THE EARNED INCOME TAX CREDIT AND INCOME MOBILITY IN WASHINGTON, DC

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Submitted: December 3, 2015

Abstract: A conditional logit model with individual fixed effects was used to examine the effect of Earned Income Tax Credit (EITC) on the income distribution in Washington, DC using an administrative tax panel data covering 2001 to 2012. The results of this study indicate that the combined federal and DC EITC increase the likelihood of income above poverty relative to those that do not claim the credit. Positive and significant results for EITC on income were found at the 50, 100, 125, and 150 percent of the Federal Poverty Line.

Keywords: Earned Income Tax Credit, EITC, poverty, inequality, District of Columbia

I. INTRODUCTION

Today, income inequality in the US is seven times greater than it was in the 1980s. The average income of the top fifth of households is 18 times greater than the income of the bottom fifth in the 50 largest U.S. cities. The income inequality in Washington, DC is the fourth highest in the nation (DC Fiscal Policy Institute 2015). The richest households in the District of Columbia (DC) earn 29 times more than the households in the bottom fifth of the income distribution. Inequality in Washington, DC diverges widely from the national average. Given the inequality in DC, it is important for DC policymakers to develop strategies to address growing income gap.

Tax and transfer policies can be used to address inequality. The Earned Income Tax Credit (EITC), the nation's largest federal cash transfer program, is an exemplary example of an effective tool to redistribute income to the poor as well raise welfare (Wu et al., 2002; Kim and Lambert 2009; Hoynes 2015). It is the primary means of cash assistance for the working poor. EITC recipients receive a credit equivalent to a percentage of each dollar earned until a maximum limit

is reached (Eissa et al. 2008; Tax Policy Center 2015). The District of Columbia is one of twenty-six states that also subsidizes working poor families via a state-level EITC; working poor families eligible for the federal EITC are also eligible for the DC earned income tax credit which is equivalent to 40 percent of the federal Earned Income Tax Credit and the highest state supplement to the federal EITC (Clark 2008).

The state-level EITC provides targeted tax relief to low-income earners by reducing disparities in the tax rate and providing an income boost to help them meet basic needs (e.g. transport to work, child care, etc.) (Nichols and Rothstein 2015). There is some evidence that the combined federal and DC EITC has antipoverty effects (Hardy et al. 2015). However, the previous study on the combined effect of the federal and DC EITC focused solely on the movements of both poor and near poor. Further research on the of the combined effect of the federal and DC EITC on the income distribution is needed as the capital jurisdiction searches for policies to aid in closing its gaping inequality gap by boosting incomes at the lower end of the distribution.

To address this gap, this study examines the combined effect of the federal and DC EITC on income mobility across the income distribution in Washington, DC between 2001 and 2012 using DC administrative municipal tax data. This study analyses the issue of income mobility in two ways. Firstly, it examines the effect of EITC on the likelihood of poverty (deep poverty, up to 50% of Federal Poverty Line (FPL), up to 100% of FPL poverty, near poverty, up to 150 of FPL, and above poverty above 200% of FPL). Secondly, it examines the likelihood of transitioning from one poverty state to another (e.g. from poor to near poor).

This paper is organized as follows: Section II provides information on the Earned Income Tax Credit Program and a literature review. Section III discusses the theoretical framework of this

study. Section IV describes the data and methodological framework. Section V offers the findings from the empirical analysis. Section VI concludes the paper with policy implications.

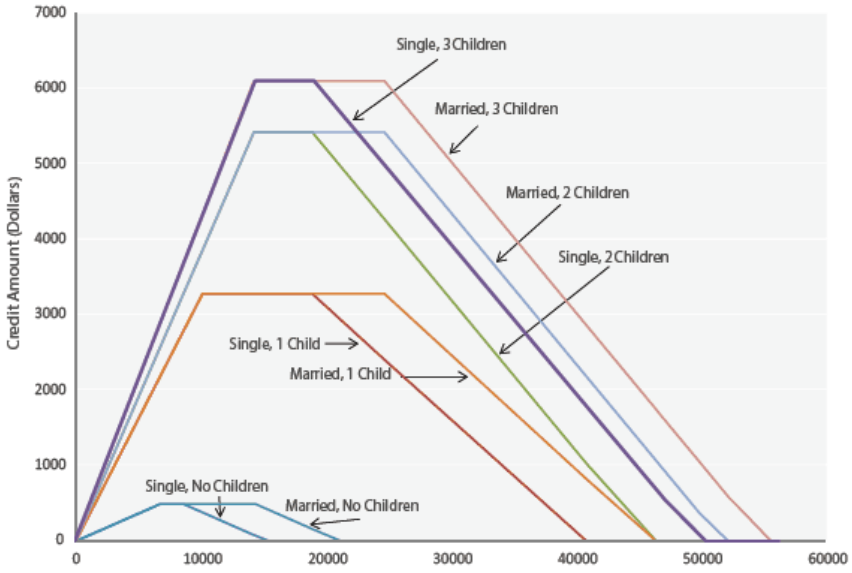
II. LITERATURE REVIEW

A. Overview of EITC

The federal EITC program was established in 1975 under the Ford Administration to reduce the tax burden of low-income workers (Nichols and Rothstein 2015). It is the largest cash-assistance program for low income families in the United States with 26.7 million recipients sharing $65 billion in federal EITC expenditures in 2014 (IRS 2015; Joint Committee on Taxation 2013). EITC expenditures in Washington, DC have been on the rise with spending doubling from $21 million in 2001 to over $53 million in 2011 (Hardy et al 2015; DC Fiscal Policy Institute, 2015). The program is administered through the income tax system and the ratio of administrative costs to claims paid is less than one percent (IRS 2015).

