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HOW DOES MINIMUM WAGE AFFECT INCOME DISTRIBUTION AMONG ETHNIC GROUPS?

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Abstract

The impact of minimum wage on employment and income distribution has been at the epicenter of debates among policymakers and academia since the seminal work of Stigler (1946). Though some economists believe that raising minimum wage will lead to higher unemployment rate, others argue that a rise in minimum wage can improve the income distribution among low-income groups. The empirical evidence to support these arguments are contradictory. This study contributes to minimum wage literature in two ways. First, it estimates the effects of raising minimum wage on income distribution among ethnic groups, which has not been addressed in the minimum wage literature. Second, it attempts to assess the effects of raising minimum wage on number of individuals under poverty and on the earning of those in the 20th lowest income quintile. The study implements different techniques including instrumental 2SLS model to account for endogeniety and causality problem. We estimate the elasticity of number of people under poverty and the earning of the lowest 20th quintiles to a rise in the federal minimum wage. We found robust evidence that minimum wage law has a statistically significant impact on reducing income inequality across different ethnic groups, albeit at different degrees.

Keywords: Minimum wage, income inequality, poverty reduction, instrumental variable, Johansen Cointegration, Two Stage Least Squares (2SLS)

INTRODUCTION

More than seventy years since the seminal work of Stigler (1946) on minimum wage, the magnitude and sign of the impact of minimum wage on unemployment and income distribution remains a hotly debated topic. By the 1980s, there was a consensus among economists that there is a modest significant effect of increase in minimum wage on income (Brown, Gilory & Kohen, 1982; Brown, 1988). However, with the use of micro data and cross-state data researchers continue to find conflicting results. While some studies support neoclassical approach that raising minimum wage reduces employment (Manning & Rahman, 2003; Neumark and Wascher, 2007; Burkhauser & Sabia, 2007), others fail to find unemployment effects from raising minimum wage (Card & Krueger, 1994; Machin & Manning, 1994; Machin & Manning & Rahman, 2003).

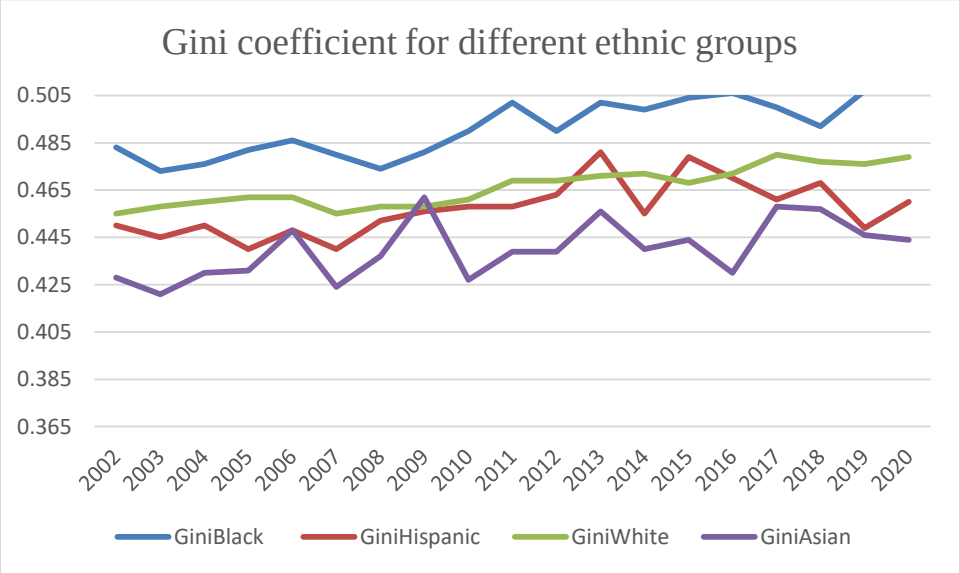
There is scant research on the impact of minimum wage on wage inequality since the seminal studies of DiNardo, Fortin, and Lemieux (1996), and Lee (1999). Indeed, several studies have focused on the relationship between minimum wage and GDP growth, and there is a scant number of studies on the relationship between minimum wage and income distribution. Though a group of economists have found a positive effect of raising minimum wage on income distribution and poverty reduction (Adison & Blackburn, 1999; Lee,1999; DeFina 2008; Lin & Yun, 2016; Dube 2019) others have found a negative effect of raising minimum wage on income distribution (Fernando & Urdinola, 2002; Burkhauser & Sabia, 2007; MaCurdy, 2015; Sabia & Nielsen, 2015).

