Do In-Work Tax Credits Serve as a Safety Net?

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ONLINE APPENDIX

This appendix contains additional tables and figures to accompany the main results in the published paper. The results presented here are primarily robustness checks and sensitivity tests of the main results. Here we provide a brief description of the appendix table and figures.

The summary statistics for our main regressions, based on the SOI data, are presented in Appendix Table 1. The observations are cells, one for each combination of state, year, marital status (married, single) and number of children (zero, one, two or more).

The main results for the paper are provided in Table 2 – where we show the cyclicality of the EITC for the pooled sample, and for the following subsamples: married filers with children, single filers with children, and those without children. In Appendix Table 2 we provide more detail by estimating models separately for all six demographic groups (single or married, by zero/one/two or more children). Those results show similar responses for families with one and two or more children. They also show that the findings for the childless are primarily driven by the sample of single childless filers.

Appendix Tables 3-5 provide extensions of our main results. In Appendix Table 3, we estimate models that allow for differential effects in expansions and recessions. In all cases we fail to reject the null that the coefficients are the same for the two periods, suggesting no evidence in favor of asymmetric responses. In Appendix Table 4, we explore a possible lag structure, with the estimated model including the current unemployment rate and a one-year lag of the unemployment rate. Those results show total effects (the sum of the contemporaneous and 1-year lag coefficients) that are quite similar to our main results. In addition, our results are robust to using the natural log of employment as an alternative measure of the business cycle, as shown in Appendix Table 5.

Figure 4, in the main paper, presents results for the cyclicality of filers with earnings in the phase-in, flat, phase-out, "near" phase-out, and above near phase-out regions. Here, in Appendix Table 6, we present the full set of unemployment rate coefficients and standard errors for the models presented in Figure 4.

Appendix Tables 7 and 8 provide further sensitivity tests for our main results. The SOI data include late filers, those who file in year t a return for a tax year prior to year t. In our main results, we drop these late filers from the sample. Ideally, we would reassign late filers to the appropriate filing year but for the last few years this re-classification is imperfect as not all late filers have yet shown up. To explore the sensitivity of our findings to dropping late filers, we estimate models where we restrict the analysis to the years 1996−2004 (most late filing of taxes for tax year 2004 should have shown up by 2008); the results are in Appendix Table 7. In column 1, we repeat our main results (exclude late filers, estimates for years 1996-2004). In column 2, we re-classify late filers to the tax year for which their federal returns were filed. In column 3, we retain late filers and do not alter their tax year variable (they appear in the counts for the year when they filed the returns). The results show that our results are not very sensitive to this sample construction.

Another sensitivity test relates to our use of the CPS to construct potential filers (filing units) in the denominator of the EITC recipient and expenditure measures. We explore several different definitions for the denominators in an effort to best capture the EITC filing rules (especially as they relate to dependents) within the available CPS data. These results, presented in Appendix Table 8, show very little difference across the alternative definitions for potential filers.[1]

Appendix Tables 9 and 10 provide evidence on threats to our interpretation of our main findings. One possible concern is that the differences in cyclicality of the EITC across groups are due to heterogeneity in the cyclicality of labor

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[1] The alternative definitions differ only on the methodology used to identify children in the family. In the first definition, we identify as children individuals that are 18 or younger. In the second one, we identify as children individuals 18 or younger, or individuals 23 or younger that are full time students. In the third case, we modify the second definition of children to include disabled individuals and to exclude non-citizens. Lastly, in our fourth alternative we identify children as in the second definition, include disabled and perform a "filers maximization" algorithm. This algorithm mimics tax noncompliance behavior when tax filers strategically declare dependent children in order to minimize the tax burden of the household and allocate them to different filing units.

supply across the groups. The evidence from the substantial literature on the cyclicality of employment, hours, and earnings across demographic groups suggests otherwise. For example, Hoynes, Miller and Schaller (2012) show that men, less-educated workers, and minorities are more sensitive to cycles than are others. In Appendix Table 9, we extend those findings and show that the employment of single parents with children is actually *more* cyclical than is employment of married parents with children. (Note that this would probably be even more true were we to present the results in percent terms.) We conclude that it is not greater cyclicality among married couples that is generating our findings. Another possibility is that our results reflect changes in marital status and fertility in response to the unemployment rate (which could affect the counts of potential filers (filing units) across our demographic groups). We directly examine this in Appendix Table 10, where we test whether the log of potential filers (by demographic group) is related to the cycle. We find very small and statistically insignificant effects of unemployment on potential filers. These analyses provide support for our interpretation – the results are due to differences in labor supply responses and the distribution of skills across the demographic groups.

