2013

State Level Earned Income Tax Credit's Effects on Race and Age: An Effective Poverty Reduction Policy

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SUBMITTED TO

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for

SENIOR THESIS

Fall 2013
December 2, 2013

Abstract

In this paper, I analyze the effectiveness of state level Earned Income Tax Credit programs on improving of poverty levels. I conducted this analysis for the years 1991 through 2011 using a panel data model with fixed effects. The main independent variables of interest were the state and federal EITC rates, minimum wage, gross state product, population, and unemployment all by state. I determined increases to the state EITC rates provided only a slight decrease to both the overall white below-poverty population and the corresponding white childhood population under 18, while both the overall and the under-18 black population for this category realized moderate decreases in their poverty rates for the same time period. I also provide a comparison of the effectiveness of the state level EITCs and minimum wage at the state level over the same time period on these select demographic groups.

Acknowledgement

This thesis would not have been possible without the hard work and many hours required to succeed these last four years at CMC. A sincere thanks goes out to my reader, Professor Serkan Ozbeklik, for his guidance and expert insight, as well as Professor Heather Antecol and Professor Janet Smith for their valuable contributions throughout this process.

I would also like to thank my friends and family for all the help and support along the way, especially my parents, Anne and Tony, and my sisters, Kristy and Kelly. Many thanks also go to my thesis buddies, ZG and AS, for putting up with me for these last three months.

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I. Introduction

The federal Earned Income Tax Credit (EITC) program was enacted in 1975 but was not considered a truly effective program until its substantial overhaul in 1986. The EITC "…provides an earnings subsidy to family members who satisfy three criteria. First, a family must have a wage earner…Second, the family must have low income…Third …to receive a significant EITC a family has to have children…" (1) This program is designed to reward employment and to "raise the earned income of the poor, a goal that is generally viewed as more desirable than making direct transfer payments to low-income families." (2). Given the design of the EITC rate structure, its primary target is the working poor at or near the poverty level and its most generous rates are targeted to families with children.

After the implementation of the federal program, some states began enacting their own state level EITC programs, which were calculated as a percentage of the federal EITC program added to the original federal rate. To date, 25 states have enacted such programs. A list of these states, the inception dates of their EITC programs, and the rates of their respective programs are detailed in Table 1.

The existence of the dichotomy between states that have enacted their own programs versus those that have not, and the various rates of the enacted programs among states, allows for the analysis of the effectiveness of income transfer from these programs to the poor at the state level. Accordingly, I performed an analysis of poverty at the state level and then at the sublevel of two major race classifications of each state: white and black for the years 1991 through 2011.

In addition to focusing on low-income level population, the majority of the EITC programs include increased credits for families with children. They have recently been amended to provide additional credits for up to three dependents. This program structure informs us that a secondary target of the EITC programs is childhood poverty. Therefore, the same major race categories are analyzed at a sublevel of children in poverty (defined as children less than 18 years of age for this analysis) by state to identify the potential effects of the credits for states with various EITC levels.

The effectiveness of the state level EITCs in the states that have enacted them in comparison to the levels of poverty that these states were at prior to the changes, and also to states that still use the baseline federal EITC levels are analyzed in this paper. Since the states have enacted different levels of these credits in addition to the federal rates, ranging from 3.5% to 50% of the federal credit, the effectiveness of higher levels of state EITCs in other states is reviewed. To date, twenty states have enacted refundable state EITCs. Along with these states, one state has a partially refundable EITC, and four others have non-refundable EITCs, totaling 25 states that have enacted their own EITC rates. This provides a substantial database to compare effects of these programs both within individual states and to states that have not enacted EITCs. This analysis looks at the effects and relationships of these credits to poverty levels in these states, while considering the effect and relationship of minimum wage rates, unemployment levels, state population levels, and gross state product in these states.

This analysis compares the changes in poverty within all states to determine if there are any significant differences in poverty level changes in states that have enacted EITC programs. By comparing all states for an extended time period from 1991 through

2011, this analysis provides a meaningful look back at more recent effects of state poverty level changes in these states before and after the implementation of the state EITC programs. This analysis takes into account the effects, if any, on amendments to this state level EITC programs as well as changes and amendments to the federal EITC rates. The analysis also takes into account any changes in minimum wage, using the federal rate as the baseline and using the state's own rate if they have implemented one that exceeds the federal rate.

The intent of both the federal and state level EITC programs and the minimum wage is to raise the earned income of the poor rather than making direct transfer payments to low-income families. Given the similar intents of income transfers to the poor of these two programs, it was logical that I include a comparison of minimum wage effects on poverty levels. This comparison is provided for the same time frame, 1991-2011 and for the same demographic categories utilized for the EITC analysis.

II. Previous Research

There are two pertinent papers that provide context for this paper. The first is Neumark and Wascher (2001). In this paper, the authors analyze the federal EITC and the refundable EITCs of four states in 1994 to "[e]xamine the empirical link between the EITC and earned pretax income using panel data on poor and low-income families that are the EITC's intended beneficiaries" (3). This paper sought to determine if there was a positive effect from the Federal EITC and four state level refundable EITC programs to poor families transitioning out of poverty.

