PRELIMINARY DRAFT – DO NOT CITE OR CIRCULATE WITHOUT PERMISSION

The Effect of the District of Columbia Supplemental EITC on Poverty, Employment, and Income Growth*

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Abstract

Using administrative tax data, we assess the combined effect of the District of Columbia (DC) supplemental earned income tax credit (EITC) and the federal EITC on poverty, employment, and income dynamics within Washington, DC from 2006-2011. The supplemental DC EITC has existed since 2001, and has expanded from 10 percent of the federal credit to 40 percent as of 2009. To implement the study, we estimate least squares models with 0/1 indicator variables for entry into employment, income above poverty, earnings growth, and income smoothing after an annual income decline. To identify the effect of the EITC, we exploit variation in the EITC subsidy rate from 2008 to 2009, when an additional EITC bracket of 45 percent was added for workers with three or more dependent children, up from 40 percent in the previous year for workers with two or more children. In order to stratify the sample, we supplement the tax data with city and census tract-level data on economic and demographic characteristics. We find that the combined EITC raises the likelihood of extensive margin employment, lowers longer term poverty, and reduces instability from income declines.

Introduction

Throughout the U.S., income inequality and stagnant wages among less educated workers have reinvigorated discussions surrounding policies to raise incomes (Autor, Katz, and Kearney 2008; Autor 2014; Berlin 2007; Blank 2008). Across the country, this phenomenon and the impact of the 2007-2009 recession have had varying effects in terms of the severity and duration of economic hardship, and the ensuing public policy response has varied as well (Ben-Shalom et al. 2012; Williams & Mai 2014). States and regions have considered a range of social welfare policy options, ranging from no response to proposals that include increased funding for food and housing assistance, minimum wages, and state level earned income tax credits (EITC). The need for local remedies is apparent in cities like Washington, D.C., where poverty and prosperity appear to coincide. Within the nation's capital, unemployment peaked at 10.1 percent in 2010 – one year after the official end of the Great recession (NBER 2010) – and, by 2012, 24 percent of residents were living at or below 125 percent of the poverty line, well above national near-poverty rates of roughly 5 percent (Hokayem and Heggeness 2014). Meanwhile the 2008-2012 DC median household income was approximately $64,000, almost $10,000 above the national median (U.S. Census Bureau 2014).

In 2001, the DC government enacted a supplemental EITC, raising net-EITC benefits for its residents by adding to the federal EITC program, which has subsidized earnings for low-income workers since the mid 1970's (Scott and Crandall-Hollick 2014). Several studies over the past 20 years have identified positive labor supply and poverty reduction effects from the federal EITC (Bollinger, Gonzales, & Ziliak 2009; Eissa and Liebman 1996; Meyer and Rosenbaum 2001; Grogger 2003; Gundersen and Ziliak 2004; Hotz et al. 2006), but most do not fully account for state and local EITC's alongside the federal program – the way they are

experienced by program participants (Cancian and Levinson 2006; Tach and Halpern-Meekin 2013). The DC EITC equals 40 percent of the federal EITC, providing a large, locally administered supplement to a federal wage subsidy. For policymakers nationwide, this local EITC is a potential demonstration of the impacts from a significantly larger net-EITC benefit.

Our study examines the effect of the larger EITC – the federal EITC combined with the DC supplemental EITC – on poverty, employment, and income dynamics between 2006 and 2011 in DC. To do so, we use administrative *local-level* municipal tax data on earnings, income, and taxes to examine the response to relatively large net-EITC payments resulting from the DC supplement to the federal EITC. We identify the effect of the EITC by exploiting a policy change in the American Recovery and Reinvestment Act (ARRA), wherein a new EITC category for workers with three or more children was established at 45 percent in 2009, a 5 percentage point increase from the 2001-2008 subsidy, when families with 2 *or more* dependent children shared the top phase-in subsidy rate of 40 percent. We find evidence that the combined EITC increases extensive margin employment, raises income above government-established poverty thresholds, and reduces negative income instability when yearly income falls among DC residents. The poverty effects vary across married households and single-parent households, whereas the income instability reducing benefits of the EITC are consistent for both married and single household filers.

Overview of the Federal and DC EITC

Federal EITC subsidy rates represent the proportion of wage and salary earnings replaced, or subsidized, through the tax system. Originally designed to reduce the tax burden facing low-income workers and their families in 1975, the program now operates as the largest cash transfer

program for the poor (Tax Policy Center). Eligibility for the program is determined by federal adjusted gross income, marital status, and the number of child dependents (Marr et al. 2014). Recipients are refunded a share of their annual earnings as a credit, up to some limit, which again varies by marital status, income, and the number of child dependents. The subsidy or "phase-in" rate replaces anywhere from 7 cents on each dollar earned for qualifying workers without children to 45 cents on each dollar earned for qualifying workers with 3 or more children as of 2009, up to some threshold or limit. Of 26 states with similar supplemental EITC's, the DC EITC is among the most generous in the nation (Kerstetter 2008), yet to date it has not undergone a rigorous, multi-year evaluation. The DC refundable EITC has undergone 3 rate increases along with eligibility expansions since enactment in 2000 (see Appendix Table 1), and is calculated as a share of the federal EITC. Since 2009 the credit is 40 percent of the federal credit, and participation in both the DC and federal EITC has been on the rise since the early 2000's. In Figure 1, participation in the DC EITC rises 14 percent between 2001 and 2006 period, and this growth continues steadily throughout the middle to late 2000's, rising 13 percent from 2007 through 2011. Interestingly, residents' participation in the DC EITC program lags that of the federal EITC, though participation levels steadily converge towards those observed within the federal program over time.

Several studies confirm increased extensive margin employment, higher net income, and lowered poverty as a result of the federal EITC, particularly among families headed by single mothers (Bollinger, Gonzales, & Ziliak 2009; Chetty, Friedman, Saez 2012; Dahl & Lochner 2012; Eissa & Hoynes 2006; Meyer & Rosenbaum 2001; Meyer 2002). Many of these studies focus on policy changes and expansions to the federal EITC during the 1980's and 1990's, including the Tax Reform Act of 1986 as well as the Omnibus Budget Reconciliation Acts of

both 1990 and 1993. More recently, from 2001 to 2011 inflation-adjusted earnings have declined among less educated workers in the United States (Grusky et al. 2013). At the national level, longer-term participation in the EITC and SNAP has risen over the past 20 to 30 years, and it is possible that state-level EITC's have helped to make the overall program appear more attractive, thereby lowering the costs of participation and compliance for tax filers. This is also positively correlated with stagnant wages over the same time period, suggesting that such programs may be providing more permanent income support than in the past (Hardy et al. 2014).