Appendix Figure 1 uses the CPS data and plots the distribution of earned income by marital status, number of children, and, within each graph, by completed education of the family head (more than high school, or high school or below). Each histogram is overlaid with the EITC schedule. The distributions are weighted using the CPS provided weight for the head of the family.

Figure 3, in the main paper, presents histograms for tax-return-reported earned income for six demographic groups: single individuals with no children, married couples with no children, single with one child, married with one child, single with two or more children, and married with two or more children. Each is overlaid with the EITC schedule. In Appendix Figure 2, we add vertical lines to indicate the levels for 50%, 100% and 150% of poverty (these vary by number of children and adults in the family). As with Figure 3, we limit the sample to those returns with earned income between $1 and $60,000. We do not condition on receipt of the EITC, but tabulate the total number of returns within each $1000 bin of earned income to see how these counts stack up across various points in the EITC schedule. On each graph, we also indicate the share of total filers for that demographic group that are excluded from the histogram (those filers with earned income that is <=0 or >$60,000).

Appendix

Table A.1: Summary Statistics of Cell Level Data

	(1)	(2) Children, Married	(3) Children, Single	(4) No Children
	All			
EITC Recipients per Potential Filer	0.220	0.146	0.868	0.079
	(0.297)	(0.060)	(0.251)	(0.052)
Real EITC Expenditures per Potential Filer (2008$)	460.9	348.6	2234.0	19.9
	(862.8)	(181.5)	(988.2)	(13.6)
Tax Filers per Potential Filer	0.883	0.826	1.152	0.840
	(0.270)	(0.125)	(0.260)	(0.290)
State Unemployment Rate	5.049			
	(1.078)			
Observations	3,978	1,326	1,326	1,326

Notes: Data are from the 1996–2008 Statistics of Income. The sample excludes high-income earners, late filers, individuals living abroad and married couples filing separately. The total population of potential filers in each cell is calculated from the corresponding survey years of the CPS ASEC. The summary statistics are weighted to represent the population of filers.

Table A.2: Effects of Unemployment Rate on EITC Recipiency Rate and Expenditures per Potential Filer, by Marital Status and Number of Children

	Single			Married		
	(1) Zero	(2) One	(3) Two or More	(4) Zero	(5) One	(6) Two or More
A: EITC Recipients						
Unemployment Rate	0.477**	-1.122	-0.663	-0.098	0.681*	1.006***
	(0.201)	(1.739)	(1.549)	(0.122)	(0.373)	(0.351)
Mean Y	0.114	0.823	0.924	0.023	0.134	0.152
Percent Impact (%)	4.2	-1.4	-0.7	-4.3	5.1	6.6
Observations	663	663	663	663	663	663
B: EITC Dollars ($2008)						
Unemployment Rate	95.9	-3409.0	-1388.2	-30.1	1004.6	2526.1**
	(65.3)	(3983.7)	(5371.1)	(38.8)	(718.6)	(1025.9)
Mean Y	29.0	1665.1	2956.1	5.9	239.6	413.1
Percent Impact (%)	3.3	-2.0	-0.5	-5.1	4.2	6.1
Observations	663	663	663	663	663	663

Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filing units from the CPS ASEC corresponding to the tax year (tax year X matched with survey done in year X). The sample excludes high-income earners, individuals living abroad, late filers and married couples filing separately. The dependent variables are total number of tax returns with EITC claims and real EITC expenditures ($2008), each divided by the total number of potential filing units in each cell. All regressions include controls for state and year fixed effects. The results are weighted by the population of potential filers in each cell. The unemployment rate is measured in percentage points. Percent impact is calculated as the effect of a 1 percentage point (1 unit) increase in the unemployment rate divided by the mean value of the dependent variable. Standard errors are clustered by state and shown in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table A.3: Asymmetric Effects of Unemployment Rate on EITC Recipiency Rate, Expenditures per Potential Filer, and Propensity to File Taxes