The authors focused primarily on the EITC credit rate in the phase-in–range and "…in many specifications [they] further restrict[ed] the sample to [families with children under age 18]" (4). The authors sought to determine whether the EITC or the minimum wage as a redistributive tool was effective. Their paper determined that "…[b]ased on the state-level EITC results… the benefits of the EITC come about mainly by inducing labor market entry for poor families without any adult workers…these results suggest that the EITC [rather than minimum wage] is the more effective anti-poverty tool, especially if one considers positive work incentives as a goal of anti-poverty programs" (5). Their analysis and conclusion were based on an analysis of data at state and federal levels for the families with children category only.

The comparison of the effectiveness of the EITC relative to the minimum wage in labor market inducement, which translated to elevated earnings and reduced poverty for the families studied, was the main intent of this first paper. The paper used data on minimum wage, employment, and hours worked for individual families from 1985-1994 to determine labor market inducement. The paper, however, did not focus the effects of state level EITC programs on below poverty individuals by race or the sub strata of children in this classification. Nor did it look at the minimum wage effects to these demographic groups.

The second relatable paper to this topic was the Neumark and Wascher (2011) paper. In this analysis they stated that "[p]revious studies of the EITC have typically shown that this program is effective at increasing the labor force attachment and earnings of low-income women and families with children"(6). Their paper analyzed the effects of both the Federal EITC and the minimum wage on the labor market inducement using data

from 1997-2006. Their main focus was to "estimate the effects of the interactions between the Earned Income Credit (EITC) and minimum wages on labor market outcomes" (7). Their analysis used data on employment, wages, and earnings to estimate the labor market response to variations in the EITC and the minimum wage for selected groups, such as minority men, single mothers, and other low-skilled workers. The authors included the effect of state EITCs for their analysis, considering them "a supplement"(8) to the federal EITC.

The paper then analyzed the implied effects on poverty rates based on the labor market inducement for their selected categories. The main difference between Neumark and Wascher with my analysis is that in their paper they did not analyze the effects of the state EITC programs on poverty levels for the white and black population below the poverty threshold nor the children in poverty sub category for this group. They also did not use the most recent data and considered a much smaller window of time.

I also reviewed other relevant papers that addressed the topics of the EITC and poverty to ensure no duplication of existing research. Meyer and Sullivan (2009) studied how poverty rates and poverty gaps have changed over time, Liebmann (2013) looked at the EITC from a labor supply perspective, Johnson and Williams (2013) studied the overall mechanics and results of the EITC program, Eamon and Wu (2013) studied the effects of the federal EITC on federal childhood poverty from 1996-2005, and Burkhauser (2013) analyzed the relationship of the minimum wage and the federal EITC on earnings of the poor from 1989-1992. Additionally, I consulted Meyer and Douglas's (2002) book research that discussed the effects of the EITC on poverty at a family level. While each of these publications explores relationships of poverty and EITC programs

with different variables, none looked in depth at the effect of the implementation of the state level EITC program's relationship to poverty level changes for the demographic groups or the time period selected for this analysis nor did they analyze the effects of the minimum wage and the earned income tax credits for these demographic classifications in the same models.

My findings expand the research of Neumark and Wascher, who found the four state level EITCs they studied to be highly effective at increasing the earned-incomes of the families they were examining, therefore decreasing the number of families in poverty relative to the states that enacted just the federal rates. This expansion is accomplished by providing updated information on these certain data points for the 25 states that have enacted EITC's versus the four that were analyzed during their initial study. Further, this study provides an updated and more extensive time frame analysis by including data from 1991 through 2011. The most significant expansion of the previous research results from the narrowing of the analysis. This is done by comparing the effectiveness of state EITC's to the base level federal EITC rates on the state poverty levels, and the examination of the effect of the state EITC programs on both a race classification level and a further subgroup of the under-18 age group at this race classification level for each state. This paper also provides an additional analysis of the minimum wage effects on these demographic groups for the same time frames, which was not provided by the other papers.

III. Data

I used a database that includes the following variables by state from 1980-2007: gross domestic product (GDP), federal EITC rates, federal minimum wage, population, poverty population, poverty rate, state EITC rates, state minimum wage, and unemployment. I updated these categories for the years 2008-2011 using the sources detailed in Table 2. In addition to these categories, I included the following data by state: poverty for children under 18 years of age from 1991-2011. I was then able to obtain the information for poverty by three major races categories: white, black, and Asian from 1991-2011. These were also then split into the under 18 years of age subcategory for each race. The sources used to obtain this data are detailed in Table 2.