The goal of this quantitative research is three-fold. First, it attempts to contribute to the literature by measuring the effects of raising minimum wages on income distribution for different ethnic groups using 2SLS models to account for endogeniety of unemployment. Second, the study attempts to estimate the elasticity of Gini coefficient to raising minimum wage to find out how much a dollar increase in minimum wage affects income distribution among ethnic groups. The approach in this study is different from previous studies because it measures the direct effect of minimum wage on income distribution among ethnic groups, which has not been addressed in previous studies. Third, the study attempts to measure the effects of raising minimum wage on number of people under poverty and on the income of 20^{th} lowest income quintiles. The results of this study has important policy implications as it can help policy makers to find out how much a one percent increase in minimum wage affects income distribution among ethnic groups.

The Gini coefficient data for the period of 2002-2020 is retrieved from the Federal Reserve Bank of St Louis, presented in Graph 1. The data indicates that the income distribution

among African Americans is more unequally distributed compared to other groups; however, the distribution for Asian Americans shows less inequality compared to other groups.

Graph 1. Gini coefficients for different ethnic groups.



Source: Data from Federal Reserve Bank of St Louis.

The rest of paper is structured as follows. Section 2 reviews the literature. Section 3 provides the data and methodology. Section 4 presents the estimated results. Section 5 concludes and provides policy recommendations.

REVIEW OF LITERATURE

In discussing the literature, the most important aspects to this study are along methodological approach; accounting for demand and supply shocks; and national approach versus cross-state approach. Therefore, we classify the literature into three sub-categories: (i) studies that have used unemployment as a control variable. (ii) studies that account for supply and demand shocks, and (iii) studies that present cross-country states or case studies. We divide each category into two sub-categories; those who find the minimum wage improved the income distribution and those who find the opposite.

Unemployment rate as a control variable

Several studies have used unemployment rate as a control variable; however, they have reached conflicting results.

(i) Adison & Blackburn (1999) investigate the effects of raising minimum wage on poverty reduction, and find indications of a poverty reducing effects of raising minimum wages among teenagers and older junior high school dropouts. DeFina (2008) assess the effects of minimum wage on children living in female-headed households and finds that raising minimum wages have significantly reduced the child poverty rates. Dube, Lester, & Reich (2008) estimate earning and employment effects of raising minimum wage and find that raising minimum wage increases overall earning of affected workers, though there are some differential effects among demographic groups. Vazquez, Esquivel, & Hernandez (2017) find no evidence on the negative effect of raising minimum wage law on employment in different regions. Lin & Yun (2016) investigated the effects of minimum wage law on income distribution in China and find that increasing minimum wage reduces inequality at the bottom end of earning distribution.

(ii) Fernando & Urdinola (2002) assess the effects of minimum wage on income inequality in Colombia and find that negative effects on employment have led to a rise in wage inequality. Neumark & Wascher (2007) find that the majority of the studies on the topic point to a negative employment effect both in U.S. and in other countries.

Models accounting for demand and supply shocks

(i) Lee (1999) investigates the effect of a rise in minimum wage law on income inequality and finds a great majority of the observed growth in inequality is attributable to the erosion of minimum wage. DiNardo, Fortin, and Lemieux (1996) highlight the compressing effects of minimum wage and find that the eroding minimum wage explained almost 40 to 65 percent of the rise in inequality. Alaniz, Gindling, & Terrell (2011) find the possibility that with the rise in the minimum wage law in Nicaragua, a poor family will move out of the poverty. Joao (2016) investigates the minimum wage and income distribution in Brazil and finds that with the minimum wage rise, the income distribution experienced great improvement. Redmond, Dorrley, McGuinness (2020) find that the Irish increase in minimum wage led to a decrease in the wage inequality. Militaru et al. (2019) assess the impact of minimum wage in Romania and find that raising the minimum wage is one way to reduce income inequality.

(ii) Smith & Vavricheck (1987) find that the relation between a worker's wage rate and his poverty depends on a number of factors including number of hours worked per year, family size, the amount of other income received by the worker, and other family' members revenues. Neumark, Cunningham, & Siga (2006) find no evidence that

minimum wage in Brazil lift the family incomes at the lower levels of income distribution. Bird & Manning (2007) assess the effects of raising minimum wage law in Indonesia and find raising minimum wage results to net loss for majority of the households.