Eligibility for the federal and DC EITC requires that an individual has earned income and an adjusted gross income within certain limits in a given tax year (IRS 2015; DC Fiscal Policy Institute 2015). An EITC program participant receives a credit (dollar) equal to a fixed percentage of earnings for each dollar earned until the maximum amount is reached based upon their annual earned income, marital status and number of children

Figure 1: Earned Income Tax Credit by Number of Children and Filing Status, 2014

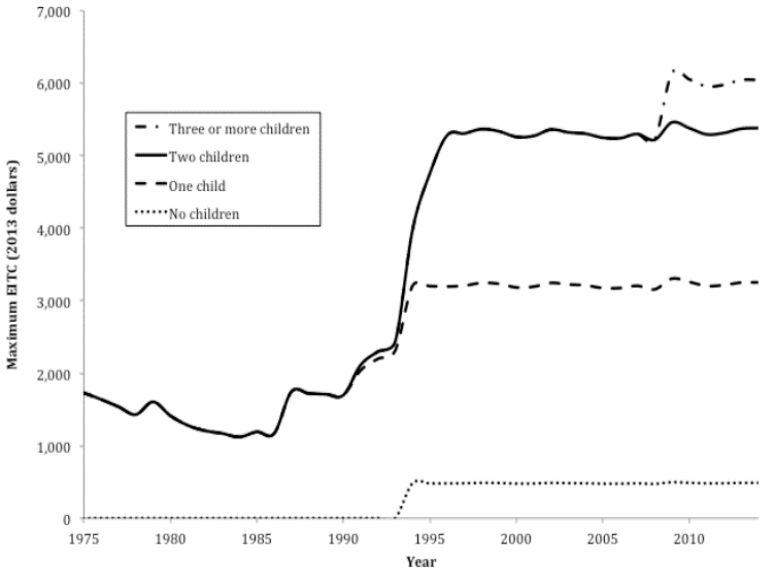


Source: 2014 EITC parameter from Tax Policy Center

(Nichols and Rothstein 2014). For example, the initial subsidy or "phase-in" rate for single filers without children and with three or more dependents in 2014 was an additional 7.65 and 45 cents per dollar earned, respectively. The credit stays at the maximum as earnings increase and then declines. The federal EITC is refundable, that is, recipients receive it in the form of a lump sum payment at the end of the tax filing season. Individuals are eventually phased out of the program as earnings increase, receiving a decreasing amount with each dollar earned until the credit disappears (see Figure 1). The phase-out process begins as at a lower income level for single parents relative to married couples.

Tax reforms in 1987, 1991 to 1996, and 2009 to 2012 expanded the scope of the program. Changes under the reforms included the incorporation of an inflation indexed credit as well as gradual increases in the benefits extended to families without children and those with one to three children (Neumark and Wascher 2000; Nichols and Rothstein 2014). Figure 2 illustrates the impact of the policy changes on the benefits for different family structures between 1975 and 2010. The most dramatic policy changes occurred for families with three or more children and in 1993 and 2009, respectively.

Figure 2. Maximum Real Credit over time, by number of children



Sources: U.S. Government Publishing Office (2004); Internal Revenue Service Publication number 596 (various years).

B. Literature Review

While the majority of early research on Earned Income Tax Credit focuses on the program's effects on labor force participation and hours worked across various subgroups of the population, more recent research examines its impact on poverty rates and the income distribution. EITC has a positive effect on labor force participation as low wage earners choose to enter the workforce to maximize the wage subsidy (Eissa and Liebman 1996). Participation increases the earnings of recipients during each year of their working life, with greater effects for younger households, allowing them to smooth consumption over their lifetime, given income or family shocks (Athreya et al. 2010; Clark 2002).

The EITC serves as a safety net for low-income families, with over 60% of participants claiming the credit for shorts periods of time (e.g. one to two years) (Clark 2002). This safety net pushed 4.3 million people out of poverty in 1997 and 1998 (Council of Economic Advisers 1998, 2000). Nichols (2006, 2013) attributes the major decline in poverty rates, particularly for children, in the 1990s to expansion of the EITC program because it shifted patterns of working parents. EITC encourages labor market entry of previously unemployed adults such as single women with children and married men as compared to married women, the program encourages labor market entry of adults that were not previously working such as single women with children and married men (Eissa and Liebman 1996; Eissa and Hoynes 1998; Meyer and Rosenbaum 2002; Haskins 2008; CBO 2007).

The combined federal and state EITC helps families rise above the poverty line (Neumark and Wascher 2001; Ziliak 2006; Simpson et al. 2009). Neumark and Wascher (2000) used low-income family-level data drawn from the March CPS for the years 1986 through 1995 to evaluate the combined effect of federal and state EITC on poverty. The authors use an income-to-needs

ratio to estimate the effects of the EITC on both the earned incomes of poor families and transitions out of poverty. Family units included in the study were assigned an income-to-needs ratio based upon their pre-tax income. The authors estimate the likelihood of being above poverty one- and two-years after the EITC receipt. Neumark and Wascher (2000) found that state-level EITC increased the likelihood of moving from below the FPL to above from one year to the next.

Literature does not provide clear evidence of the effect of the EITC on mobility for the recipients in the lower end of the distribution. Two studies indicate that the EITC encourages upward mobility of the families at the lower end of the distribution. For example, Liebman (1998) found that the EITC offsets 23 percent of the decline in income for the households in the first and second income quintiles. Clark (2002) also identified positive effects of the EITC on incomes at the lower end of the distribution. Clark's study finds that only 11 percent of individuals in the third decile of income claiming EITC in 1990 were in the same decile in 2003. In contrast, Hoynes and Patel (2014) found that EITC has little effect on those at the lower income levels, 50 percent below the federal poverty line. The authors found increasing effects on those concentrated between 75% and 150% of the poverty line. The finding of Hoynes and Patel (2014) is consistent with findings on the effect of the credit in Washington, DC.

Hardy et al. (2015) used a longitudinal administrative tax panel covering from 2001 to 2011 to assess the combined effect of the federal and DC EITC on income dynamics of Washington, DC. The authors use a linear probability model to estimate the likelihood that the net-EITC income of a tax files is above poverty (i.e. 100 percent above the poverty line) and near poverty (125 percent above the poverty). They find that EITC increases the likelihood that the net-income is above or near poverty by approximately nine percent. While the study provides meaningful insight on the impact of EITC on the income distribution in DC, it concentrates

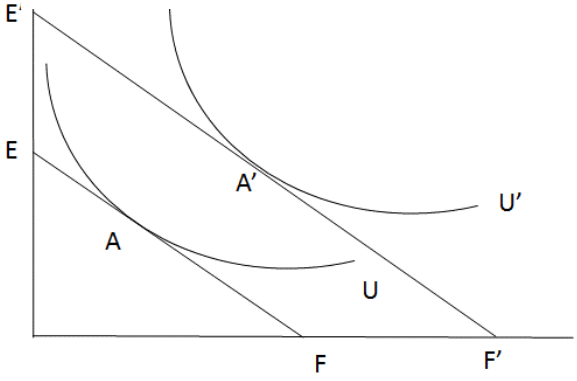
exclusively on movement of the working poor above and near the poverty line. Understanding the impact on the EITC on a broader scope of the income distribution is particularly important for Washington, DC as it faces a growing inequality.