The race categories of white, black, and Asian were selected, as they were the three categories that were available as selections for all of the years in the database and, therefore, would remain fully comparable throughout the years. The inclusion of additional different race category options in the 1990s and 2000s, however, has the impact of reducing the number of people who would have selected any of these three primary race choices in years when more applicable categories to their races did not exist. I considered that each of these categories could be skewed by this fact, but determined that they offered the best evaluation tool of the racial impact of the state level EITC programs. The addition of these race categories provides further levels of data analysis on the effectiveness of the state level EITC programs on a separate demographic characteristic.

I chose the childhood poverty variable since the program is designed to provide the most assistance to families with children and, therefore, the analysis should show an

even greater impact on childhood poverty in the states that have enacted EITC programs. To allow for a related comparison to the first selected variable, which is the overall poverty level of each state, this childhood poverty variable was also broken down by the three race categories detailed above.

To obtain this data, I contacted the Census Bureau and was directed to use the Data Ferrett tool, which is accessed through the Data tools category of the US Census Bureau's homepage. Individual data tables were created for each state from 1991 through 2011 by accessing the Current Population data subcategory "March Supplements" for each of the 20 years available on this site. The March Supplement information pertains to the year previous to the Supplement date; therefore the March 1992 Supplement contains information for the year 1991.

From the March Supplements, I accessed the variables of Current Population Survey subcategories to obtain the necessary data. Using the Household Variables Tab from this survey, I selected the 1960 Census State Code to format the data at a state level for each year from 1991 through 2011. Next, I accessed the Family Variables Tab and selected the Poverty-ration income/low level category. Then, I further refined this selection to generate data for the under the poverty level classification to obtain the number of people below the poverty level in each state for each selected year. From the Persons Variable Tab, I selected the race demographic tab labeled "A_Race" for the supplement years 1992-1995. This category was subsequently retitled "PRD TRACE" for the years 1996-2012, and this label was therefore accessed for the years 1996-2012. I then further refined this category by selecting only the three most comparable categories for the time span of this analysis − white, black, and Asian − to gather the necessary by-

race detail from each of these states for the years selected. I then accessed the Persons Variable Tab again for the demographic of age category. I refined the data extracted for this category by coding the selection to include only ages 0 through 17. This allowed the extraction of the number of children in poverty by race in each state for each selected year. Unlike Neumark and Wascher, I did not have to apply weights to the variables used in the data sheets during their input, as this was not required with these data selections since they were not taken from separate survey information. After I created the 50 separate databases, I then created an Excel spreadsheet to incorporate the information into a singular database. Since the source of the Data Ferrett data tool information accessed was the US Census Bureau, this information also remains consistent and comparable with the other data categories in my database.

After obtaining the number of whites, blacks, and Asians in poverty by state and by year and the number of whites, blacks, and Asians under 18 in poverty by state and by year, it was determined that the Asian variables were insignificant in regards to the proportion of the total population for each of these categories. This race category was therefore omitted from further analysis. To gather data for the remaining variables in the study, I obtained and included the following data to my original data selection: "Total population by White race classification by-state, by-year," "Total population by White race classification under 18 by-state, by-year," "Total population for Black race classification by-state, by-year," and "Total population for Black race classification under 18 by-state, by-year."

The source for this information was the US Census Bureau Data Ferrett Tool using Current Population Survey March supplements. I gathered this data by again using

the Current Population Tab and accessing the March Supplement detail. The geographic census state codes were used along with the A_Race and PRD TRACE categories with the selection of white as the race classification for the first set of data sheets by year and the selection of black as the race selection for the second set of data sheets. For both the white and black data sheets, the age category 0 through the maximum age listed in the corresponding supplement (this maximum age varies by supplement year) was selected to gather the total population by race category. The ranges of age years 0-17 were then subtotaled to determine the total childhood population by race for each data year. I then combined the 51 datasheets for each race classification into an Excel worksheet and incorporated the information into the database. Once the data was extracted, I used this information to determine the percent of each of the race classifications that was in poverty and the percent of the 18 and under population in each of these categories that was in poverty for each data year.

IV. Description of Model

a. Model

To see the effects of the entire cross section through the look back window from 1991-2011, I determined that a panel data analysis with fixed effects was the best method for capturing all the relevant information. Panel data, which is also referred to as longitudinal or cross-sectional time-series data, allows for the "control of variables you cannot observe or measure like cultural factors or differences in business practices across the states; or variables that change over time but not across entities (i.e. national policies,

federal regulations, international agreements, etc.). That is, it accounts for individual heterogeneity."(9). Some of the drawbacks of this model are mostly due to data collection issues, usually arising from sample design/coverage. I was able to eliminate this issue with the data set I have assembled, which incorporates complete information of the variables in question over the entire period of time. The fixed effects model was used since I was interested in analyzing only the impact of the desired variables over time. The Fixed effects model explores, "the relationship between predictor and outcome variables within an entity. [And] Each entity has its own individual characteristics that may or may not influence the predictor variables." (10) When using this model, we assume that something within the entity may impact or bias the dependent variable (being poverty rates), so we must control for this. As the Princeton Walkthrough notes, "[Fixed Effects] remove the effect of those time-invariant characteristics from the predictor variables so we can assess the predictors' net effect."(11) Another important assumption of the fixed effects model is that "those time-invariant characteristics are unique to the individual and should not be correlated with other individual characteristics. Each entity is different therefore the entity's error term and the constant (which captures individual characteristics) should not be correlated with the other [variables]." (12)