DDD Model of EITC Effects

The federal EITC phase-in rate for families with three or more children was established at 45 percent in 2009, a 5 percentage point increase from the implied 2001-2008 subsidy for this group, when families with 2 *or more* dependent children shared the top phase-in subsidy rate of 40 percent (Tax Policy Center). This jump in the EITC rate for families with 3 or more children introduces variation in the size of the EITC benefit over time by family size, both across the nation and for DC residents, as shown in Figure 2. This variation in the level of benefits over time allows for estimation of a plausibly causal effect of the EITC on the margin (Hotz and Scholz 2003; Ziliak 2013). Because eligibility for the EITC is determined by (1) income level and (2) the number of child dependents, and the natural experiment design arises from the (3) 2009 ARRA policy change, these three indicators identify the effect of the combined DC and federal EITC. This "Differences-in-Differences-in-Differences" (DDD) estimator (Gruber 1994) is popular in scenarios like the one presented by the ARRA, where government policy is altered in a way that is unanticipated by program participants (Meyer 1995; Yelowitz 1995). We use

least squares to estimate the effects of the combined DC and federal EITC on the probability of employment, poverty, wage growth, and income instability reduction. More formally,

(1) $$Y_{it} = \alpha + \beta_1 X_{it} + \beta_2 ARRA_t + \beta_3 Treated_i + \beta_4 I + \beta_5 (ARRA_t * Treated_i) + \beta_6 (ARRA_t * I) + \beta_7 (Treated_i * I) + \beta_8 (Treated_i * I * ARRA_t) + e_{it},$$

where Y_{it} is an 0/1 dichotomous dependent variable reflecting employment status, income above poverty, or income dynamics – growth and instability. $ARRA_t$ represents the time period spanning 2009 to 2011. $Treated_i$ indicates tax filers with 3 or more dependents, the experimental group subject to the policy change beginning in 2009. Finally, *I* represents the income threshold beyond which tax filers no longer qualify for the EITC. β_3 captures the fixed, time invariant characteristics of the treatment group – tax filers with 3 or more dependents. β_4 captures the fixed effect for tax filers falling within the EITC size-adjusted threshold, and β_4 through β_7 are interactions of these variables. β_8 is the main parameter of interest, capturing the effect of the combined DC and federal EITC. X_{it} represents the vector of DC and tract-level economic and demographic characteristics, and is meant stratify the tax panel, which otherwise contains very little data on demographic variation. Specifically, the vector contains controls for DC unemployment, gross state product for DC, percent food insecure in DC, and tract-level indicators for the percent poor, married, black, Hispanic, less than 35 years old, holding a high school degree or less, and female within the tax filer's census tract. e_{it} is a random error term.

Data

The data comes from the individual income tax (IIT) records for District of Columbia tax filers for tax years 2006-2011.[1] The tax data includes all information regarding income, taxes, exemptions, and other tax related variables for individuals who filed in a given year. We use social security numbers (SSN) to link individual tax filers across years, and in the course of constructing the IIT panel data we discovered that a small share of filers submit multiple tax returns within a year, creating duplicates in the data. In order to facilitate construction of a panel dataset where variables for social security number and year uniquely identify observations, we drop all tax returns for each filer after the first observed return, dropping 3,485 duplicate observations, roughly 0.31 percent of the total number of records in the final analysis sample.

Eligibility for the EITC is determined by comparing federal adjusted gross income to internal revenue service (IRS) income thresholds based upon marital status and the number of dependent children. Government poverty thresholds are determined in a similar manner, based upon overall family size and number of dependent children. To link this external data to our tax file, we use an internal variable for number of dependents along with information on whether the filer is married or single to construct a measure of family size. We then use this family size variable to link the tax data with annual weighted average poverty thresholds from the U.S. Department of Health and Human Services (HHS), and we use number of dependents and filing status to merge IRS data containing EITC thresholds.[2] The use of weighted average poverty thresholds is an acknowledgement that the number of dependents variable does not provide

[1] Panel IIT data have been constructed for 2001-2011. The analyses presented here is restricted to 2006-2011, due to limitations in the availability of American Community Survey tract-level data prior to 2006.

[2] A variable for number of EITC dependents merits future consideration as well. However, as reported in Table 1, the standard deviation on this variable is relatively high. We therefore use number of dependents.

information on the age distribution of dependents within the family unit, and the un-weighted poverty thresholds vary by the balance of children to adults within a household.

The data include geocodes for tax filers merged on by the DC Office of the Chief Technology Officer (OCTO), providing location information for the tax record including address, census block, census tract, neighborhood and ward. Using this finer level of detail, we supplement the tax data with census tract-level data from the American Community Survey (ACS). The ACS produces period estimates of socio-economic and housing characteristics, with the intention to describe the average characteristics of census tracts over a specific time period. The ACS collects survey information continuously nearly every day of the year and then aggregates the results over a specific period of time such as 1,3, or 5 years. Beginning in 2010, Census Bureau released ACS 5-year estimates (2005-2009) for all geographic areas down to census tract and block levels. Multiyear estimates released in consecutive years consist mostly of overlapping years and shared data (U.S. Census Bureau 2009). Based on ACS data, we created percent variables for age, gender, educational attainment, marital status, race and ethnicity, and poverty status for each census tract. The tract-level variables are included to allow for some stratification of the IIT panel data. We assign the 2005-2009 ACS data to IIT years 2006 and 2007, 2006-2010 ACS data to IIT year 2008, 2007-2011 ACS data to IIT year 2009, and the 2008-2012 ACS data to IIT years 2010 and 2011. City-level variables for unemployment, food insecurity, and gross state product supplement our tax file and are drawn from the University of Kentucky Center for Poverty Research (UKCPR) National Welfare Database for 2014. All dollar denominated values in the analysis are adjusted using the personal consumption expenditures deflator (PCE) for 2010.

We estimate separate regression models for married "joint" filers as well as household head filers, referred to in the tables and subsequent text as "single parents," with the restriction that tax filers must appear in at least 4 of 6 years, while dropping any observations with negative or missing values for wages or adjusted gross income. This leaves us with a sample of 261,167 unique tax filers, inclusive of all tax filing types. Upon subsetting the data to married-filing jointly and household head tax filers, the extensive margin employment models (Table 3) contain 7,895 married-filing jointly tax filers and 8,167 household head, or "single" tax filers. This noticeably smaller sample size is due to our proxy for modeling entry into, or extensive margin, employment, that tax filers report zero earnings. Our samples for poverty (Table 4) and income dynamics (Table 5) both consist of 33,478 married filers and 72,877 single filers.