While the EITC has strong anti-poverty effects, it is unclear if those at the lower end of the distribution are experiencing these anti-poverty effects. This study builds upon the work of Hardy et al. (2015) by expanding the scope of the poverty thresholds to include the deep poor (50 percent below the federal poverty line) and working poor (up to 150 percent of the poverty line and above). More specifically, it examines the impact of the EITC on the income distribution and the likelihood of transitioning across the distribution in Washington, DC.

III. THEORETICAL FRAMEWORK

The EITC program has dual benefits for the low-wage earner: increased utility and income smoothing. The rational consumer allocates resources across all possible goods to obtain the greatest satisfaction or highest utility (Varian 1992). The consumer ranks preferences in terms of the level of utility that different consumption bundles provide. Further, the consumer maximizes utility given an economic or budgetary constraints. The level of satisfaction is determined by non-economic factors based upon individual taste and preferences. Preferences can be mapped through the use of indifference curves. An indifference curve is a collection of all commodity bundles which provides the consumer with the same level of utility. Given that preferences are monotonic, the commodity bundle U' in Figure 3 is preferred to U. That is, the consumer prefers the bundle that allows them

Figure 3: An individual's potential choices before and after the EITC



to consume more of both goods. The rational consumer selects the most preferred bundle given their budget constraint. The optimal bundle, A, is where the indifference curve is tangent to the budget constraint. Cash transfer programs such as the EITC shift the budget constraint of low wage earners from EF to E'F'. Given the shift in the budget constraint, a low wage earner is able to afford a new optimal bundle that yields higher utility. Thus, the low wage earner will opt to participate in the EITC program in order to maximize utility.

The EITC program also provides low wage earners with the income support necessary to smooth consumption throughout life. Consumption and income needs vary at different stages in life. The life-cycle hypothesis suggest that younger people tend to borrow to meet consumption needs. The receipt of EITC by younger households may offset the need for them to borrow as it pushes earned income closer to the increased earnings anticipated in middle age.

The EITC program is not only beneficial for the low-wage earners targeted by the program, it also benefits society. The government uses EITC as a vehicle to reduce poverty. The approach to poverty reduction is two-fold: (1) redistribute funds to low-income workers through a cash transfer (credits) and (2) encourage low wage earners to continue to work to stabilize income and further facilitate an escape from poverty. Poverty reduction resulting from the program nudges society toward more equitable distribution of goods and services, or social optimality.

This purpose of this study is to investigate whether the EITC government program is achieving the aim of lifting the working poor out of poverty in Washington, DC. More specifically, it will examine the impact of EITC on the likelihood of a low-wage worker moving out of poverty. My hypothesis is that EITC is an effective anti-poverty tool and reduces the likelihood of poverty for low-wage earners.

IV. DATA & EMPIRICAL METHOD

A. Data

A panel data set with 322,712 observations: thirteen observations for each tax filers living in Washington, DC each year from 2001 – 2012 is used for this study. The data set is comprised of information from individual income tax (IIT) records from the District of Columbia and macroeconomic variables drawn from the University of Kentucky Center for Poverty Research (UKCPR) National Welfare Database. The IIT records from DC contain a unique identifier for every tax filer living in the city in a given tax year as well as information regarding their income, taxes, exemptions, ward of residence, and other tax related variables such as the amount of federal and DC EITC received. All income variables are deflated for 2012 using the consumer price index for all urban consumers (CPI-U) for the Washington-Baltimore area. The data sample is restricted to individuals that filed taxes annually during the period of the study (i.e. 2001 to 2012), filers reporting a positive federal adjusted gross income (FAGI), and earnings (i.e. wages, salaries and tips).

The individual filer's tax status (i.e. single, married, or head of household) and number of dependents claimed is used to construct a family size variable. The family size variable is used to define an EITC eligibility variable as well as poverty thresholds. EITC eligibility is determined by comparing the tax filer's FAGI and family composition with the Internal Revenue Service (IRS) income thresholds for EITC eligibility in a given year.

Poverty thresholds are constructed using the same approach. The family size variable is used to construct a poverty line indicator by linking the tax data with the annual weighted average poverty thresholds from the U.S. Census Bureau. The poverty line indicator is used create additional poverty threshold for the deep poor (i.e. 50 percent below the poverty line which is equal to 0.50*poverty threshold), near poverty (i.e. 125 percent above the poverty line

which is equal to 1.25*poverty threshold), working poor (i.e. within 150 percent of the poverty line which is equal to 1.50*poverty threshold), and non- poor (i.e. within 200 percent of the poverty line which is equal to 2*poverty threshold).

Macroeconomic city-level variables to supplement the tax data are drawn from the UKCPR database. Those variables include the District of Columbia unemployment rate, gross state product, state minimum wage, and family-size specific combined welfare cash and food stamp benefits.

There are two limitations with the data used in this study. First, it is does not include detailed demographic information (e.g. education, race and age) on tax filers. Some aspects of EITC eligibility are determined by demographic factors such as age. For example, to qualify for the federal EITC without children an individual must at least 25 years old but under the age of 65. The IIT data includes an indicator of whether the individual is a senior citizen (i.e. 65 or older). Therefore, to avoid any misrepresentation of the data, this study restricts the analysis to the EITC eligible population below the age of 65. Secondly, the number of dependents captured in the IIT data can encompass more than just a related child. For example, an individual can claim other relatives (e.g. nephew, cousin). In 2006, the DC began collecting the number of EITC children claimed. The Number of Dependents and EITC children claimed values for the years 2006 – 2012 were compared for consistency. There are not major differences between the values (e.g. less than 2 percent).

Below is descriptive overview of the variables used in this analysis (see Table 1 and 2). The percentage of the population eligible for EITC has declined from 31 percent in 2001 to 24 percent in 2012. EITC claims have also declined from 25 percent of the tax filing population in 2001 to 20 percent in 2012. The eligible EITC population tends to be single with one or two

dependents. They dwell primarily in Wards 7 and 8 in the southeast quadrant of the city (see Table A.2 in appendix). The majority of the eligible EITC population and recipients are 200 percent or more above the federal poverty line. The majority of the DC population also fall into that income position. The deep poverty category (i.e. 50% below the poverty line) has both the least amount of eligible EITC filers and claimants.