The equation that is associated with this analysis comes in the form:

$$Yit = \beta Xit + \alpha i + uit$$

The variable αi (i=1991-2011) is the unknown intercept for each state. Yit is the dependent variable, which is the poverty level associated with the group under examination. βXit is a vector representing all the independent variables and their

associated coefficients (indicated by their own β) in this analysis. These include the main independent variable of focus, EITC rate, which is indicated as a combined variable. The second independent variable of interest is also a combined variable of state and federal minimum wage amounts. The other independent variables in this vector include the gross state product and the state population levels. Finally, *uit* represents the error term for the respective model. The key insight with this is that "if the unobserved variable does not change over time, then any changes in the dependent variable must be due to influences other than these fixed characteristics" (13)

Since the factor of childhood poverty was to be analyzed along with the overall poverty rates for each state, I determined 1991 to be the best starting point for the analysis. This was the year in which the federal government established variable EITC rates for families with dependent children. The rates increased for the number of dependent children that the family had, up to two until 2009, when it was amended to include an extra category for three dependent children. The increased EITC rates for families with children are indicative of the program's intention to target and alleviate poverty at the childhood level. I decided to include data through the most recent time period available, being 2011, to provide the most updated findings and to also incorporate the longest look forward period for enacted EITC programs possible.

b. Step Analysis

By using STATA 12-64 as my data analysis tool, I was able to set up my data for this panel data analysis using the "xtset" command. I was then able to use the "xtreg"

command followed by the ",fe" fixed effects syntax to run my regressions. Once my regressions were set, I was able to cluster my standard errors of each regression on the state variable, which helps eliminate the correlation of the standard errors with unobserved factors. My data set was "strongly balanced," meaning I had full information for each state in each year, indicating a balanced panel. Along with this, the delta for my time variable was represented as "1 unit," meaning that the change in time per cross section is indicated by a change of one year.

After the data was set up in the correct format, I was then able to perform my two-tier analysis. The first tier determined "the impact of state EITCs on overall poverty in the states." This analysis was then broken down into the two subcategories: "percent of the total white population that is in poverty" and the "percent of the total black population that is in poverty." This part was then followed by the second tier of the analysis, which focuses on the poverty rates of the under 18 years of age group for each state. This group was then also broken down into the subcategories "Percent by-state, under 18 years of age that is white and in poverty" and "Percent by-state, under 18 years of age that is black and in poverty." I included this second tier of analysis to determine if any of these sub categories was more affected by the state-enforced EITC policies compared to the base federal EITC rates while including any amendments that either of these programs may have incurred over the 21-year time frame.

The first regression in this analysis is observing the effects that the state EITCs for each state had on the state level poverty rate as a whole. The federal EITC did not become significantly effective until its amendment in 1991 that allowed for different rates to be applied to families with increasing amounts of dependent children up to two

children. In order to observe the effects of this change and the comparative effects of the individual state EITC rates with these adjusted federal rates, a look back window through 1991 was used. From there, the levels of state EITC for each state, in combination with the federal rate, were incorporated to show the difference between the states that had their own policies and the states whose residents only had access to the federal rates during that period. While looking at this relationship, both the state and federal level minimum wages with the state were also incorporated using their own rates only if they were larger than the federal rate at the time. By doing this, it was ensured that the effects of the EITC changes were not also showing the effects of the minimum wage on poverty rates in the states, while also being able to observe the relative effects between the two "anti-poverty" programs.

In this analysis, the state EITC rates are calculated as a percentage of the federal rate; the state level would be the additional percentage of the federal rate added to the base level (ex: state rate of Colorado is 10%, and federal rate of 34% would result in a combined rate for that indicated year of 37%). A similar method was used for the combination of the state and federal minimum wages. The minimum wage is indicated by the federal value unless the individual state had enacted its own minimum wage policy that was in excess of the base federal rate. If that was the case, then that was the amount used for the following years in that state. I also provided variables for the Gross State Product of each state and the population of each state for the years being observed, 1991-2011. The variables for gross state product and the population of each state were indicated as natural log variables in order to capture a more normalized result and try to make the model a "better fit." Assuming that the poverty rates are affected by any

changes in the total output of the state or by any significant changes to the population, it was necessary to not have those effects missing from the observations. I obtained the unemployment rates of each state for the years under observation and included them to ensure that the effects of my other main variables were not picking up any changes in the poverty levels that would be due to changes in the unemployment rates of each state. Seeing as these were already in terms of percentages, no major changes to the data were necessary, since they already showed the level-level effects between the unemployment and poverty rates.