Table 1 reports summary statistics for the full data sample. The full sample of DC tax filing residents is relatively affluent, with mean wages of $75,000 and FAGI equal to $93,000. The standard deviations for wages, salaries and earnings (reported as wages in Tables 1 and 2) and Federal Adjusted Gross income (FAGI), $1,003,854 and $935,049 respectively, provide a clear view of the inequality of earnings and incomes in the sample. We also find that the average DC EITC recipient (federal EITC greater than zero) has mean wages and FAGI below $20,000 and a combined mean EITC receipt of over $3,000. The average recipient resides in a census tract that has higher poverty, lower marriage rates, a higher proportion of black residents, and lower educational attainment. Appendix Figure 1 looks at the within-city participation by Ward, and as expected, EITC recipients cluster in and around the eastern Wards of the city, historically the poorest.

As shown in Table 2, before and after the 2009 ARRA there is very little change between 2006-2008 and 2009-2011 wages or FAGI, though it is noteworthy that adjusted gross income

actually falls in the 2009-2011 period for the full sample, perhaps reflecting the post-ARRA unemployment rate of almost 10 percent. The largest differences before and after the ARRA policy change are evident in the average EITC for families with 2 or fewer children versus those with 3 or more children. As Figure 3 illustrates, the mean EITC benefit for participant families with two or fewer kids is stable over the 2006-2011 period, rising a mere $36 between 2006-2008 and 2009-2011. On the other hand, the typical EITC benefit for families with three or more children was always larger, and this difference widens after 2008. The 2009-2011 average for these larger families rises to $1,500 from $800 during the 2006-2008 period. The 5 percentage point EITC increase for these families may not fully explain this increase, which instead could reflect increased hardship and participation for this group of families in DC.

Results

In Tables 3-5, we examine the effect of the combined federal and DC EITC on employment, poverty, wage growth, and the response of the EITC to negative income changes. To begin, in Table 3 we define employment as the extensive margin transition *into* work. Without an actual employment variable in the data, we approximate unemployment or joblessness with wages equal to zero in the current year *t*, with the transition to employment as positive wages in the years following the year *t* EITC. We then test whether EITC receipt in year *t* is more likely to induce employment, positive earnings (wages, salaries, and tips), in years *t+1* (columns 1 and 2) *and t+2* (columns 3 and 4). As a result, we restrict the sample to persons who report zero earnings in year *t*, our proxy for joblessness. Row 7, *Treated*Income*ARRA*, shows that the treatment group is anywhere from 10 to 14 percent more likely to *enter* work – as proxied by

positive earnings – than our control group. The size of the employment effect is sensitive to an alternative definition shown in Appendix Table 2 where we restrict the sample to tax filers who do not move and are observed for 6 out of 6 years in the sample. Here, we find a larger employment effect of 34 percent among single parents and no effect among married parents. A second alternative specification tests the sensitivity of the main results to allowing missing observations for earnings alongside zeroes in year *t*, under the assumption that jobless workers may forgo filing a tax return. After including and essentially equating missing and zero observations, we find no meaningful differences between this set of models (Appendix Table 1) and our preferred set of models in Table 3.

In Table 4 we estimate the effect of a larger EITC on the likelihood of FAGI *with* EITC above the weighted average poverty threshold over time. The dependent variable compares nominal adjusted gross income plus the yearly amount of federal and DC EITC received to the weighted average family-size adjusted poverty threshold in years t, *t+1* and *t+2*. The first set of models (columns 1 and 2) estimate shorter-term poverty effects by examining the likelihood of FAGI with EITC above poverty in years *t* and *t+1*. The last two columns estimate the likelihood of FAGI plus the full EITC above the poverty threshold for years *t*, *t+1*, and *t+2*. The effect of the EITC is mixed, such that treatment group single parents with 3 or more children are 1.5 percent less likely to have adjusted gross income with EITC above the poverty threshold in the short term (2009 and 2010), whereas the EITC combined with adjusted gross income *is* 3 percent more likely to lift single parents with 3 or more children above poverty on a more permanent 3 year basis (2009-2011). It is worth noting that the model predicting a lower probability of FAGI with the EITC above poverty, in column 2, explains only 8 percent of the overall variation, compared with anywhere from 35 to 52 percent of the overall variation explained in columns 1,

3, and 4. Perhaps there are a wider range of poverty determinants that are harder to explain in the shorter-term model. Historically, most individuals and families are poor for relatively short time periods (Bane and Ellwood 1986; Hokayem and Heggeness 2014), and the literature addresses different culprits for longer versus shorter-term poverty spells (Darity et al. 2012; Duncan and Rodgers 1986).

Table 5 presents two sets of results on income dynamics. The first models (columns 1 and 2) estimate the likelihood of annual earnings growth over a one year period. This is not only a direct exploration into earnings growth, but an inquiry into the possibility of an hours worked effect from a larger EITC – given that hourly earnings among lower skilled and less educated workers appear stagnant over the 1990's and 2000's (Autor 2014; Autor, Katz, and Kearney 2008). The dependent variable for these models indicates whether or not year *t+1* earnings are greater than earnings in year *t*. Here, we find no evidence of any earnings growth effect from a larger EITC.

The second set of models in table 5 (columns 3-4) estimates whether the EITC in year *t* lowers the size of negative percent changes in year *t* adjusted gross income. Workers whose earnings fall between years should have their after-tax income supplemented in a progressive tax system, and if they fall into range, via the EITC (Hardy 2013; Hardy and Ziliak 2014; Kniesner and Ziliak 2002). The dependent variable is conditioned for tax filers experiencing a one year decline in FAGI, and columns 5-6 test the robustness of this result to using a lagged value of the EITC, to test whether last year's *t-1* EITC credit, received in April of year *t*, reduces the absolute value of a negative FAGI percent change between years. We find that the both the current and previous year's *larger* EITC raise the probability that the credit reduces a negative percent

change in FAGI, from 4 to 6 percent more likely for married and single parents across the current and previous year EITC.

The city and tract-level demographic controls are not of primary importance to the study, but a few general patterns emerge. First, the city's unemployment rate was negatively associated with extensive margin employment for single parents, though the opposite is true for married parents. Married parents residing in tracts with a higher proportion of blacks or females were less likely to be employed. Higher city-wide unemployment, tract-level poverty, and a larger proportion of neighbors over 35 reduced the likelihood of longer-term spells above poverty, although, holding all else equal, higher food insecurity was then related to a higher likelihood of FAGI with EITC above poverty on a longer-term basis. Higher city unemployment, a higher share of blacks and married family residents, less educated residents, and female residents reduced the probability of wage growth. Income stabilization from the EITC was more likely to occur in higher poverty tracts and those with lower marriage rates. In several instances, controls such as city-wide food insecurity do not exhibit the expected sign throughout the models in Tables 3-5.