Studies with cross-state data and micro-level

(i) Autor, Manning, & Smith (2016) find that minimum wage reduces inequality in the lower tail of wage distribution. Card & Krueger (1994) find that the rise in federal minimum wage leads to narrowing wage inequality. Dube (2019) asses how minimum wage changes affect entire distribution of family income and finds strong evidence that a rise in minimum wage reduces the share of individuals with low family incomes.

(ii) Burkhauser & Sabia (2007) find little evidence of significant relationship between minimum wage increase and the overall state poverty rate. Sabia (2008) examine the relationship between minimum wage and reducing poverty among single mothers, and finds that most single mothers are not affected by minimum wage rise. Sabia & Burkhauser (2010) assess the impacts of minimum wage rise on poverty rates and find that wage increase had no effect on state poverty rates. Sabia & Nielsen (2015) examine the effects of minimum wage increase on poverty and find little evidence that federal minimum wage increase has reduced the poverty.

METHODOLOGY

Research design and model specification

This research study implements Ordinary Least Squared (OLS), and Two Stage Least Squared Model (2SlS) models, which have been used in several empirical studies to account for endogeniety problem and omitted variables bias in single-equation estimation. (Angrist & Imbens 1995). Another advantage of using 2SLS is that it can estimate the average causal effect of a variable. Indeed, it is useful because it can account for the causality relationship between unemployment and minimum wage rise.

We extend the study of Sarel (1997) and Deyshappriya (2017) who assume that inequality is a function of GDP growth, CPI inflation rate, terms of trade, real exchange rate depreciation, and federal minimum wage (Equation 1).

However, one of the differences of our study with theirs is that we control for unemployment rate to capture the effects of minimum wage on unemployment as an endogenous variable (Equation 2).

$$Gini = a_0 + a_1 GDPG + a_2 Inf + a_3 TOT + a_4 Ex + a_5 MW + \xi$$ Equation 1.

$$Unem = b_0 + b_1 MW + b_2 GDPG + b_3 Inf + \xi$$ Equation 2.

Where, *Gini* represents income inequality measured by Gini coefficient. *GDPG* is real GDP growth at constant prices of 2012; *Inf* represents inflation rate of CPI; *TOT* represents terms of trade; *Ex* is the real exchange rate depreciation; *MW* represents the federal minimum wage rate; and *Unem* represents unemployment rate at the national level.

The Data

The data on minimum wage, Gini coefficient, GDP growth, CPI, terms of trade, minimum wage, and unemployment rate have been retrieved from Federal Reserve Bank of St Louis, Fred website. We will use Gini coefficients for different ethnic group to find out if there is any differences on the effects of raising the minimum wage on different ethnic groups. We use annual data for the period 1994-2020 to assess the impact of minimum wage on income inequality. The reason for choosing 1994 as the starting point is because the minimum wage was increased in several U.S. states; and the last available data for several independent variables end in 2020.

Analytical approach

The analytical approach is based on regression models with ordinary least squared (OLS) technique, estimating equations 1 and 2. The estimated results have important policy implications because it can help policymakers to measure the effects of raising minimum wage on Gini coefficient among ethnic groups before making any decision.

ESTIMATED RESULTS

Estimated Results with OLS Models

We estimate the model for different ethnic groups as well as for total population at the national level. The estimated results presented in Table 1 indicate that more than 70 percent of changes in income inequality are explained by the abovementioned independent variables. The results also indicate that inflation and minimum wage are statistically significant in explaining Gini coefficient among different ethnic groups. Since the models are in the logarithm form, the coefficients can be interpreted as elasticities.

The estimated results indicate that one percent increase in minimum wage reduces inequality by 0.04 percent for total population; for Whites by 0.06, for African Americans by 0.09; for Hispanics by 0.08 and for Asians by 0.04. Indeed, the highest effects of minimum wage on

inequality is observed for African Americans and Hispanics. A one percent increase in minimum wage reduces income inequality by 0.09 percent for African Americans and by 0.08 percent for Hispanics. In other words, one percent increase in minimum wage improves income inequality for Hispanics and African Americans by 0.08 and 0.09 percent, respectively. Our estimates are smaller than Dube (2019), who finds long run elasticity of income to minimum wage between 0.15 and 0.49.