The next part of this analysis was to analyze the effects of these variables on the subsets of race. When conducting the analysis, the form of the regressions stayed the same, and the only thing that changed was the dependent of each regression was changed from "the overall poverty rate of the state" to first, "percent of the total white population that is in poverty" and then "percent of the total black population that is in poverty." This analysis is provided to see is these implementations of state EITC rates in addition to the federal rates provided more relief to a certain race group.

Following the breakdown into the categories of race for the first tier of the analysis, I then conducted the second set of regressions. This tier of the analysis is the main point of emphasis, which is looking at the effectiveness of these state EITC rates on the poverty rates of the under-18 age group. In this regression, I observed the percentage of the people in poverty that were under the age of 18 by state for all the years in this analysis. These were also set up in the same format with the poverty rate of this group by state being the dependent variable and the independent variables still being the state and federal EITC combination variable, the state and federal minimum wage combination

variable, the natural logs of both the state population and the gross state products, and finally the unemployment rate of each state. Once this part was conducted, I then broke down this tier of the analysis into its own subsets of the "percent by-state, under 18 years of age that is white and in poverty" and the "percent by-state, under 18 years of age that is black and in poverty."

V. Results

a. Regression Overview Part 1

The first tier of the study was centered around analyzing the effectiveness of the state level EITCs on overall state level poverty relative to just the federal rates that are used by all states. When running the panel data analysis with fixed effects and clustered standard errors, as seen in TABLE3, the overall poverty rate in the states decreased by 2.9% for every one percentage point increase in the state level EITC in addition to the base federal rate. This was significant at the 10% level. This was an interesting observation seeing as the combined minimum wage variable, which was defined as the federal minimum wage level unless the state implemented their own minimum wage that was in excess of the federal level, resulted an increase in the state level poverty rates of 0.1% for every dollar increase in minimum wage. This finding was not statistically significant. The variables controlling for state variations in population both had negative coefficients but were very small, and neither statistically significant. The variable for state level unemployment contributed to an increase in the state level poverty, as expected.

This analysis was then broken down into the subcategories of "Poverty rate of white individuals" in each state and the "poverty rate of black individuals" within each state. This part of the analysis revealed some very interesting results. While the effect of a one percentage point increase to the state level EITC rate relative to the base federal rate contributed to a 1.1% increase in the poverty rate for white individuals, a one percentage point increase of this rate led to a 23.1% decrease in poverty rates for black individuals. This decrease in poverty for the black individuals, due to the increase in the state EITC rate, was also statistically significant at the 5% level with a p-value of 0.0109. These results came along side of negative coefficients for the combined minimum wage variable for both of the demographic groups. The minimum wage led to a 0.08% decrease in the poverty rate for every dollar increase for the white demographic group and a 2% decrease in poverty levels for the black demographic group. When compared to the state EITC rate variable, the minimum wage seems to be a more effective at decreasing the overall state poverty rates for white individuals, with neither of the findings being statistically significant. However, when looking at the overall poverty rates of the black demographic group, the increase in the state EITC relative to the federal rate seems to have a much greater impact on lowering the poverty level, decreasing poverty 23% for every 1% increase, than the combined minimum wage variable, which decreased poverty rates at the state level by 2% for every one dollar increase. These results were both statistically significant at the 5% level with p-values of 0.0109 and 0.0139, respectively.

b. Regression Overview Part 2

The second tier of the analysis used the same model to measure the effect that increases in these variables would have on the state level childhood poverty rates, which is defined in this paper as being under 18 years of age. As seen in TABLE4, when run as a whole, increasing the state level EITC rate by 1% led to a 5.92% decrease in the overall childhood poverty rates. This was indicated as being statistically significant at the 1% level. This is compared to a one dollar increase in the combined minimum wage level contributing to a 0.1% decrease in the state level childhood poverty rates. This result, however, was not statistically significant. As they did in the first tier of the analysis, the other controlling variables of interest - the controls for changes in state level gross state product and population – both had negative coefficients. These negative coefficients could be interpreted as meaning that a decrease in either of these variables would lead to a slight decrease in the state level childhood poverty rates. However, neither of these results was statistically significant. Finally, the last variable in the model, the state level unemployment rate, once again implied that an increase in the unemployment levels would lead to a steep increase in the state level childhood poverty rates, just as it did for the overall state level poverty rates discussed in the first tier of analysis.

As was done in the first tier, this part of the analysis was also broken down into the demographic groups of white childhood poverty and black childhood poverty. These results were almost identical to the effects seen in the overall poverty rates. For the group that was defined as "white and under 18 years of age," the state level poverty rate increased by 1% for every one percentage point increase in the state level EITC program relative to the federal rate. This is in combination with the combined minimum wage

variable, defined the same way as it was in the initial analysis, led to a 0.4% decrease in state level childhood poverty for white individuals for every dollar increase in minimum wage. Neither of these results was reported as being statistically significant with the closest being the combined minimum wage variable, which obtained a p-value of 0.142.