Conclusion

The EITC has wide appeal as a labor market policy because it increases theoretical work incentives on the phase-in range and does not raise employer costs, in contrast to some proposals that raise the minimum wage. In the absence of improved private labor market wage growth, programs like the supplemental EITC in DC may be considered and pursued by other regions as a work support for adults living within or near the poverty threshold (BLS 2013; Blank 2008; Hardy, Smeeding, and Ziliak 2014). Extensions to this analysis of the larger combined EITC

include models that allow for a wider range of married income tax filer types, such as married filing combined separate (separate filing on the same tax form), and married filing separate.

To summarize, our findings suggest that the larger combined federal and DC EITC increased employment for both married and single parents in DC. Our extensive margin definition of employment draws upon a unique subsample of DC residents – those who experience or report a full year without earnings. The credit reduces the likelihood of shorter term income above poverty while raising the likelihood of longer-term income above poverty. To reconcile these results, it is worth considering that the determinants and underlying causes of short versus longer term poverty may differ (Darity et al. 2012; Duncan and Rodgers 1986). We do know that most poor households experience poverty in short-term spells (Bane and Ellwood 1986; Hokayem and Heggeness 2014). In this view, the long-term results are promising and, perhaps, consistent with the literature. Finally, there is no evidence that the EITC elicits any increase in earnings – or hours worked via yearly earnings increases, but the larger EITC is more likely to reduce the magnitude of annual FAGI declines. This may have important consequences for individual household consumption choices (Keys 2008), as well as larger educational consequences for children (Dahl and Lochner 2012; Hardy 2014; Huff-Stevens and Schaller 2011).

Our findings are consistent with work by Bitler, Kuka, and Hoynes (2014) showing that the EITC stabilizes incomes – though we find that this effect holds across *both* married and single parent families. While the EITC exhibits evidence of providing an income floor, this coincides with evidence of EITC and SNAP as longer-term supplements (Hardy, Smeeding, and Ziliak 2014) for many low-wage workers. This may reconcile the stabilization and longer-term poverty findings, and suggests that the combined EITC program plays an important, longer-term

role for workers. The overall positive link between the combined EITC – a 40 percent enhancement over the federal program alone – may provide encouragement for proponents of expanded wage subsidies (Berlin 2007), though it remains to be seen if the relatively strong preliminary results in DC would generalize to other localities, or the nation as a whole.

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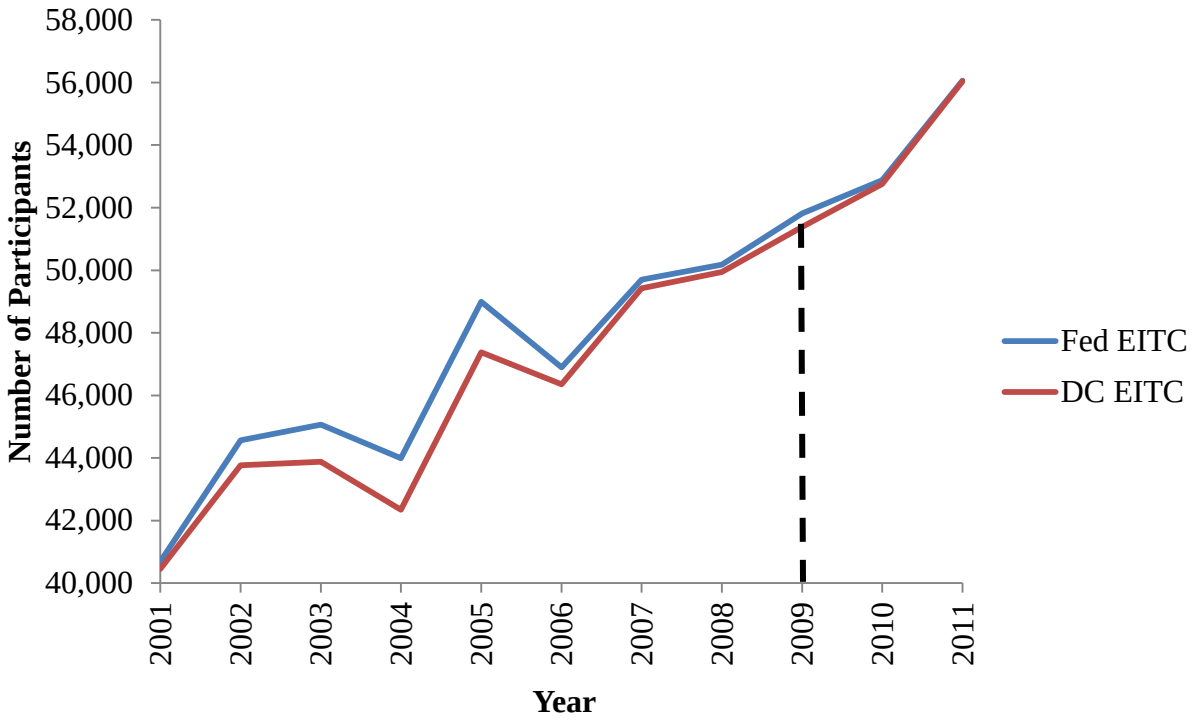
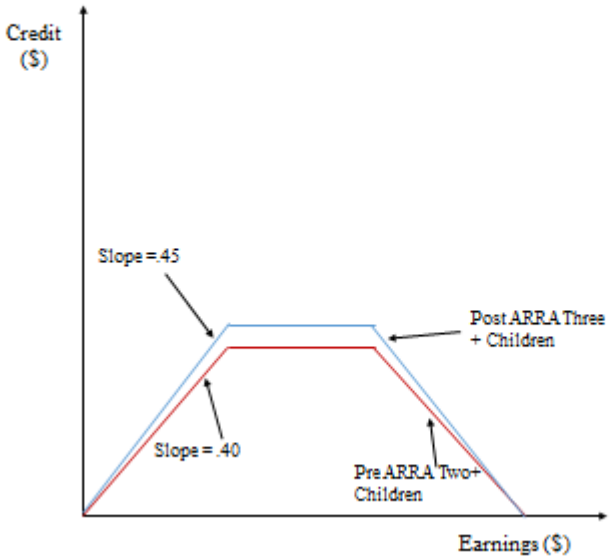
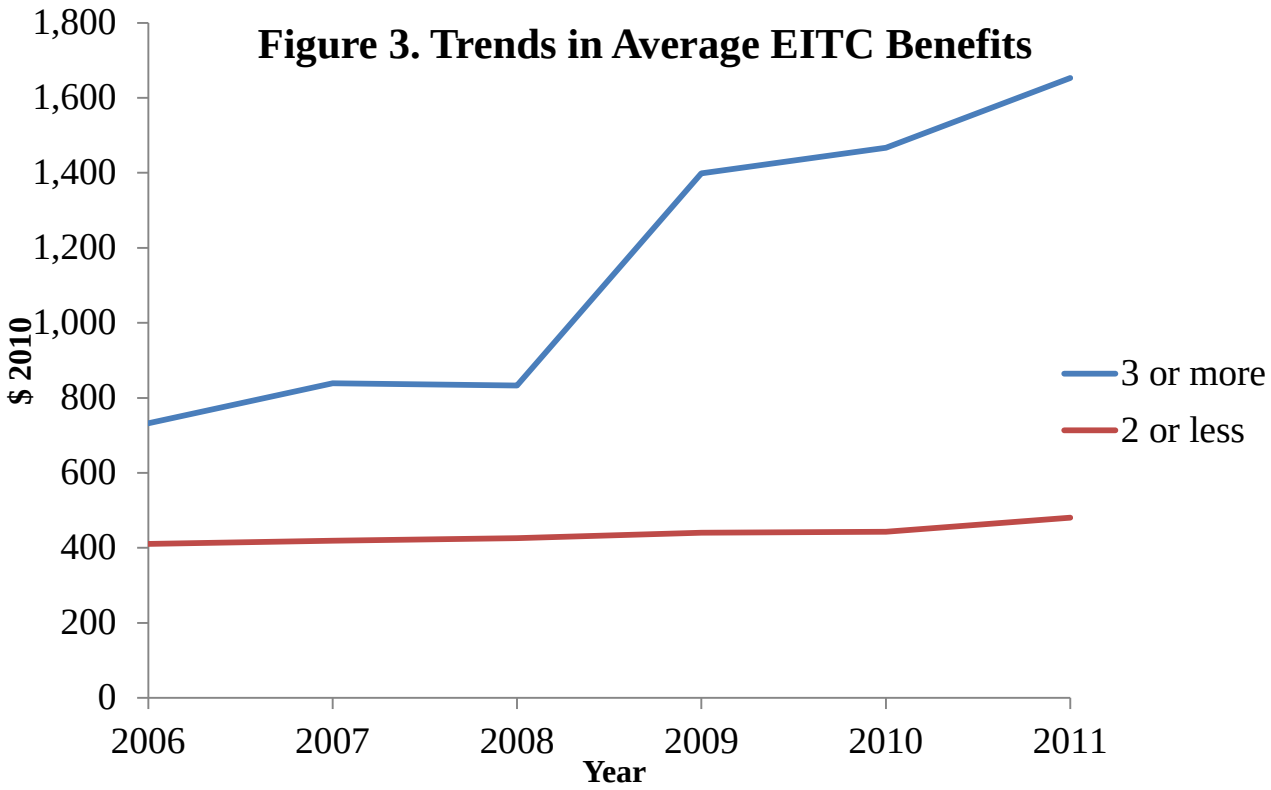
Figure 1. Number of EITC Participants