Table 1. The estimated results for equation 1 Gini coefficient for different ethnic groups

Variable	Total population	Whites	African Americans	Hispanics	Asians
GDPG	0.0036	0.004	0.006	-0.006	0.006
	(0.0030)	(0.004)	(0.007)	(0.007)	(0.01)
Inf	0.009**	0.11**	0.07**	-0.05**	0.26**
	(0.002)	(0.004)	(0.01)	(0.01)	(0.13)
TOT	-0.04	-0.001	-0.05	0.57**	-0.39
	(0.11)	(0.28)	(0.49)	(0.026)	(0.83)
Ex	0.02	0.036	0.05	-0.24**	0.15
	(0.03)	(0.11)	(0.20)	(0.009)	(0.33)
MW	-0.04**	0.06**	-0.09**	-0.08**	-0.04**
	(0.02)	(0.03)	(0.05)	(0.004)	(0.001)
Adjusted R-squared	0.88	0.79	0.71	0.75	0.72
Durbin Watson	2.06	2.10	2.54	2.34	2.27
F-Statistics	38.56	13.14	8.01	7.20	12.36

Numbers in parentheses are standard errors.

The estimated results for the effects of minimum wage on unemployment rate, captured in equation 2 are presented in Table 2. All variables together are able to explain more than 78% of changes in unemployment rate among ethnic groups. Expectedly, the coefficient of minimum wage for all ethnic groups is positive and significant. Put it differently, an increase in minimum wage leads to higher unemployment rate for all ethnic groups. The results are consistent with majority of studies in the literature including Fernando & Urdinola (2002), and Neumark and Wascher (2007).

The coefficients are interpreted as elasticities since the models are in logarithm forms. As clearly observed in the Table, one percentage increase in minimum wage leads to 0.04 increase in unemployment rate for whites, 0.07 percent for African Americans, 0.05 percent for Hispanics, and 0.04 percent for Asians. In other words, while Whites' unemployment rate is less affected by a rise in minimum wage, African Americans and Hispanics are more severely affected. This finding highlights a huge difference across effect of raising minimum wage on unemployment rate among ethnic groups.

Table 2. The estimated results for equation 2
unemployment rate for different ethnic groups

Variable	Total population	Whites	African Americans	Hispanics	Asians
MW	0.03 (0.01)	0.04 (0.01)	0.07 (0.02)	0.05 (0.03)	0.04 (0.01)
GDPG	0.009** (0.002)	0.11** (0.004)	0.07** (0.01)	-0.05** (0.01)	0.26** (0.13)
Inf	-0.04 (0.11)	-0.001 (0.28)	-0.05 (0.49)	0.57** (0.026)	-0.39 (0.83)
Adjusted R-squared	0.79	0.85	0.83	0.78	0.87
Durbin Watson	2.01	1.98	2.14	1.87	1.96
F-Statistics	27.54	19.24	13.45	27.20	17.45

Numbers in parentheses are standard errors.

Estimated Results for Johansen Cointegration Technique

We also use Johansen cointegration technique to find out if there is a long-run relationship between the Gini coefficients and minimum wage for different ethnic groups. The results presented in Table 3 indicate that values of Trace statistics are well above the corresponding critical values for test of zero and one cointegration relationship, which indicates that the number of stationary long-run relationship is at least two between minimum wage and Gini coefficients for all ethnic groups. The results here support the regression results in previous section and indicate that there is a robust long-run relationship between federal minimum wage and Gini coefficient across all ethnic groups.

Table 3. Tests of Cointegration rank on Gini coefficients
and minimum wage for ethnic groups

Ethnic Group	Eigen Value	H_0	H_1	Trace Test Statistics	Critical Values
Whites	0.49	r=0	r>0	234.2	166.3
Whites	0.36	r=1	r>1	139.82	121.64
African Americans	0.47	r=0	r>0	145.11	113.45
African Americans	0.35	r=1	r>1	156.12	124.56
Hispanics	0.32	r=0	r=0	145.23	111.78
Hispanics	0.26	r=1	r>1	135.79	110.46
Asians	0.34	r=0	r=0	127.45	109.36
Asians	0.29	r=1	r>1	116.78	104.23

To find out whether minimum wage has a long-run relationship with unemployment rate, we also use Johansen Cointegration technique. The results presented in Table 4 indicate that values of Trace statistics are above the corresponding critical values for test of zero and one; therefore, one can argue that there are at least two stationary long-run relationships between unemployment and minimum wage for all ethnic groups. Put

differently, minimum wage not only affects the income distribution among ethnic groups, but also affects their unemployment rate. Therefore, we try to find out the net effects by incorporating unemployment rate into equation 1 and estimating it to see whether the results are affected.