These results are interesting when compared to the effects seen in the state level childhood poverty rate for individuals in the demographic group that was defined as being black and under the age of 18. While the one percentage point increase in the state EITC level relative to the federal level led to a 1% increase in the state level childhood poverty rate for the white demographic group, the same increase led to a 21% decrease in state level childhood poverty for the black demographic group. This negative coefficient for the state and federal EITC combined variable was also reported as being statistically significant at the 5% level for this demographic group with a p-value of 0.0407. This is compared to a negative coefficient on the combined minimum wage variable as well. For this demographic group, a one dollar increase in the minimum wage led to a 3% decrease in the state level childhood poverty rates. This decrease resulting from the increase in minimum wage was stated as being significant at the 1% level with a p-value of 0.006. These observations are quite interesting seeing as, while both the changes in the state EITC rate relative to the federal rate and the changes to the minimum wage led to a decrease in the state level childhood poverty rates for the black demographic group at statistically significant levels, the changes in the state level EITC relative to the federal rate seemed to have a much greater effect on decreasing the poverty rates.

VI. Conclusion

a. Findings

While minimum wage is seen as an acceptable policy for decreasing overall poverty, including the decrease for both white and black childhood poverty, the increase in the state level EITC rates, relative to the federal rates, seem to have a much greater effect on decreasing the poverty rates of these demographic groups. This is seen through the negative coefficients on the independent variables of focus for both main groups of the analysis - the overall state poverty rates and the childhood poverty rates for each state. These results also came back as being statistically significant, with the state EITCs' effect being significant at the 10% level for the overall state poverty levels and at the 1% level for the overall poverty levels. Additionally, these results were significant at the 5% level for both of the categories in which the black demographic group was the main focus. These findings are in accordance with the changes in state level EITC having small positive coefficients for both parts of the analysis that used the white demographic group as the area of focus, with neither of these being statistically significant.

b. Implications Part 1

These varying results by demographic categories are interesting to consider in light of previous research that determined that single women benefitted the most from increased EITC rates. My analysis instead looked at the demographics of race and age to determine which categories receive any benefit from the increased EITC or minimum

wage levels and indicate a correlation between the results of my study and these earlier results.

My data indicates a statistically significant improvement to the poverty rates of the black population in the study versus a non-statistically significant negative effect to the white population for the EITC variable. This is in accordance with the minimum wage differences that also only returned as statistically significant for the black demographic group with a much smaller coefficient compared to the EITC variable. According to the Current Population Survey's March Supplement for 2012, the percentage of black households that are categorized as unmarried civilian female primary householder account for 54 percent of black households under the poverty thresholds compared to 32 percent of white households in the same classification. While not all of these householders are single parents, (Washington 2010) estimates that the black community has a 72 percent rate of single mothers versus a 29 percent for their white counterparts. Considering these statistics, it is a fair assumption that a larger portion of the black population versus the white population was identified as unmarried civilian female primary householders who were single mothers. This is also supported by the reduced percentage in the black population identified as married households, unmarried male head of household, and single women without children versus the corresponding white population.

This significantly larger percentage of female single mothers under the poverty threshold in the black race classification translates to a larger population that would be enticed to enter the job market, thereby, increasing their wages and decreasing their poverty levels. This could be an implication behind why this analysis experienced

positive results from increases in EITC rates. This larger percentage of single mothers coupled with their lower male and single mother percentages, which could negatively impact the increases in EITC rates, supports the positive improvement to the poverty rates for the black demographic in my analysis.

Conversely for the corresponding white population, the percentage of single mothers is a significantly smaller percentage. This percentage difference is exacerbated when we consider there is a much larger percentage of this population that identifies itself as married, male, or as women without children, all three of which are categories that are negatively impacted by increases in EITC rates. (Neumark and Wascher 2011). Given the increased levels of both males and single women without children in this group, it can be assumed that the negative effects to their demographic outweighs the positive effects experienced by the single mothers in this category.

These same arguments can be extrapolated when analyzing the results of the increased EITC on childhood poverty rates. Given from previous research that single mothers are the group that benefit most from income increases in EITC levels and that their children are direct beneficiaries of their income increases, it follows that children in the under-18 age category of the black population, which, in my analysis, benefitted the most from EITC increases, would on a percentage basis realize a greater positive effect from increases in the EITC than their white counterparts. (Neumark and Wascher 2011).

The minimum wage data reflects a decrease in poverty rates of .08 percentage points for the white population under the poverty threshold for every dollar spent. This is measured against a two-percentage point decrease in poverty rates for the corresponding black population. The larger magnitude of the changes to the poverty rates of the black

population can also be correlated to Neumark and Wascher's (2011) results that indicated single women with children benefitted the most from the combination of increases in EITC rates and higher minimum wage rates. Given that research and the larger percentage of black single mothers in my analyzed data, it correlates that there would be a larger positive impact on this demographic category.

c. Implications Part 2

Neumark and Wascher (2011) found, "…that for single women with children, the EITC boosts employment and earnings, and coupling the EITC with a higher minimum wage enhances this positive effect. Conversely, for less skilled minority men and for women without children, employment and earnings are more adversely affected by the EITC when the minimum wage is higher….[w]hether the policy combination of a high EITC and a high minimum wage is viewed as favorable or unfavorable depends in part on whom the policymakers are trying to help"(14). This difference in effects is also demonstrated in my results, with the black population realizing both significantly larger benefits from EITC increases and minor increased improvement in poverty levels from minimum wage increases versus the white population.