Source: Authors' tabulation of internal DC Tax Data

Figure 2. Theoretical Phase-in Phase-Out Pre and Post ARRA





Source: Authors' tabulation of internal DC Tax Data

Table 1. Summary Statistics, 2006 - 2011

Variables	All Filers		EITC Recipients		Married Filing Jointly		Household Head	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Wages	75,331.27	1,003,854.53	18,549.28	11,752.97	128,620.03	798,902.52	37,931.61	141,915.21
FAGI	92,959.12	935,049.88	19,017.63	10,175.98	199,494.63	2,526,639.17	39,731.18	83,996.33
DC EITC	157.52	418.42	863.08	589.73	110.87	366.55	529.16	625.70
Federal EITC	413.73	1,091.11	2,266.74	1,524.24	290.33	956.33	1,390.17	1,634.06
D.C. Level and Census Tract Characteristics								
DC Unemployment	7.97	0.00	7.97	0.00	7.97	0.00	7.97	0.00
DC Food Insecure	14.47	0.00	14.47	0.00	14.47	0.00	14.47	0.00
DC Gross State Product	101,216.83	0.00	101,216.83	0.00	101,216.83	0.00	101,216.83	0.00
Below Poverty	0.17	0.12	0.24	0.13	0.14	0.10	0.24	0.13
Married	0.51	0.19	0.40	0.15	0.58	0.21	0.41	0.16
Black	0.54	0.36	0.77	0.26	0.46	0.36	0.78	0.26
Hispanic	0.09	0.10	0.09	0.12	0.10	0.10	0.08	0.11
Under 35 Years Old	0.50	0.10	0.52	0.10	0.48	0.10	0.51	0.11
High School or Less	0.25	0.14	0.35	0.10	0.22	0.14	0.34	0.11
Female	0.53	0.05	0.54	0.05	0.53	0.05	0.54	0.05
Single Tax Filer	0.24	0.42	0.71	0.45	0.00	0.00	1.00	0.00
No. of Dependents	0.60	0.95	1.54	0.99	1.00	1.16	1.62	0.90
No. of EITC Children	0.60	80.6	2.85	175.79	0.21	0.91	1.35	70.61

Summary statistics are inflation adjusted using personal consumption expenditures deflator for 2010. Wages includes salaries and tips. Census tract socio-economic characteristics are derived from geocoded American Community Survey using tract-level data from 2005-2009, 2006-2010, 2007-2011, and 2008-2012. Summary statistics and final data file consist of positive values of wages and FAGI, and also require at least 4 observations over the 6 year period from 2006-2011. Summary statistics for EITC recipients are constructed on condition that observation reports positive values for DC EITC. District of Columbia economic indicators compiled from the University of Kentucky Center for Poverty Research National Welfare Database for 2014.

Table 2. Mean Statistics, before and after 2009 ARRA Creation of 45 Percent Family Phase-in Range

Variables	All Filers		Married EITC Filers		Household Head EITC Filers	
	2006-2008	2009-2011	2006-2008	2009-2011	2006-2008	2009-2011
Wages	74,236.05	76,351.21	21,938.54	23,745.11	19,986.42	20,950.85
FAGI	93,104.06	92,597.11	22,990.24	25,059.04	20,531.98	21,408.04
DC EITC	142.03	172.92	845.6465	1,055.49	883.33	1,046.73
Federal EITC	390.98	435.91	2332.308	2,664.74	2,433.03	2,638.17
D.C. Level and Census Tract Characteristics						
DC Unemployment	5.94	9.99	5.95	9.99	5.93	9.99
DC Food Insecure	14.22	14.76	14.22	14.74	14.20	14.76
DC Gross State Product	96,124.72	106,190.51	96,047.58	106,301.73	95,994.49	106,241.49
Below Poverty	0.17	0.17	0.20	0.20	0.26	0.26
Married	0.51	0.50	0.46	0.45	0.39	0.38
Black	0.54	0.53	0.68	0.65	0.82	0.79
Hispanic	0.09	0.10	0.12	0.13	0.08	0.08
Under 35 Years Old	0.49	0.50	0.50	0.51	0.52	0.53
High School or Less	0.26	0.24	0.33	0.31	0.37	0.35
Female	0.53	0.53	0.53	0.53	0.54	0.54

Summary statistics are inflation adjusted using personal consumption expenditures deflator for 2010. Wages includes salaries and tips. Census tract socio-economic characteristics are derived from geocoded American Community Survey using tract-level data from 2005-2009, 2006-2010, 2007-2011, and 2008-2012. Summary statistics and final data file consist of positive values of wages and FAGI, and also require at least 4 observations over the 6 year period from 2006-2011. Summary statistics for EITC recipients are constructed on condition that observation reports positive values for DC EITC. District of Columbia economic indicators compiled from the University of Kentucky Center for Poverty Research National Welfare Database for 2014.