Table 4. Tests of Cointegration rank on unemployment and minimum wage for ethnic groups

Ethnic Group	Eigen Value	H_0	H_1	Trace Test Statistics	Critical Values
Whites	0.31	r=0	r>0	146.2	123.2
Whites	0.29	r=1	r>1	137.26	111.95
African Americans	0.38	r=0	r>0	176.11	145.29
African Americans	0.27	r=1	r>1	147.85	129.46
Hispanics	0.41	r=0	r=0	137.48	110.19
Hispanics	0.35	r=1	r>1	126.17	109.15
Asians	0.27	r=0	r=0	133.45	111.26
Asians	0.19	r=1	r>1	131.56	103.74

Table 5 represents the regression model results when we incorporate the unemployment rate into equation 1. As we can see when we control for unemployment the explanatory power of models measured by R-squared have increased and all the independent variables together explain more than 80 percent of changes in Gini coefficient for different ethnic groups. The coefficient on GDP growth is statistically significant for all ethnic groups, indicating that income distribution is affected by cyclical nature of GDP. The highest elasticity of Gini coefficient to inflation is observed for African Americans and Hispanics, -0.05 and -0.04, respectively. Interestingly, when we incorporate the unemployment rate to equation 1, the elasticity of Gini coefficient to minimum wage decreases significantly. The results indicate that a rise in minimum wage will improve the income distribution for all ethnic groups, and more importantly for African Americans. The coefficients on unemployment are also statistically significant and positive, highlighting that the rise in unemployment rate leads to a worsen income distribution as the coefficients are positive. However, the net effect of raising minimum wage on income inequality, measured by Gini coefficient is negative, indicating that despite the unemployment caused by the minimum wage we still observe an improvement in income inequality. Since, there might be an endogeniety problem as unemployment rate is affected by minimum wage rate and causality may run in different direction, we use instrumental variable through 2SLS model to solve for the endogeniety problem.

Table 5. The estimated results for Gini coefficient with unemployment rate incorporated to model.

Variable	Total population	Whites	African Americans	Hispanics	Asians
GDPG	0.002** (0.001)	0.003** (0.001)	0.006** (0.001)	0.006** (0.002)	0.005** (0.001)
Inf	0.008** (0.002)	0.06** (0.04)	0.07** (0.01)	0.07** (0.01)	0.04** (0.01)
TOT	-0.05 (0.01)	-0.02 (0.02)	-0.04 (0.51)	0.57 (0.26)	0.49 (0.23)
Ex	0.02 (0.03)	0.04 (0.12)	0.06 (0.20)	0.01 (0.08)	0.15 (0.09)
MW	-0.03** (0.02)	-0.04** (0.02)	-0.05** (0.01)	-0.04** (0.02)	-0.02** (0.01)
Unem	0.02** (0.01)	0.03** (0.01)	0.02** (0.01)	0.01** (0.001)	0.01** (0.02)
Adjusted R-squared	0.89	0.82	0.81	0.81	0.85
Durbin Watson	2.15	1.96	1.84	1.89	2.16
F-Statistics	49.34	28.53	18.07	26.42	22.57

Numbers in parentheses are standard errors.

Estimated Results for Two Stage Least Squares (2SLS) Models

A Two Stage Least Squared (2SLS) model is used to account for omitted variables and endogeniety problem. As pointed out by Angrist & Imbens (1995), and Mydeau-Olivares, Shi, & Rosseel (2019), the 2SLS instrumental variables are unbiased and account for omitted variables and causality and endogeniety problem. Even if instrumental variable is misspecified, generally better coverage is obtained compared to simple regression models.