Based on the varying demographics of the poverty population within individual states and the cost of the policies implemented to counter poverty, there is no one set level of EITC or minimum wage rates that could be considered the standard for poverty reduction of all groups. Given the relatively stable job market for the target population of both EITC and minimum wage increases, when choosing which policy to implement, policy makers must decide which population is the intended beneficiary of their choices.

VII. Limitations

Due to the nature of this analysis, there are a few things that can be seen as limitations to the study. The main issue could be attributed to the way that the Census Bureau collected its data on poverty over the years. From 1991-1996, they only collected data for the categories white, black, and other. After this time period, they began collecting data on ten different race categories, possibly taking an amount of the population away from the original white and black demographic categories. Another limitation is the way that the states chose whether to implement their own EITC rates or their own minimum wages above the federal rates for these policies. These choices themselves could be seen as endogenous, and were considered as being held constant in the study with the fixed effects method of the panel data model.

VIII. Appendix

Table 1. EITC Rates and Program Detail by State

State	Percent of Federal Credit	Year Enacted, Amended	Credit Refundable
Colorado	10	1999, 2013	Yes
Connecticut	30	2011	Yes
Delaware	20	2005	No
Illinois	10	2000	Yes
Indiana	9	1999, 2003	Yes
Iowa	14	1989, 2013	Yes
Kansas	18	1998, 2007, 2010	Yes
Louisiana	3.5	2007	Yes
Maine	5	2009	No
Maryland	50 *	1987	Yes
Massachusetts	15	1997, 2001	Yes
Michigan	6	2006	Yes
Minnesota	33 **	1991,1993, 1997	Yes
Nebraska	10	2006	Yes
New Jersey	20	2000	Yes
New Mexico	10	2007, 2008	Yes
New York	30	1994	Yes
North Carolina	4.5	2007, 2008	Yes
Ohio	5	2013	No
Oklahoma	5	2002	Yes
Oregon	6	1997	Yes
Rhode Island	25	1986	Partially
Vermont	32	1988	Yes
Virginia	20	2004	No
Wisconsin	4, 11, 34 ***	1989	Yes

* Up to 50%, considering values over analysis time horizon
** Average value over analysis time horizon
*** Indicates changing rates over analysis time horizon

Source:www.taxcreditsforworkingfamilies.org/state

This Table is a representation of which states have enacted their own state level EITC programs in addition to the federal rates that all states use. The "percent of the federal credit" variable indicates that the state will take that percentage of the credit received under the federal rate, and add provide that to the family in addition to the amount received from the federal policy. The "Year enacted, Amended" variable states when the state enacted their own policy. The data used for the analysis takes into account any changes in the rates that occurred. Finally, the "Credit Refundable" variable indicates whether the state provided credit was a refundable or non-refundable credit. (Refundable credits are allowed as a wage-subsidy if the amount of the credit exceeds the state income tax. While in states with the non-refundable credits, the families must return to the state any amount that is in excess of the amount provided to offset the income tax.)

Table 2. Data Sources

Variable	Source
GDP by state	2006-2011 US Bureau of Economic Analysis
Federal EITC One Dependent Rate	Taxpolicycenter.org tax facts individual
Federal Minimum Wage	2007-2011 US Department of Labor, Wage and Hour Division
US population by state	US Census Bureau, Population Estimates Branch 2000-2009, Infoplease.com 2010-2011
Poverty Population by state	2008-2012 Pew Report- pewstates.org 2007 infoplese.com
State EITC Rates	Taxcreditsforworkingfamilies.org/state
Poverty Rate	Ratio Poverty to Population
State Minimum Wage	2007-2011 US Department of Labor, Wage and Hour Division
Local Area Unemployment statistics	2007-2011 unemployment US Bureau of Labor Statistics
Unemployment Rate	Ratio unemployment to Population
Poverty by state by race	US Census Bureau Data Ferrett Tool
Poverty by state and race for children under 18	US Census Bureau Data Ferrett Tool

This table indicates any information that was updated in the data set for the analysis that was not in the original data set that was provided to me by my thesis reader. This was all updated from the same place as the original data just using the years that were not there already. The only variables that were not included in this data set that I had to add were the "Poverty rate by state by race" and the "Poverty rate by state and race for children under 18." These were obtained using the US Census Bureau Data Ferrett Tool utilizing the Current Population Survey, March Supplements options.

