to their analysis include the use of few observations \( (N = 48) \) at one point in time. Another concern is the apparent lack of attention to multicollinearity. Such an analysis also utilizes limited degrees of freedom and the generalizations from one point in time with few cases makes us reluctant to accept the conclusion that the state minimum wage does not reduce income inequality.

8. It is also worth noting, as Ashenfelter and Smith (1979) state, “The assumption that the statutory minimum wage is the actual minimum wage presumably reflects the belief that employers fully comply with this law.” (1979, p. 334)

9. Even under a competitive market, employers will still face an effective minimum, even if there is no legal minimum wage. For example, in 1959 Arkansas had a minimum wage of $0.16, or $0.97 in 2001 dollars.

10. The BIC is computed with ease as \( \text{BIC}' = N \log(1 - R^2) + k \log(N) \) (Raftery, 1995). Lower values indicate a better model fit.

11. The estimated effect was virtually identical if all states without a minimum wage were assigned the federal minimum wage, although the model fit not as strong. We also obtained estimates by dropping states without a minimum wage and the results were similar. One other strategy was to give each state without a minimum wage the value of $1.00 and the results were virtually the same with the magnitude of the effect of the minimum wage a little stronger. If anything, obtaining estimates by assigning states without a minimum wage the value of $0, as is reported, is a reasonable analytical decision.

12. To the extent that some readers may question the use of Gini’s index, I also repeated the analyses for 3 years using Theil’s entropy index and the variance of
logged income. Results from models using these alternative measures also produced
the significant inverse association between the minimum wage and income inequality
and in both cases the piecewise specification produced a stronger $t$-statistic and better
overall model fit.
13. 82 observations had a minimum wage less than $4.00 while the remaining 163
observations had a minimum wage greater than $4.00 (2001$).
14. Using SAS, we estimated Restricted Error Maximum Likelihood (REML)
models using the PROC MIXED procedure (SAS Institute, 1999, p. 2086). Models
differing in their covariance structures were estimated and compared: diagonal, auto-
regressive, Toeplitz, and unstructured. The diagonal covariance structure provides es-
timates that are identical to OLS estimates. The remaining covariance structures
provided substantively similar and statistically significant results for the minimum wage
effect. The Bayesian Information Criterion (BIC) and Akaike’s Information Criterion
(AIC) both favor the model that places no restrictions on the error correlations (un-
structured covariance matrix). Hence, we present the results from the model with an
unstructured covariance matrix. Also estimated was a Fixed Effects model in PROC
GLM which provided an estimate of $-0.164$ ($p < 0.001$) for the state minimum wage.
15. A concern with getting estimates from ecological units of analysis like states is
multicollinearity. One way to diagnose multicollinearity is with Variance Inflation
Factors (VIF) (Gujarati, 1995). A VIF above 10 indicates high levels of multicoll-
linearity (Gujarati, 1995, p. 339). We checked whether the minimum wage estimates
were a product of collinearity by dropping all the variables with a VIF exceeding 10
and the coefficient for the state minimum wage was consistent with what we report
above even after dropping the highly correlated variables.
16. Since the Gini coefficient for 1960 and 2000 came from different sources than
the other years, this may be one reason for these differences. If we were to drop 1960
and 2000 and just obtain estimates from 1970–1990, the coefficients for the state
minimum wage are basically identical.
17. Some readers have suggested dropping other potential intervening variables
such as recent international migrants and female-headed families. Doing so, how-
ever, does not produce any change in conclusions.
18. The only consistent data across 1970 and 1990 concerns the share covered by
the federal minimum wage. The estimated share of the non-supervisory labor force
covered under the federal minimum wage has changed between 1970 and 1990. In
1970, the range of coverage by the federal minimum wage went from a low of 59%
(South Dakota) to a high of 80% (Connecticut) with a mean of 73%. In 1990, the
range went from 78% (South Dakota) to 92% (Nevada) with a mean of 86%. A
southern state with high inequality like Mississippi had approximately 88% covered
by the federal minimum wage in 1990, but Hawaii, Ohio and Virginia had virtually
the same shares of workers covered by the federal minimum wage which suggests the
absence of a clear-cut geographic pattern.
19. Prior analyses of states have found that the effect of union membership on family
income inequality is rather weak (e.g. Levernier et al., 1995; Partidge et al., 1998).
20. To the best of our knowledge and efforts we were unable to locate published
quintile data by state for the other years. The figures we use were calculated from
CPS data by Jon Haveman of the Public Policy Institute of California and used with
his permission.
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