The results for the 2SLS model are presented in Table 6 and indicate that all explanatory variables together explain more than 80 percent of changes in Gini coefficient for all ethnic groups. The coefficients on minimum wage rate are negative and statistically significant for all ethnic groups, indicating that an increase in minimum wage reduces Gini and leads to an improvement in income inequality. Again, consistent with previous regression models, the highest elasticities of Gini coefficient to minimum wage are observed for African Americans and Hispanics, with values of -0.04, and -0.05, respectively. The coefficient on unemployment is positive and statistically significant for all ethnic groups, indicating that a rise in unemployment rate will deteriorate income distribution, measured by Gini coefficient. In sum, the results here indicate that though raising the minimum wage has negative effects on employment, the net effect on income distribution is negative, indicating a reduction in income inequality even accounting for unemployment effect.

Table 6. The 2SLS model results for effects of minimum wage on Gini coefficient for ethnic groups.

Variable	Total population	Whites	African Americans	Hispanics	Asians
GDPG	0.0001	0.001	0.004	0.005	0.004
	(0.001)	(0.02)	(0.01)	(0.02)	(0.01)
Inf	0.07**	0.06**	0.08**	0.04**	0.03**
	(0.002)	(0.03)	(0.01)	(0.01)	(0.01)
TOT	-0.04	-0.01	-0.03	0.37	0.29
	(0.05)	(0.02)	(0.51)	(0.46)	(0.25)
Ex	0.01	0.05	0.07	0.01	0.05
	(0.03)	(0.12)	(0.20)	(0.04)	(0.7)
MW	-0.02**	-0.03**	-0.04**	-0.05**	-0.02**
	(0.01)	(0.01)	(0.01)	(0.02)	(0.001)
Unem	0.01**	0.02**	0.04**	0.03**	0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Adjusted R-squared	0.85	0.83	0.80	0.84	0.81
Durbin Watson	2.17	1.83	1.95	1.76	1.89
F-Statistics	38.95	46.24	78.56	56.47	34.91

Numbers in parentheses are standard errors.

Estimated Results for Vector Auto Regression Models

As inequality in previous period can affect inequality in this period, a Vector Auto Regression (VAR) model is used to account for the lagged variables. The results of VAR models for ethnic groups in Table 7 indicate that minimum wage is statistically significant and matters for all ethnic groups, with highest elasticity for African American and Hispanics. More than 71 percentage of changes in the Gini coefficients are explained by our independent variables including: GDP growth, terms of trade, exchange rate depreciation, inflation, and minimum wage. Gini in previous periods are significant for Asian and Hispanics, not for Whites and African Americans. Terms of trade and real exchange rate depreciation are significant for Hispanic and Asians.

The results indicate the importance of external environment, as the coefficients on terms of trade and exchange rate are significant, indicating an improvement in TOT or exchange rate depreciation could improve income inequality. This finding has important results for policy makers as they could also emphasize on the external variables to reduce income inequality. Coefficients on minimum wage are negative and statistically significant for all ethnic groups, indicating that an increase in minimum wage will reduce income inequality, measured by Gini. Total population will also benefit from a rise in minimum wage. The elasticity of Gini coefficient to minimum wage is highest for Hispanics, and African Americans, and stands at 0.08 and 0.07, respectively. The results of the VAR model are robust and support the findings of 2SLS model.

Table 7. Vector Auto Regression Model for Gini Coefficient for Different Ethnic Groups

Variables	Total Population	Whites	African Americans	Hispanics	Asians
Gini (-1)	0.10	0.51	0.32	-0.23**	-0.53**
	(0.22)	(0.04)	(0.31)	(0.09)	(0.29)
Gini (-2)	-0.17	-0.32	-0.32	-0.17**	-0.46**
	(0.16)	(0.41)	(0.32)	(0.08)	(0.23)
C	0.49	0.32	0.30	0.34	0.67
	(0.10)	(0.21)	(0.18)	(0.11)	(0.22)
GDPG	0.02	0.04	0.006	-0.039	-0.11
	(0.05)	(0.07)	(0.12)	(0.12)	(0.15)
TOT	-0.002**	-0.006**	-0.001**	-0.002**	-0.002**
	(0.0003)	(0.001)	(0.002)	(0.001)	(0.001)
EX	-0.002	-0.003	-0.003**	-0.001**	-0.009**
	(0.001)	(0.0005)	(0.0001)	(0.0004)	(0.001)
Inf	0.0002**	0.0002	0.0001	-0.00015	0.0004
	(0.0001)	(0.0003)	(0.0003)	(0.00015)	(0.0004)
MW	-0.02**	-0.04**	-0.07**	-0.08**	-0.03**
	(0.001)	(0.001)	(0.003)	(0.003)	(0.008)
R-squared	0.92	0.86	0.78	0.75	0.77
Adjusted R-squared	0.89	0.76	0.74	0.73	0.71
F- Statistics	31.41	8.41	14.69	13.44	9.56
Schwarz SC	-7.78	-7.58	-6.2	-6.07	-5.48

Numbers in parentheses are standard errors.