Table 3. OLS Probability of Extensive Margin Employment

	Employment 1 Year Later		Employment 2 Years Later	
VARIABLES	Married Filers	Single Filers	Married Filers	Single Filers
ARRA Policy Variables				
ARRA	-0.0920***	0.1114***	-0.1255***	0.0937***
	(0.030)	(0.039)	(0.025)	(0.033)
Treated	0.0511**	0.1503***	0.0504***	0.1233***
	(0.020)	(0.041)	(0.018)	(0.038)
Income	0.1723***	0.0838***	0.1639***	0.0593***
	(0.009)	(0.007)	(0.008)	(0.006)
ARRA *Treated	-0.0232	-0.1353***	-0.0406**	-0.0963**
	(0.025)	(0.046)	(0.020)	(0.042)
ARRA*Income	-0.1493***	-0.0398***	-0.1501***	-0.0506***
	(0.010)	(0.009)	(0.009)	(0.007)
Treated*Income	-0.1074***	-0.1335***	-0.1105***	-0.1153***
	(0.036)	(0.046)	(0.032)	(0.041)
Treated*Income*ARRA	0.1422***	0.1364***	0.1210***	0.0991**
	(0.044)	(0.052)	(0.036)	(0.046)
DC and Tract Characteristics				
DC Unemployment Rate	0.0356***	-0.0240**	0.0437***	-0.0268***
	(0.009)	(0.011)	(0.008)	(0.010)
DC Food Insecurity	0.0071***	0.0543***	-0.0071***	0.0286***
	(0.003)	(0.003)	(0.002)	(0.003)
DC Gross State Product	-0.0000***	-0.0000***	-0.0000***	-0.0000***
	(0.000)	(0.000)	(0.000)	(0.000)
Below Poverty	0.0110	0.0782**	-0.0019	0.0462*
	(0.027)	(0.031)	(0.022)	(0.024)
Married	0.0210	-0.0427**	0.0046	-0.0160
	(0.016)	(0.021)	(0.013)	(0.016)
Black	-0.0423***	-0.0009	-0.0400***	-0.0024
	(0.011)	(0.015)	(0.009)	(0.012)
Hispanic	0.0174	0.0297	-0.0201	0.0045
	(0.030)	(0.030)	(0.024)	(0.022)
Under 35 Years Old	0.0334	0.0242	0.0058	0.0377
	(0.025)	(0.031)	(0.020)	(0.023)
High School or Less	0.0016	-0.0568	-0.0109	-0.0367
	(0.035)	(0.038)	(0.029)	(0.031)
Female	-0.0860*	-0.0574	-0.0514	-0.0475
	(0.045)	(0.055)	(0.036)	(0.043)
Constant	0.6372***	0.1455*	0.6879***	0.1332*
	(0.070)	(0.084)	(0.061)	(0.070)
Observations	7,895	8,167	7,895	8,167
R-squared	0.073	0.041	0.096	0.040

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Married Filers refers to tax filers defined as married filing jointly. Single Filers refers to tax filers defined as household heads. Tract level demographic variables are percentages and do not refer to the individual demographic characteristics of the tax filer.

Table 4. OLS Probability FAGI Above Poverty with the EITC

VARIABLES	Above Poverty 1 Year Out Married Filers	Above Poverty 1 Year Out Single Filers	Above Poverty 2 Years Out Married Filers	Above Poverty 2 Years Out Single Filers
ARRA Policy Variables				
ARRA	0.0032	0.0002	0.5441***	0.3595***
	(0.010)	(0.009)	(0.019)	(0.014)
Treated	-0.0008**	0.0009***	0.0290***	0.0449***
	(0.000)	(0.000)	(0.006)	(0.004)
Income	-0.4449***	-0.1824***	-0.5173***	-0.3312***
	(0.006)	(0.002)	(0.006)	(0.003)
ARRA *Treated	0.0008**	-0.0001	-0.0166**	-0.0334***
	(0.000)	(0.000)	(0.008)	(0.007)
ARRA*Income	0.0499***	-0.0002	0.3572***	0.2250***
	(0.008)	(0.002)	(0.007)	(0.003)
Treated*Income	0.0676***	-0.0609***	0.0282*	-0.0362***
	(0.015)	(0.005)	(0.016)	(0.007)
Treated*Income*ARRA	0.0123	-0.0142**	0.0071	0.0310***
	(0.019)	(0.006)	(0.019)	(0.009)
DC and Tract Characteristics				
DC Unemployment Rate	-0.0022	0.0006	-0.2394***	-0.2003***
	(0.003)	(0.003)	(0.005)	(0.004)
DC Food Insecurity	0.0009	-0.0002	0.2450***	0.1968***
	(0.001)	(0.001)	(0.002)	(0.001)
DC Gross State Product	0.0000**	-0.0000	-0.0000***	-0.0000***
	(0.000)	(0.000)	(0.000)	(0.000)
Below Poverty	0.0099	-0.0638***	-0.0380**	-0.0705***
	(0.013)	(0.009)	(0.019)	(0.011)
Married	0.0014	-0.0159**	0.0463***	0.0314***
	(0.006)	(0.006)	(0.010)	(0.008)
Black	0.0156***	0.0270***	-0.0415***	0.0257***
	(0.004)	(0.005)	(0.008)	(0.006)
Hispanic	0.1275***	0.0827***	-0.0347**	-0.0693***
	(0.012)	(0.009)	(0.017)	(0.011)
Under 35 Years Old	0.0190*	-0.0264***	0.0525***	0.0300***
	(0.010)	(0.009)	(0.016)	(0.011)
High School or Less	0.0053	-0.0211**	0.0111	-0.0283**
	(0.014)	(0.010)	(0.022)	(0.013)
Female	-0.0214	-0.0264*	0.0163	0.0131
	(0.017)	(0.015)	(0.027)	(0.019)
Constant	0.9345***	1.0485***	1.4216***	1.4213***
	(0.023)	(0.021)	(0.038)	(0.029)
Observations	33,478	72,877	33,478	72,877
R-squared	0.353	0.088	0.527	0.375

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Married Filers refers to tax filers defined as married filing jointly. Single Filers refers to tax filers defined as household heads. Tract level demographic variables are percentages and do not refer to the individual demographic characteristics of the tax filer.