Table 1. Poverty Status of DC Population, 2001 – 2012 (Dependent Variable, N=24,824)

Poverty Status	DC Population (%)	EITC Eligible (%)	EITC Recipients (%)
Above 200% FPL			
2001	82.55	14.49	11.94
2002	84.33	15.51	13.81
2003	83.55	13.79	12.34
2004	83.56	12.41	11.09
2005	83.04	11.05	9.89
2006	82.36	9.36	7.84
2007	82.11	8.52	7.45
2008	80.40	6.76	5.76
2009	80.58	7.84	6.47
2010	79.31	6.44	5.16
2011	77.17	4.73	3.73
2012	76.15	4.28	3.13
150 – 200% FPL			
2001	8.32	7.24	6.46
2002	10.06	7.23	6.72
2003	8.57	7.50	7.08
2004	8.73	7.49	7.14
2005	9.49	8.20	7.73
2006	9.91	8.51	7.67
2007	9.73	8.27	7.77
2008	10.34	8.38	7.82
2009	10.14	8.48	7.73
2010	10.34	8.44	7.45
2011	10.37	8.10	7.12
2012	10.41	7.87	6.87
125 – 150% FPL			
2001	3.04	3.00	2.49
2002	8.20	2.62	2.31
2003	8.57	2.76	1.18
2004	2.81	2.74	2.45
2005	2.88	2.68	2.44

Poverty Status	DC Population (%)	EITC Eligible (%)	EITC Recipients (%)
2006	3.21	2.98	2.63
2007	3.34	2.96	2.76
2008	3.74	3.15	2.90
2009	3.73	3.25	2.96
2010	4.17	3.61	3.27
2011	4.86	4.05	3.70
2012	4.81	3.84	3.54
100 – 125% FPL			
2001	2.08	2.07	1.58
2002	2.67	1.74	1.40
2003	1.91	1.87	1.55
2004	2.00	1.97	1.70
2005	1.89	1.87	1.60
2006	1.93	1.90	1.62
2007	2.03	1.98	1.68
2008	2.45	2.41	2.08
2009	2.30	2.26	1.86
2010	2.76	2.69	2.23
2011	3.28	3.14	2.55
2012	3.38	3.15	2.61
50 – 100% FPL			
2001	2.57	2.55	1.91
2002	1.92	1.88	1.41
2003	2.12	2.07	1.62
2004	1.91	1.66	1.45
2005	1.70	1.82	1.47
2006	1.76	1.73	1.36
2007	1.99	1.95	1.53
2008	2.07	2.03	1.59
2009	2.15	2.11	1.60
2010	2.48	2.43	1.80
2011	3.16	3.11	2.32
2012	3.63	3.58	2.63
Below 50% FPL			
2001	1.44	1.31	0.85
2002	1.11	1.06	0.66
2003	1.04	0.97	0.63
2004	1.00	0.95	0.58
2005	0.83	0.77	0.51
2006	0.83	0.77	0.41
2007	0.81	7.49	0.49
2008	1.00	0.91	0.49
2009	2.74	0.94	0.56

Poverty Status	DC Population (%)	EITC Eligible (%)	EITC Recipients (%)
2010	0.95	0.91	0.50
2011	1.16	1.12	0.63
2012	1.62	1.59	0.80

Table 2. City Level Characteristics, 2001 – 2012 (Independent Variables)

Variable	Definition	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
eitc[1]	Indicator variable=1 is EITC recipient, 0 otherwise (percent)	25.22 (30.66)	26.31 (30.03)	25.62 (28.96)	24.42 (27.43)	23.64 (26.39)	21.53 (25.28)	21.69 (24.43)	20.64 (23.66)	21.15 (24.88)	20.41 (24.52)	20.05 (24.25)	19.59 (24.32)
Unemp	DC unemployment rate	6.30	6.70	7.00	7.50	6.50	5.70	5.50	6.60	9.70	10.10	10.20	9.10
Gross	DC gross domestic product (millions)	66,260	70,822	75,086	80,753	85,403	89,861	96,625	101,571	101,927	106,615	110,702	111,870
Mwage	State minimum wage (dollars)	6.15	6.15	6.15	6.15	7.00	7.00	7.00	7.55	8.25	8.25	8.25	7.25
TANF_FS[2]	Combined monthly maximum welfare (AFDC/TANF) and food stamp benefit conditional on family size	383	403	411	415	427	441	445	462	486	524	515	504

1. Total N = 24,824, Percent of population eligible for EITC in parentheses
2. Mean value rounded to the nearest dollar

B. Empirical Method

In order to examine the effect of EITC on income dynamics in, I use the following conditional logit model:

$$Y_{it} = \beta_1 E_{it} + \beta_2 E_{it-1} + \tau X_t + \alpha_s + \epsilon_{it}$$

where the subscript *i* denotes the individual tax filer and *t* indexes the time. Y_{it} is a dichotomous variable reflecting a net-EITC income above poverty. Individual fixed effects, α_s, are included to control for unobservable time invariant characteristics (e.g. education, race, age) the variable of interest, $E_{it.}$ E_{it} indicates whether the individual *i* was EITC eligible in a given tax year *t*. Lagged EITC receipt, E_{it-1}, is included in the model because present EITC receipt is correlated to past receipt (Cahuc et al. 2014). Vector X_t consists of controls for city-level time varying economic and policy variables including the District of Columbia unemployment rate, gross state product, state minimum wage, and combine welfare benefits (i.e. ADFC/TANF and food stamps). For example, $Female_i$ indicates whether child *i* is female. Lastly, ϵ_{is}, is the error term.

The conditional logit model was the preferred model for this study given that the dependent variable is binary and the study is focused on analyzing the impact of EITC overtime. While the traditional probit model is commonly used to estimate unbiased coefficients in the case of a binary dependent, it is not appropriate for the data used in this study as it cannot accommodate fixed effects without inducing biased coefficients and standard errors. The robustness of the model was tested against a linear probability model (LPM) with fixed effects. LPM is not the ideal estimation technique given that the dependent variable is dichotomous, coded as 1 if the tax filer changed from their current income position and 0 otherwise. Furthermore, the LPM can produce predicted probabilities outside of the [0, 1] range. The conditional logit model with fixed effects is a commonly used alternative to LPM (Greene 2012). Advantages of this method include that it

controls for unobserved heterogeneity, reduces self-section and omitted variable bias (Chamberlain, 1980). However, a major criticism of the technique is that it removes all between-group correlation only considers within group correlation and thus drops any group *i* without variation from the analysis. It is argued that this can distort the analysis by making the sample unrepresentative of the population. Distortion is not a concern given the data used in this study reflects the population of tax filers in Washington DC from 2001 to 2012 rather than a sample.