Estimated Results for Number of People Under Poverty

To test for robustness we also use different measure of inequality including poverty, and earning of the 1st to 20th lowest income percentiles. We estimate the effects of raising minimum wage on the total number of people under poverty in Table 8. As shown in this Table, more than 85 percent of changes in number of people under poverty can be explained by our independent variables. Interestingly, the results indicate that the exchange rate depreciation and GDP growth are statistically significant in explaining the total number of people under poverty for all ethnic groups. The results highlight the importance of exchange rate depreciation and GDP growth in reducing number of people under poverty.

The coefficient on minimum wage exerts a negative statistically significant impact on the total number of people under poverty. In other words, raising the minimum wage leads to a reduction in number of people under poverty. The results are consistent with the finding of previous sections that raising minimum wage improves income inequality, and reduces number of people under poverty. The coefficient on minimum wage is also highest for African Americans and Hispanics and stands at 0.09 and 0.07, respectively. Indeed, though the rise in minimum wage leads to higher unemployment rate, the income effect exceeds the unemployment effect,

leading to a reduction in number of people under poverty. Therefore, the net effect of raising minimum wage on the total number of people under poverty is negative.

Table 8. Effects of minimum wage on the total number of people under poverty

Variable	Total Population	Whites	African Americans	Hispanics	Asians
Constant	24.95	25.11	24.52	24.96	13.45
	(4.24)	(1.91)	(1.95)	(4.19)	(2.56)
GDP	-2.0009	-0.00018**	-4.0005	-0.0002**	-0.0004**
	(0.0004)	(0.0001)	(0.0003)	(0.0001)	(0.0002)
Inf	0.02	0.18	0.02	0.018	0.016
	(0.06)	(0.14)	(0.03)	(0.03)	(0.03)
TOT	-0.006	-0.004	-0.03	-0.02	-0.03
	(0.06)	(0.05)	(0.02)	(0.05)	(0.04)
EX	-0.11**	-0.11**	-0.11**	-0.09**	-0.05**
	(0.02)	(0.01)	(0.01)	(0.02)	(0.06)
MW	-0.06**	-0.03**	-0.09**	-0.07**	-0.06**
	(0.030)	(0.021)	(0.031)	(0.023)	(0.021)
R-Squared	0.85	0.86	0.87	0.87	0.85
Adjusted R-Squared	0.82	0.83	0.83	0.82	0.81
F-Statistics	25.05	34.78	32.79	31.95	41.23
Durbin Watson	1.97	1.79	1.92	1.85	1.79

Number in parentheses are standard errors.

Estimated Results for Two Lowest Income Percentile

To test for robustness we also estimate the effects of minimum wage on the earning of the two lowest percentiles of income, 1st to 20th. The results presented in Table 9 indicate that all independent variables are able to explain more than 70 percent of changes in earning of the two lowest income quintiles. Expectedly, GDP growth has a positive significant impact on the earning of this quintile, and inflation exerts a negative effect on the earning of this group. Interestingly, the coefficient on exchange rate depreciation is negative and significant for all ethnic groups; indicating that depreciation will lower the earning of the two lowest income quintiles. Terms of trade is also significant for all ethnic groups, indicating that an improvement in external competitiveness can improve the income of the two lowest income groups and lowers poverty.

Interestingly, the coefficients on minimum wage are positive and statistically significant for all ethnic groups, supporting the finding that raising minimum wage can lead to higher income for the two lowest income groups. The results indicate the elasticity of the earning of the two lowest income groups to minimum wage is 0.29 and 0.23 for African Americans and Hispanics, respectively. The reason for this positive net effect is that negative effect of raising

minimum wage on employment is neutralized by a rise in hourly wages, leading to a net positive effect on the income of the 1st to 20th percentile. The results here are consistent with Adison & Blackburn (1999) and Dube, Lester, & Reich (2008) who find that raising minimum wage improves the earning of workers though there are some differential effects among ethnic groups.