Table 5. OLS Probability of Wage Growth and Income Stabilization

	P(Wage Growth)		P(EITC Income Stabilization)			
			Current Year EITC		1 Year EITC Lag	
VARIABLES	Married Filers	Single Filers	Married Filers	Single Filers	Married Filers	Single Filers
ARRA Policy Variables						
ARRA	0.1377***	0.0167	-0.0389***	-0.1237***	-0.1435***	-0.2292***
	(0.025)	(0.015)	(0.007)	(0.009)	(0.011)	(0.011)
Treated	0.0557***	0.0091	-0.0006***	-0.0034***	0.0027	0.0018
	(0.009)	(0.007)	(0.000)	(0.001)	(0.004)	(0.004)
Income	-0.0113*	-0.0228***	0.1123***	0.1705***	0.0817***	0.1353***
	(0.007)	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)
ARRA *Treated	0.0011	-0.0082	0.0008	-0.0016	0.0029	0.0043
	(0.012)	(0.010)	(0.001)	(0.001)	(0.005)	(0.005)
ARRA*Income	-0.0121	0.0395***	0.0853***	0.1115***	0.0803***	0.1095***
	(0.008)	(0.004)	(0.006)	(0.002)	(0.006)	(0.003)
Treated*Income	0.0016	0.0054	0.0717***	0.0158***	0.0421***	-0.0020
	(0.018)	(0.009)	(0.011)	(0.004)	(0.012)	(0.006)
Treated*Income*ARRA	0.0034	-0.0078	0.0439***	0.0629***	0.0601***	0.0406***
	(0.022)	(0.012)	(0.016)	(0.006)	(0.017)	(0.008)
DC and Tract Characteristics						
DC Unemployment Rate	-0.0452***	-0.0292***	0.0068***	0.0170***	0.0386***	0.0515***
	(0.007)	(0.004)	(0.002)	(0.003)	(0.003)	(0.003)
DC Food Insecurity	0.1510***	0.1724***	-0.0153***	-0.0458***	-0.0275***	-0.0580***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
DC Gross State Product	-0.0000***	-0.0000***	0.0000***	0.0000***	-0.0000***	0.0000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Below Poverty	0.0001	-0.0328***	0.0218**	0.0266***	0.0311**	0.0321***
	(0.024)	(0.012)	(0.010)	(0.009)	(0.014)	(0.010)
Married	-0.0279**	-0.0499***	0.0003	-0.0130*	-0.0202***	-0.0162**
	(0.013)	(0.010)	(0.005)	(0.007)	(0.007)	(0.008)
Black	-0.0229**	0.0223***	-0.0042	-0.0003	-0.0038	-0.0085
	(0.010)	(0.007)	(0.003)	(0.005)	(0.005)	(0.005)
Hispanic	0.1175***	0.0413***	0.0010	-0.0168*	0.0127	0.0054
	(0.021)	(0.013)	(0.010)	(0.009)	(0.013)	(0.011)
Under 35 Years Old	0.0977***	0.0369***	0.0157**	-0.0073	0.0189*	0.0195*
	(0.020)	(0.012)	(0.008)	(0.009)	(0.011)	(0.010)
High School or Less	-0.0580**	-0.0290*	0.0351***	0.0059	0.0467***	0.0298**
	(0.028)	(0.015)	(0.011)	(0.011)	(0.015)	(0.012)
Female	-0.3120***	-0.0277	0.0065	0.0005	-0.0215	-0.0035
	(0.034)	(0.022)	(0.013)	(0.016)	(0.019)	(0.018)
Constant	0.8376***	0.5816***	-0.0195	-0.1852***	0.3880***	0.2401***
	(0.052)	(0.033)	(0.016)	(0.020)	(0.027)	(0.024)
Observations	33,478	72,877	33,478	72,877	33,478	72,877
R-squared	0.111	0.130	0.175	0.137	0.072	0.085

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Married Filers refers to tax filers defined as married filing jointly. Single Filers refers to tax filers defined as household heads. Tract level demographic variables are percentages and do not refer to the individual demographic characteristics of the tax filer.

Appendix Table 1. DC Refundable Earned Income Credit Policy Changes, 2000-2010

Year	Match Rate/Policy Change
2000	Legislative approval of refundable DC EITC
2001	DC EITC initiated; Level at 10% of federal credit
2002	DC EITC Level at 25% of federal credit
2006	Expansion of EITC to non-custodial parents
2006	DC EITC Level at 35% of federal credit
2009	DC EITC Level at 40% of federal credit