V. RESULTS

Tables 3 contain the estimates of the combined effect of the federal and DC EITC on the poverty status of the EITC eligible population. The coefficient and odds ratio are presented for 50 percent, 100 percent, 125 percent, and 200 percent FPL.[1] The results indicate that filer that takes EITC is more likely to be above the given poverty threshold than the eligible EITC tax filer that does not take the credit. EITC has significant effects at the 50 percent FPL, 100 percent FPL, and 150 percent FPL. The odds of being above 50 percent FPL for those who take EITC is 2.51 (i.e. the odds increase by 150 percent) times higher than for those that do not credit. Similar effects are found at the 100, 125 and 200 percent FPL. However, the odds are decreasing in FPL. For example, the odd of being 200 percent above FPL for those who take EITC is 2 (i.e. the odds increase by 100 percent) relative to those that do not take it.

The effect of EITC on poverty thresholds outside of the scope of the working poor (i.e. at 200 and 250 percent FPL) were examined to test the robustness of the model (see Table 4). EITC has negligible effects at these levels. For example, the coefficient on the model for 200 percent FPL is insignificant; further, the odds ratio 1.10 indicates that EITC recipients only have minor advantages of those who do not claim the credit. Lastly, in the case of 250 percent FPL, the odds

[1] The average marginal effects cannot extrapolated using this method as it does not provide an estimate of the fixed effect distribution.

of EITC being above poverty at this level is negative relative to those who do not claim EITC. Overall, the regression results are consistent with the program aims. Claiming the EITC credit increases the odds of being above the respective poverty status at lower thresholds (e.g. 50, 100, 125, and 150 percent FPL). Individuals at these income levels represent the working poor that the program targets.

The transition probabilities presented in Tables A3 and A4 (see Appendix) illustrate that those claiming the EITC are more mobile relative to those that do not. For example, 69 percent of the eligible population in deep poverty (50 percent FPL) in one period, remain there in the next period. Only 20 and 7 percent of the deep poor move to 100 percent and 125 percent FPL from one period to the next, respectively. In comparison, only 29 percent of those claiming EITC in deep poverty in one period remain there from one period to the next. Also, 30 and 12 percent of those deep poverty move to 100 percent and 125 percent FPL from one period to the next.

Table 3. Empirical estimates of the effect of EITC on poverty status

	50% FPL		100% FPL		125% FPL		150% FPL	
VARIABLES	**(1) Logit coeff**	**(2) Odds ratio**	**(1) Logit coeff**	**(2) Odds ratio**	**(1) Logit coeff**	**(2) Odds ratio**	**(1) Logit coeff**	**(2) Odds ratio**
eitc	0.923***	2.512***	0.722***	2.058***	0.789***	2.223***	0.693***	2.000***
	(0.107)	(0.326)	(0.068)	(0.145)	(0.066)	(0.157)	(0.065)	(0.128)
eitc_l	-0.014	0.986	-0.047	0.954	-0.017	0.983	-0.096**	0.909**
	(0.107)	(0.764)	(0.014)	(0.0551)	(0.054)	(0.058)	(0.044)	(0.041)
Unemp	-0.124***	0.884 ***	-0.156***	0.855***	-0.148***	0.863**	-0.115***	0.891***
	(0.027)	(0.212)	(0.014)	(0.014)	(0.054)	(0.010)	(0.009)	(0.010)
Gross	-0.000***	1.000***	-0.000***	1.000***	-0.000***	1.000***	-0.000***	1.000***
	(3.61e-0.6)	(3.36e-06)	(2.36e-06)	(2.19e-06)	(0.013)	(2.12e-06)	(1.97e-06)	(1.80e-06)
Mwage	0.421***	1.524***	0.500***	1.632***	0.475***	1.608***	0.473***	1.605***
	(0.061)	(0.102)	(0.037)	(0.067)	(0.033)	(0.053)	(0.031)	(0.045)
TANF_FS	0.003***	1.002***	0.002***	1.001***	0.001***	1.000***	-0.001***	0.999***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Observations	11104		26140		34390		42217	

Robust standard errors in parentheses
***p<0.01, **p<0.5, *p<0.1

Table 4. Empirical estimates of the effect of EITC on poverty status (Robustness Check)

	200% FPL		250% FPL	
VARIABLES	**(1) Logit coeff**	**(2) Odds ratio**	**(1) Logit coeff**	**(2) Odds ratio**
eitc	0.095	1.100	-0.250***	0.779
	(0.060)	(0.074)	(0.090)	(0.077)
eitc_l	-0.206***	0.814***	-0.213***	0.081***
	(0.033)	(0.031)	(0.056)	(0.059)
Unemp	-0.022*	0.979**	-0.015	0.985
	(0.013)	(0.010)	(0.019)	(0.020)
Gross	-0.000***	1.000***	-0.000	1.000***
	(2.19e-06)	(2.33e-06)	(3.31e-06)	(3.85e-06)
Mwage	0.461***	1.586***	0.366***	1.442***
	(0.034)	(0.055)	(0.066)	(0.112)
TANF_FS	-0.005***	0.995***	-0.007***	0.993***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	44449		21856	

Robust standard errors in parentheses
***p<0.01, **p<0.5, *p<0.

VI. CONCLUSION

The results of this study indicate that the combined federal and DC EITC increase the likelihood of income above poverty relative to those that do not claim the credit. Positive and significant results for EITC on income were found at the 50, 100, 125, and 150 percent FPL. This is expected and consistent with previous literature indicating that EITC has anti-poverty effects on the poor and near poor (Hoynes and Patel 2014; Hardy et al 2015). Given the benefits of EITC on low-income households, it is recommended that the local DC government introduce targeted campaigns to increase the uptake of eligible participants. Campaigns can target, for example, wards (e.g. ward 7 and 8) where there is a high density of EITC eligible tax files

Future research might take three policy-relevant directions. First, it might further refine the statistical analyses to examine the marginal effect or benefit of EITC at various income levels. One approach may be a quantile regression with fixed effects. Secondly, qualitative research on why eligible participants are not taking the credit might suggest to policy makers meaningful approaches to increase uptake. Thirdly, this study should be replicated in another state that offers EITC to compare the differences in the effect (e.g. percentage of population that uses it, success at uplifting the working poor). This will help policy makers identify best practices for the program implementation.

REFERENCES

Athreya, K. B., et al. 2010. Earned Income Tax Credit Recipients: Income, Marginal Tax Rates, Wealth, and Credit Constraints. *Federal Reserve Bank of Richmond Economic Quarterly* 96(3): 229-258.