Table 3. Effects of State level EITC on Overall State level Poverty Rates

VARIABLES	(1) PovertyRatedec1	(2) whitetotinpov	(3) blacktotinpov
StateandFEDEITCcomb	-0.0299*	0.0117	-0.231**
	(0.0179)	(0.0219)	(0.0873)
MinWageCombined	0.00109	-0.000899	-0.0208**
	(0.00122)	(0.00148)	(0.00814)
lnGSP	-0.00420	-0.00692	0.00295
	(0.00423)	(0.00762)	(0.0422)
lnPop	-0.000623	0.0118	-0.0481
	(0.0106)	(0.0172)	(0.128)
unemploymentrate	0.626***	0.576***	1.184***
	(0.0472)	(0.0718)	(0.253)
Constant	0.156	-0.0201	1.081
	(0.135)	(0.201)	(1.597)
Observations	1,071	1,071	1,071
R-squared	0.365	0.249	0.090
Number of state	51	51	51

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This table shows the regressions of the first tier of the analysis. The dependent variable in the first regression is "Overall Poverty Rate by State and Year" the second dependent variable is "State Level Poverty rate of Overall White Demographic Group" and the third dependent variable is the "State Level Poverty rate of Overall Black Demographic Group." The independent variable of focus is the "StateandFEDEITCCOMB" variable, which is denoted as the federal one dependent EITC rate unless the state has enacted their own rate. If this is the case then they would take that percent of the federal rate and provide that much of a subsidy to the family on top of what the federal rate is providing. Other variables of note are the "MinWageCombined" variable, which is denoted as the federal minimum wage dollar amount unless the state has enacted their own minimum wage that is in excess of the federal rate. If that is the case then the state uses that level as their minimum wage. "lnGSP" and "lnPop" are the natural log forms of the gross state product and population for each state, respectively. Lastly, the "unemploymentrate" variable is denoted as the unemployment rate for each state. These regressions have all been clustered based on state to help eliminate the correlation of the standard errors with unobserved factors.

Table 4. Effects of State level EITC on Childhood* State level Poverty Rates

VARIABLES	(1) PovertyRateund18dec	(2) whiteund18inpov	(3) blackund18inpov
StateandFEDEITCcomb	-0.0592***	0.0137	-0.210**
	(0.0156)	(0.0421)	(0.0998)
MinWageCombined	-0.00112	-0.00443	-0.0300***
	(0.00172)	(0.00296)	(0.0105)
lnGSP	-0.0115	-0.0146	0.0499
	(0.00777)	(0.0108)	(0.0472)
lnPop	-0.0120	0.0286	-0.243
	(0.0226)	(0.0284)	(0.166)
unemploymentrate	0.943***	0.906***	1.850***
	(0.0561)	(0.113)	(0.395)
Constant	0.471	-0.144	3.583*
	(0.291)	(0.389)	(2.104)
Observations	1,071	1,071	1,071
R-squared	0.550	0.178	0.129
Number of state	51	51	51

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

*Childhood denoted as under 18 years of age

This table shows the regressions of the second tier of the analysis. The dependent variable in the first regression is "Childhood(Under18)Poverty Rate by State and Year." The second dependent variable is "State Level Childhood(Under18)Poverty Rate for White Demographic Group" and the third dependent variable is the "State Level Childhood(Under18)Poverty Rate for Black Demographic Group." The independent variable of focus is the "StateandFEDEITCCOMN" variable which is denoted as the federal one-dependent EITC rate unless the state has enacted their own rate. If this is the case then they would take that percent of the federal rate and provide that much of a subsidy to the family on top of what the federal rate is providing. Other variables of note are the "MinWageCombined" variable, which is denoted as the federal minimum wage dollar amount unless the state has enacted their own minimum wage that is in excess of the federal rate. If that is the case then the state uses that level as their minimum wage. "lnGSP" and "lnPop" are the natural log forms of the gross state product and population for each state, respectively. Lastly, the "unemploymentrate" variable is denoted as the unemployment rate for each state. These regressions have all been clustered based on state to help eliminate the correlation of the standard errors with unobserved factors.

Table 5. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
whitetotinpov	1071	0.108	0.033	0.037	0.252
blacktotinpov	1071	0.270	0.135	0.009	2.667
PovertyRateund18dec	1071	0.184	0.056	0.066	0.368
whiteund18inpov	1071	0.148	0.053	0.010	0.351
blackund18inpov	1071	0.382	0.142	0.026	0.842
StateandFEDEITCcomb	1071	0.331	0.073	0.167	0.510
MinWageCombined	1071	5.448	1.107	4.250	8.670
lnGSP	1071	11.645	1.068	9.364	14.462
lnPop	1071	15.025	1.034	13.034	17.445
unemploymentrate	1071	0.056	0.019	0.023	0.138

This table is a breakdown of the number of observations, the means, standard deviations, and the mins and maxes of each variable. The first six variables are the dependent variables being run in the separate regressions. The bottom four are the independent variables of choice along with the factors being held constant for each regression.

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