Source: DC Tax Facts 2012

Appendix Table 2. OLS Probability of Extensive Margin Employment – with Missing

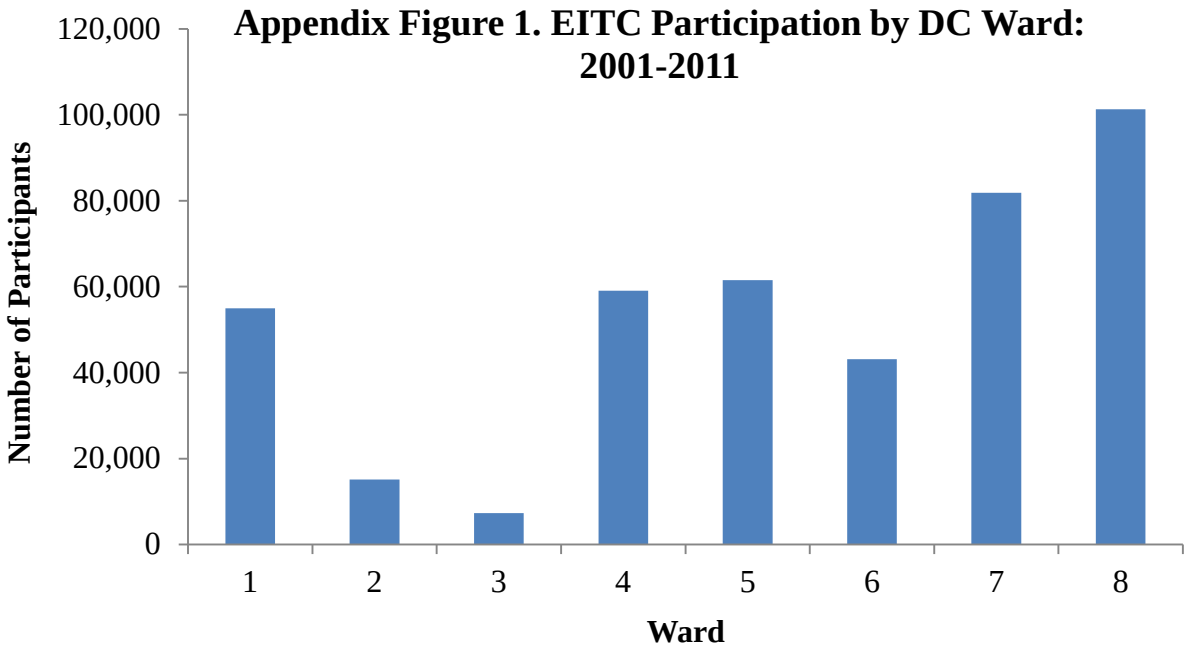
	Employment 1 Year Later		Employment 2 Years Later	
VARIABLES	Married Filers	Single Filers	Married Filers	Single Filers
ARRA Policy Variables				
ARRA	-0.0909***	0.1114***	-0.1256***	0.0937***
	(0.030)	(0.039)	(0.025)	(0.033)
Treated	0.0514***	0.1503***	0.0480***	0.1233***
	(0.020)	(0.041)	(0.018)	(0.038)
Income	0.1723***	0.0838***	0.1639***	0.0593***
	(0.009)	(0.007)	(0.008)	(0.006)
ARRA *Treated	-0.0229	-0.1353***	-0.0391*	-0.0963**
	(0.024)	(0.046)	(0.020)	(0.042)
ARRA*Income	-0.1493***	-0.0398***	-0.1501***	-0.0506***
	(0.010)	(0.009)	(0.009)	(0.007)
Treated*Income	-0.1076***	-0.1335***	-0.1081***	-0.1153***
	(0.036)	(0.046)	(0.032)	(0.041)
Treated*Income*ARRA	0.1419***	0.1364***	0.1194***	0.0991**
	(0.044)	(0.052)	(0.036)	(0.046)
DC and Tract Characteristics				
DC Unemployment Rate	0.0352***	-0.0240**	0.0437***	-0.0268***
	(0.009)	(0.011)	(0.008)	(0.010)
DC Food Insecurity	0.0071***	0.0543***	-0.0071***	0.0286***
	(0.003)	(0.003)	(0.002)	(0.003)
DC Gross State Product	-0.0000***	-0.0000***	-0.0000***	-0.0000***
	(0.000)	(0.000)	(0.000)	(0.000)
Below Poverty	0.0103	0.0782**	-0.0018	0.0462*
	(0.027)	(0.031)	(0.022)	(0.024)
Married	0.0211	-0.0427**	0.0048	-0.0160
	(0.016)	(0.021)	(0.013)	(0.016)
Black	-0.0425***	-0.0009	-0.0399***	-0.0024
	(0.011)	(0.015)	(0.009)	(0.012)
Hispanic	0.0153	0.0297	-0.0205	0.0045
	(0.030)	(0.030)	(0.024)	(0.022)
Under 35 Years Old	0.0328	0.0242	0.0060	0.0377
	(0.025)	(0.031)	(0.020)	(0.023)
High School or Less	0.0029	-0.0568	-0.0112	-0.0367
	(0.035)	(0.038)	(0.029)	(0.031)
Female	-0.0864*	-0.0574	-0.0520	-0.0475
	(0.045)	(0.055)	(0.036)	(0.043)
Constant	0.6356***	0.1455*	0.6872***	0.1332*
	(0.070)	(0.084)	(0.061)	(0.070)
Observations	7,902	8,167	7,902	8,167
R-squared	0.072	0.041	0.096	0.040

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Regressions are estimated restricting any observations with negative values of wages, salaries, and tips or FAGI. Tract level demographic variables are percentages and do not refer to the individual demographic characteristics of the tax filer. Tax filers with missing values for wages and FAGI are retained.

Appendix Table 3. OLS Probability of Extensive Margin Employment – Non Movers

	Employment 1 Year Later		Employment 2 Years Later	
VARIABLES	Married Filers	Single Filers	Married Filers	Single Filers
ARRA Policy Variables				
ARRA	0.0849	0.1931	0.1340	0.1602
	(0.126)	(0.135)	(0.114)	(0.119)
Treated	0.1286	0.2987*	0.1407	0.3041*
	(0.096)	(0.171)	(0.096)	(0.171)
Income	0.0804***	0.0813***	0.0709***	0.0348
	(0.028)	(0.024)	(0.025)	(0.022)
ARRA *Treated	-0.0289	-0.3257*	-0.1775*	-0.3182*
	(0.127)	(0.175)	(0.096)	(0.172)
ARRA*Income	-0.0868***	-0.0246	-0.0769***	-0.0339
	(0.033)	(0.032)	(0.027)	(0.026)
Treated*Income	-0.1086	-0.2871	-0.0895	-0.3132*
	(0.148)	(0.182)	(0.146)	(0.177)
Treated*Income*ARRA	0.1121	0.3214*	0.1796	0.3408*
	(0.193)	(0.189)	(0.161)	(0.180)
DC and Tract Characteristics				
DC Unemployment Rate	-0.0233	-0.0411	-0.0386	-0.0466
	(0.037)	(0.039)	(0.034)	(0.034)
DC Food Insecurity	0.0232**	0.0757***	0.0079	0.0453***
	(0.011)	(0.012)	(0.009)	(0.010)
DC Gross State Product	-0.0000	-0.0000***	-0.0000	-0.0000
	(0.000)	(0.000)	(0.000)	(0.000)
Below Poverty	0.0755	-0.0092	0.0749	0.0069
	(0.107)	(0.123)	(0.088)	(0.097)
Married	-0.0070	-0.1127	-0.0587	-0.0539
	(0.074)	(0.077)	(0.061)	(0.056)
Black	-0.0472	0.0398	-0.0749*	0.0439
	(0.051)	(0.054)	(0.039)	(0.044)
Hispanic	0.2457*	-0.0452	0.2157*	-0.0312
	(0.144)	(0.102)	(0.124)	(0.077)
Under 35 Years Old	0.0252	0.0676	-0.0478	0.0641
	(0.108)	(0.120)	(0.086)	(0.096)
High School or Less	-0.0535	-0.1083	-0.0477	-0.0931
	(0.143)	(0.126)	(0.119)	(0.102)
Female	0.0344	-0.1349	0.0941	-0.2311
	(0.169)	(0.201)	(0.157)	(0.171)
Constant	0.1844	0.1326	0.3792*	0.1156
	(0.246)	(0.267)	(0.219)	(0.223)
Observations	502	791	502	791
R-squared	0.050	0.051	0.070	0.045

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Regressions are estimated restricting any observations with negative values of wages, salaries, and tips or FAGI. Likewise, tax filers with fewer than 6 observations are dropped from the analysis sample. Tract level demographic variables are percentages and do not refer to the individual demographic characteristics of the tax filer.



Source: Authors' tabulation of internal DC Tax Data