Table 9. Effects of minimum wage on the income of the lowest earning groups (1st to 20th quintiles)

Variable	Total Population	Whites	African Americans	Hispanics	Asians
Constant	21.79	30.26	-0.93	31.04	1.34
	(4.65)	(6.63)	(2.44)	(6.29)	(0.21)
GDPG	0.41**	0.11**	0.15**	0.16**	0.22**
	(0.2)	(0.05)	(0.04)	(0.05)	(0.03)
Inf	-1.6**	-1.89	-1.95	-1.65**	-1.17**
	(0.33)	(0.44)	(0.49)	(0.03)	(0.02)
TOT	1.6*	2.5**	1.45**	1.75**	1.15**
	(0.8)	(0.9)	(0.04)	(0.06)	(0.23)
EX	-1.95**	-2.47**	-1.69**	-2.56**	-1.38**
	(0.44)	(0.66)	(0.36)	(0.64)	(0.24)
MW	0.27**	0.16**	0.29**	0.23**	0.14**
	(0.12)	(0.07)	(0.01)	(0.06)	(0.03)
R-Squared	0.76	0.75	0.76	0.73	0.77
Adjusted R-Squared	0.72	0.71	0.73	0.71	0.70
F-Statistics	29.37	18.79	12.97	15.40	34.98
Durbin-Watson	1.70	1.63	1.62	1.73	1.89

Numbers in parentheses are standard errors.

CONCLUSION AND POLICY RECOMMENDATIONS

The debate over the minimum wage and its employment and distribution effects is far from over. Though there is a great amount of literature on the effects of minimum wage on employment and GDP growth, less attention has been paid to the effects of minimum wage on income distribution among ethnic groups. To fill the gap in the literature, this study used different econometric techniques and different measures of inequality to test for robustness. We found that minimum wage exerts a negative statistically significant impact on income inequality, measured by Gini coefficients. However, the elasticity is bigger for African Americans, and Hispanics and stand at 0.09 and 0.08, respectively. We also used a 2SLS technique to account for missing variables bias, endogeniety of unemployment rate, and causality treatment. The results are still robust and indicate a significant impact of minimum wage on income distribution among all ethnic groups. The Johansen Cointegration test also indicate there is a long-run relationship between minimum wage and income distribution.

The estimated results for the effects of raising minimum wage on the total number of people under poverty showed that an increase in minimum wage leads to a reduction in the total number of people under poverty. Again, the greatest impact relates to African Americans and Hispanics. The effects of raising minimum wage on the earning of the two lowest income quintiles indicate minimum wage exerts a positive effect on the income of the lowest income groups (1^{st} to 20^{th} quintiles). Our results are consistent with those of Adison & Blackburn (1999), and Dube, Lester, & Reich (2008) who find that raising minimum wage improves the earning of workers though there are some differential effects among ethnic groups. However, our estimates are much smaller than those find by Dube (2019), who finds long- run elasticity of minimum wage is between 0.15 and 0.49.

An important policy implication of this research study is that poverty reduction is not only responsive to raising minimum wage, but also to external competitiveness. For instance, terms of trade and exchange rate depreciation, improves income distribution and has an effect on poverty reduction. Indeed, policy makers should not only rely on minimum wage to improve income distribution, but pay more attention to external competitiveness.

The estimated results here indicate that an increase in minimum wage reduces the total number of people under poverty and increases the earning of the two lowest income groups (1^{st} to 20^{th} percentile). Indeed, though there is a negative effect on employment, the net effect on earning of the two lowest percentiles is positive; in other words, the income effect exceeds the unemployment effect, probably due to higher working hours.

This study can be developed in the future across several dimensions. First, by using different measures of income distribution such as Atkinson Index, Piesch index, and Kakwani index as suggested by Cowel (2010); second by using more endogenous variables, such as hours worked, and third, by using data at state levels. In addition, the study may benefit from using different econometric techniques such as Generalized Method of Moments (GMM). Indeed, GMM provides a computationally convenient method of obtaining consistent and asymptotically normally distributed estimators of the parameters of statistical models; and is the second best alternative to Instrumental Variable (IV) Approach (Hall 2007).

Competing Interest Statement:

Authors have no financial or competing interest in writing this article and its findings.

Data Availability: The data that support the findings of this study are available from the corresponding author upon request.

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