Cahuc, Pierre, and André Zylberberg. 2004. *Labor economics*. Cambridge, Mass: MIT Press.

Chamberlain, Gary. 1980. Analysis of covariance with qualitative data. R*eview of Economic Studies* 57: 225–238.

Clark, T. (2002). Taxes and Transfers 1997-2001. *Oxford Review of Economic Policy* 18(2): 187-201.

Congressional Budget Office. 2007. Changes in the economic resources of low income households with children. CBO paper no. 2602. Washington: Congress of the United States Congressional Budget Office, May.

Council of Economic Advisers (CEA). 1964. *The Annual report of the Council of Economic Advisers*. Washington, D.C.: Council of Economic Advisers, January.

"DC Fiscal Policy Institute." DC Fiscal Policy Institute. Accessed November 1, 2015. http://www.dcfpi.org/.

"Do I Qualify for EITC?" Do I Qualify for Earned Income Tax Credit EITC. Accessed November 1, 2015. https://www.irs.gov/Credits-&-Deductions/Individuals/Earned-Income-Tax-Credit/Do-I-Qualify-for-Earned-Income-Tax-Credit-EITC.

Dowd, T. and J. B. Horowitz 2011. Income Mobility and the Earned Income Tax Credit: Short-Term Safety Net or Long-Term Income Support. *Public Finance Review* 39(5): 619-652.

Eissa, N. and J. B. Liebman. 1996. Labor Supply Response to the Earned Income Tax Credit. *The Quarterly Journal of Economics* 111(2): 605-637

Eissa, N. and H. Hoynes (2008). Redistribution and Tax Expenditures: The Earned Income Tax Credit, National Bureau of Economic Research, Inc, NBER Working Papers: 14307.

Guzman, T., et al. (2013). Social Policy: What Have We Learned?. *Policy Studies Journal* 41: S53-S70.

Greene, William H., 1951. 2012. *Econometric analysis*. 7th ed. Upper Saddle River, N.J: Prentice Hall.

Hardy, Bradley L., Daniel Muhammad, and Rhucha Samudra. 2015. The Effect of the Earned Income Tax Credit in the District of Columbia on Poverty and Income Dynamics. *Upjohn Institute Working Paper* 15-230. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Haskins, Ron. 2008. Making work pay–again. Big ideas for children: Investing in our nation's future.

Hilary, W. H., et al. 2007. Review of: Public Policy and the Income Distribution. *Journal of Economic Literature* 45(1): 178-181.

Hoynes, H. W. and A. J. Patel. 2015. Effective Policy for Reducing Inequality? The Earned Income Tax Credit and the Distribution of Income, National Bureau of Economic Research, Inc, NBER Working Papers: 21340.

Hutto, N., et al. 2011. Improving the Measurement of Poverty. *Social Service Review* 85(1): 39-74.

Joumard, I., et al. 2012. Tackling Income Inequality: The Role of Taxes and Transfers. *OECD Journal: Economic Studies* 2012: 37-70.

Kim, J. and E. Tebaldi (2013). Trends and Sources of Income Inequality in the United States. *Journal of Business and Economic Studies* 19(2): 1-13.

Kim, K. and P. J. Lambert (2009). Redistributive Effect of U.S. Taxes and Public Transfers, 1994-2004. *Public Finance Review* 37(1): 3-26.
Levitan, M., D'Onofrio, C., Koolwal, G., Krampner, J., Scheer, D., Seidel, T. and Virgin, V. 2010, Using the American community survey to create a National Academy of Sciences–style poverty measure: Work by the New York City Center for Economic Opportunity. *J. Pol. Anal. Manage.*, 29: 373–386. doi: 10.1002/pam.20496
Liebman, J. B. 1998. The Impact of the Earned Income Tax Credit on Incentives and Income Distribution, Cambridge: MIT Press for the National Bureau of Economic Research.
B.D, Meyer. 2002. Labor supply at the extensive and intensive margins: The EITC, welfare, and hours worked. The American Economic Review 92 (2): 373-9.
Meyer, B. 2007. The U.S. Earned Income Tax Credit, its Effects, and Possible Reforms, Harris School of Public Policy Studies, University of Chicago, Working Papers: 0720.
Meyer, B. D. 2010. The Effects of the Earned Income Tax Credit and Recent Reforms, Chicago and London: University of Chicago Press; Cambridge, Mass.: National Bureau of Economic Research.
Moffitt, R. and R. National Bureau of Economic (2003). Means-tested Transfer Programs in the United States. Chicago, University of Chicago Press.
Moffitt, R. A. and J. K. Scholz 2009. Trends in the Level and Distribution of Income Support, National Bureau of Economic Research, Inc, NBER Working Papers: 15488.
Nichols, Austin. 2006. Understanding recent changes in child poverty. Urban Institute.
Nichols, A. and J. Rothstein 2015. The Earned Income Tax Credit (EITC), National Bureau of Economic Research, Inc, NBER Working Papers: 21211.
Nichols, Austin. 2013. Explaining changes in child poverty over the past four decades. Urban Institute.
Neumark, David, and William Wascher. 2000. Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania: Comment. *American Economic Review*, 90(5): 1362-1396.
Neumark, David, and William Wascher. 2001. Using the EITC to help poor families: New evidence and a comparison with the minimum wage. *National Tax Journal* 54 (2): 281-317.
OECD In It Together: Why Less Inequality Benefits All, OECD Publishing.
Simpson, Nicole B., Jill Tiefenthaler, and Jameson Hyde. 2010. The impact of the earned income tax credit on economic well-being: A comparison across household types. *Population Research and Policy Review* 29 (6): 843-64.
"Taxation and the Family: What Is the Earned Income Tax Credit?" What Is the Earned Income Tax Credit? Accessed November 1, 2015. http://www.taxpolicycenter.org/briefing-book/key-elements/family/eitc.cfm.
Varian, Hal R. 1992. *Microeconomic analysis*. 3rd ed. New York: Norton.
Wu, Ximing, Jeffrey M. Perloff, and Amos Golan. 2006. Effects of government policies on urban and rural income inequality. *Review of Income and Wealth* 52 (2): 213-35.
Ziliak, James P. 2005. Understanding poverty rates and gaps: Concepts, trends, and challenges. *Foundations and Trends in Microeconomics* 1 (3): 127-99.

APPENDIX

Table A1. Internal Revenue Service Earned Income Tax Credit Thresholds ($2013), 2001 - 2012

		Qualifying Children			
Year	**Filing Status**	**0**	**1**	**2**	**3+**
2001	Single, Head of Household Widowed Married Filing Jointly	$ 14,794.16	$ 39,065.69	$ 42,988.70	
	Max Credit	$502.81	$ 3,367.71	$5,536.41	
2002	Single, Head of Household or Widowed	$15,277.63	$ 40,337.91	$45,830.12	
	Married Filing Jointly	$16,658.97	$ 41,719.25	$ 47,211.46	
	Max Credit	$519.38	$ 3,461.64	$5,718.75	
2003	Single, Head of Household or Widowed	$11,230.00	$ 29,666.00	$ 33,692.00	
	Married Filing Jointly	$12,230.00	$30,666.00	$ 34,692.00	
	Max Credit	$382.00	$2,547.00	$4,204.00	
2005	Single, Head of Household or Widowed	$ 16,230.75	$ 42,863.00	$ 48,710.21	
	Married Filing Jointly	$ 18,993.43	$ 45,625.68	$ 51,472.89	
	Max Credit	$ 551.15	$ 3,677.13	$ 6,077.90	
2004	Single, Head of Household or Widowed	$ 15,871.60	$ 41,907.11	$ 47,598.23	
	Married Filing Jointly	$ 17,252.94	$ 43,288.45	$ 48,979.57	
	Max Credit	$ 538.72	$ 3,597.01	$ 5,939.76	
2006	Single, Head of Household or Widowed	$ 16,741.85	$ 44,204.28	$ 50,208.97	
	Married Filing Jointly	$ 19,504.53	$ 46,966.96	$ 52,971.65	
	Max Credit	$ 569.11	$ 3,794.54	$ 6,265.76	
2007	Single, Head of Household or Widowed	$ 17,391.08	$ 45,917.14	$ 52,191.19	
	Married Filing Jointly	$ 20,153.76	$ 48,679.82	$ 54,953.87	
	Max Credit	$ 591.21	$ 3,940.96	$ 6,514.40	

2008	Single, Head of Household or Widowed	$ 17,791.67	$ 46,958.67	$ 53,383.29	
	Married Filing Jointly	$ 21,935.69	$ 51,102.69	$ 57,527.31	
	Max Credit	$ 605.03	$ 4,029.37	$ 6,663.59	
2009	Single, Head of Household or Widowed	$ 18,565.22	$ 48,986.48	$ 55,661.12	$ 59,783.04
	Married Filing Jointly	$ 25,471.92	$ 55,893.18	$ 62,567.82	$ 66,689.74
	Max Credit	$ 631.27	$ 4,203.42	$ 6,945.38	$ 7,814.24
2010	Single, Head of Household or Widowed	$ 18,592.84	$ 49,085.94	$ 55,755.05	$ 59,883.88
	Married Filing Jointly	$ 25,513.36	$ 56,006.45	$ 62,675.57	$ 66,804.39
	Max Credit	$ 631.27	$ 4,213.09	$ 6,956.43	$ 7,826.68
2011	Single, Head of Household or Widowed	$ 18,869.11	$ 49,800.09	$ 56,585.24	$ 60,776.22
	Married Filing Jointly	$ 25,886.32	$ 56,817.30	$ 63,602.45	$ 67,793.43
	Max Credit	$ 640.94	$ 4,273.87	$ 7,061.41	$ 7,944.09
2012	Single, Head of Household or Widowed	$ 19,311.14	$ 50,999.09	$ 57,950.00	$ 62,243.21
	Married Filing Jointly	$ 26,507.93	$ 58,195.88	$ 65,146.78	$ 69,439.99
	Max Credit	$ 656.14	$ 4,377.47	$ 7,232.70	$ 8,137.48
2013	Single, Head of Household or Widowed	$ 19,808.42	$ 52,311.37	$ 59,450.14	$ 63,855.23
	Married Filing Jointly	$ 27,184.78	$ 59,687.73	$ 66,826.49	$ 71,231.59
	Max Credit	$ 672.71	$ 4,489.36	$ 7,420.56	$ 8,348.82

Table A2. Characteristics of Non-EITC and EITC households, 2001 – 2012

Variables	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
EITC Eligible (Claimant) Filer												
Total (N)	6,261	6,532	6,360	6,061	5,868	5,344	5,385	5,124	5,250	5,067	4,978	4,862
Filing Status (%N)												
Single	4.07	3.08	3.25	3.55	3.53	3.71	3.88	4.20	4.59	5.09	5.79	7.28

Variables		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	Head of Household	93.74	94.49	94.26	93.68	93.68	93.36	92.92	92.31	91.50	91.80	90.08	88.03
	Married	2.19	2.43	2.48	2.77	2.79	2.94	3.19	3.49	3.90	3.83	4.14	4.69
Family Structure (%N)													
	No dependents	5.08	3.14	3.35	3.56	3.56	3.80	4.01	4.25	4.69	5.19	5.95	7.57
	1 dependent	36.22	35.81	33.71	31.69	32.24	31.34	31.33	30.87	30.76	30.83	31.38	32.06
	2 dependents	43.79	44.96	45.82	47.52	46.59	47.21	46.13	44.93	40.46	38.72	37.30	36.36
	3 + dependents	14.90	16.09	17.12	17.22	17.60	17.65	18.53	19.95	24.10	25.26	25.37	24.00
Neighborhood (%N)													
	Ward 1	12.80	12.42	12.78	13.28	12.25	11.89	11.94	11.87	11.46	11.37	11.82	11.69
	Ward 2	2.47	2.23	2.32	2.43	1.96	1.81	1.99	1.73	1.90	2.08	2.10	1.94
	Ward 3	1.14	1.26	1.19	1.18	1.04	0.97	1.06	1.30	1.22	1.31	1.18	1.24
	Ward 4	11.24	11.26	11.38	11.28	11.97	12.43	12.50	12.90	13.78	13.64	13.62	13.59
	Ward 5	14.49	14.23	14.41	14.11	13.90	14.22	13.80	13.74	13.06	13.41	13.56	13.55
	Ward 6	10.70	10.65	10.64	10.77	9.55	9.82	9.37	8.73	8.95	9.06	8.80	9.12
	Ward 7	20.52	21.08	20.69	20.48	22.96	22.16	23.40	23.41	23.34	22.90	22.82	23.06
	Ward 8	26.64	26.87	26.59	26.46	26.36	26.70	25.93	26.28	26.28	26.23	26.11	25.81
EITC Eligible (Non-Claimant) Filers													
Total (N)		1,351	924	828	747	682	924	679	749	927	1,020	1,043	1,174
Filing Status (%N)													
	Single	28.87	29.33	29.35	26.10	24.49	19.37	24.30	26.44	24.06	23.24	26.75	29.98
	Head of Household	64.25	66.02	66.43	68.27	69.35	75.22	69.96	66.89	70.12	71.67	66.83	64.74
	Married	6.88	4.65	4.23	5.62	6.16	5.41	5.74	6.68	5.83	5.10	6.42	5.28
Family Structure (%N)													
	No dependents	33.38	30.52	30.19	27.58	25.95	20.67	25.77	28.30	25.03	24.80	28.67	31.60
	1 dependent	38.27	39.61	38.77	41.90	41.20	37.77	41.24	40.85	40.13	38.53	39.21	43.70
	2 dependents	20.36	22.19	23.55	23.43	24.63	31.17	22.83	22.83	20.06	21.86	20.33	17.12
	3 + dependents	7.99	7.68	7.49	7.10	8.21	10.39	10.16	8.01	14.78	14.80	11.79	7.58
Neighborhood (%N)													
	Ward 1	14.45	17.12	15.58	14.67	14.13	15.01	14.48	13.69	14.66	13.86	13.70	12.19
	Ward 2	5.68	6.03	6.26	6.14	5.07	5.30	4.78	4.75	6.36	5.48	6.70	5.04
	Ward 3	6.10	7.02	6.66	7.34	8.14	6.43	5.39	6.84	6.36	6.00	6.30	5.68

Variables		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	Ward 4	14.29	14.53	16.25	14.22	18.43	17.49	15.10	14.80	12.39	13.24	13.20	13.93
	Ward 5	12.87	14.41	14.78	13.62	14.59	13.32	15.87	14.39	13.98	13.65	14.70	14.02
	Ward 6	11.11	10.96	9.99	10.93	10.60	7.90	10.17	11.45	10.57	9.72	10.20	9.53
	Ward 7	16.71	15.64	14.78	16.32	14.75	18.06	18.03	16.62	19.43	19.96	17.70	21.91
	Ward 8	18.80	14.29	15.71	16.77	14.29	16.48	16.18	17.46	16.25	18.10	17.50	17.69
EITC Ineligible Filers													
Total (N)		17,212	17,368	17,636	18,016	18,274	18,556	18,760	18,951	18,647	18,737	18,803	18,788
Filing Status (%N)													
	Single	70.03	69.06	67.75	66.75	67.16	66.69	67.17	66.82	67.85	67.83	68.73	69.85
	Head of Household	25.7	26.46	27.82	28.92	28.55	28.77	28.51	28.87	27.89	27.69	26.80	25.47
	Married	4.28	4.47	4.43	4.33	4.29	4.26	4.32	4.30	4.26	4.48	4.46	4.68
Family Structure (%N)													
	No dependents	74.44	73.35	72.35	71.20	70.88	70.59	70.38	70.32	71.63	71.71	72.66	73.72
	One dependent	14.91	15.70	16.13	16.57	16.73	16.98	17.12	17.13	16.35	16.73	15.83	15.31
	Two dependents	7.13	7.22	7.57	8.03	8.15	7.99	8.02	8.05	7.88	7.80	7.57	7.32
	Three dependents	3.51	3.73	3.95	4.20	4.24	4.44	4.48	4.50	4.14	4.12	3.94	3.65
Neighborhood (%N)													
	Ward 1	12.69	12.64	12.65	12.52	12.59	12.51	12.34	12.31	12.04	12.00	12.17	12.10
	Ward 2	14.18	14.08	13.93	13.69	12.63	12.35	12.00	11.83	11.75	11.62	11.64	11.60
	Ward 3	16.09	15.91	15.92	15.61	14.61	14.44	14.42	14.19	14.23	14.15	14.15	14.02
	Ward 4	13.20	13.28	13.13	13.22	13.87	13.71	14.00	13.98	14.07	14.00	13.95	14.08
	Ward 5	12.22	12.22	12.15	12.35	12.92	12.97	12.76	12.93	13.05	12.99	12.92	12.95
	Ward 6	13.26	13.32	13.30	13.17	12.77	12.67	12.54	12.48	12.47	12.52	12.46	12.32
	Ward 7	10.93	10.92	11.10	11.28	12.15	12.66	12.97	13.11	13.24	13.48	13.38	13.45
	Ward 8	7.43	7.61	7.82	8.1	8.46	8.70	8.98	9.17	9.14	9.25	9.33	9.47

Table A3. Estimated Transition Probabilities, Non-Claimant (EITC Eligible)

			T + 1						
			50%	50 – 100%	100 – 150%	150 – 200%	200 – 250%	250 – 300	300 – 350%
	50%	FPL	0.688	20.28	0.066	0.026	.0139	0.004	0.000
	50 – 100%	FPL	0.178	0.561	0.158	0.057	0.032	0.014	0.000
	100 – 150%	FPL	0.100	0.288	0.368	0.127	0.069	0.038	0.009
T	150 – 200%	FPL	0.036	0.136	0.210	0.331	0.228	0.054	0.005
	200 – 250%	FPL	0.008	0.027	0.059	0.141	0.532	0.203	0.030
	250 – 300 %	FPL	0.009	0.009	0.011	0.034	0.243	0.565	0.124
	300 – 350%	FPL	0.003	0.003	0.008	0.012	0.063	0.322	0.588

FPL = Federal Poverty Line

Table A4. Estimated Transition Probabilities, EITC Claimant

			T + 1						
			50%	50 – 100%	100 – 150%	150 – 200%	200 – 250%	250 – 300	300 – 350%
	50%	FPL	0.286	0.303	0.120	0.107	0.132	0.045	0.007
	50 – 100%	FPL	0.097	0.377	0.189	0.137	0.150	0.042	0.008
	100 – 150%	FPL	0.033	0.182	0.334	0.225	0.018	0.039	0.007
T	150 – 200%	FPL	0.002	0.078	0.165	0.361	0.306	0.0623	0.007
	200 – 250%	FPL	0.008	0.029	0.050	0.139	0.580	0.176	0.019
	250 – 300 %	FPL	0.004	0.010	0.013	0.033	0.275	0.571	0.943
	300 – 350%	FPL	0.002	0.004	0.005	0.013	0.086	0.335	0.556

FPL = Federal Poverty Line