	(1) Children, Married	(2) Children, Single	(3) No Children
A: EITC Recipients			
UR * Expansion	0.910***	-0.880	0.276**
	(0.269)	(1.434)	(0.136)
UR * Recession	0.888***	-0.899	0.251*
	(0.274)	(1.328)	(0.130)
p-value, Rec. Coef. = Exp. Coef.	0.672	0.942	0.411
Observations	1326	1326	1326
B: EITC Dollars (2008$)			
UR * Expansion	1976.2***	-2294.3	54.0
	(683.8)	(4181.0)	(45.9)
UR * Recession	1993.0***	-2458.4	47.0
	(680.1)	(3903.8)	(45.5)
p-value, Rec. Coef. = Exp. Coef.	0.922	0.835	0.432
Observations	1326	1326	1326
C: Tax Filers			
UR * Expansion	0.268	-2.242**	-1.893***
	(0.606)	(1.095)	(0.481)
UR * Recession	0.186	-1.860*	-1.770***
	(0.587)	(1.088)	(0.439)
p-value, Rec. Coef. = Exp. Coef.	0.644	0.117	0.450
Observations	1326	1326	1326

Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filing units from the CPS ASEC corresponding to the tax year (tax year X matched with survey done in year X). The sample excludes high-income earners, individuals living abroad, late filers and married couples filing separately. The dependent variables are total number of tax returns with EITC claims, real EITC expenditures ($2008) and total filers, each divided by the total number of potential filing units in each cell. Expansion (recession) years are defined as years in which a state experienced a decrease (increase) in the state unemployment rate. All regressions include controls for demographic characteristics, as well as state and year fixed effects. The results are weighted by the population of potential filers in each cell. The unemployment rate is measured in percentage points. Percent impact is calculated as the effect of a 1 percentage point (1 unit) increase in the unemployment rate divided by the mean value of the dependent variable. Standard errors are clustered by state and shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table A.4: Effects of Unemployment Rate on EITC Recipiency Rates—
Sensitivity to Adding a Lag for the Unemployment Rate

	Children, Married		Children, Single		No Children	
	(1)	(2)	(3)	(4)	(5)	(6)
A: Y = EITC/Pop (Baseline)						
Unemployment Rate	0.889***	0.496*	-0.899	-1.851	0.252*	0.007
	(0.273)	(0.294)	(1.329)	(1.314)	(0.132)	(0.161)
1-Yr. Lag Unempl. Rate		0.514*		1.266		0.322**
		(0.257)		(1.320)		(0.158)
Mean Y	0.146	0.146	0.868	0.868	0.079	0.079
Observations	1326	1326	1326	1326	1326	1326

Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filing units from the CPS ASEC corresponding to the tax year (tax year X matched with survey done in year X). The sample excludes high-income earners, late filers, individuals living abroad and married couples filing separately. The dependent variable is total number of tax returns with EITC claims divided by the total number of potential filing units in each cell. All regressions include controls for demographic characteristics, as well as state and year fixed effects. The results are weighted by the population of potential filers in each cell. The unemployment rate is measured in percentage points. Percent impact is calculated as the effect of a 1 percentage point (1 unit) increase in the unemployment rate divided by the mean value of the dependent variable. Standard errors are clustered by state and shown in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table A.5: Effects of Employment on EITC Recipiency Rate and Expenditures
per Potential Filer

	(1)	(2)	(3)	(4)
		Children,	Children,	
	All	Married	Single	No Children
A: EITC Recipiency Rate				
Log(Employment)	-0.127**	-0.165**	-0.040	-0.070***
	(0.049)	(0.062)	(0.280)	(0.025)
Mean Y	0.220	0.146	0.868	0.079
Observations	663	1326	1326	1326
B: EITC Dollars/Potential Filer ($2008)				
Log(Employment)	-241.8	-313.6	-469.7	-16.3*
	(155.6)	(188.9)	(825.2)	(9.1)
Mean Y	460.9	348.6	2234.0	19.9
Observations	663	1326	1326	1326

Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filing units from the CPS ASEC corresponding to the tax year (tax year X matched with survey done in year X). The business cycle is measured by the natural log of non-farm employment from the BLS. The sample excludes high-income earners, late filers, individuals living abroad and married couples filing separately. The dependent variables are total number of tax returns with EITC claims and real EITC expenditures ($2008), each divided by the total number of potential filing units in each cell. All regressions include controls for demographic characteristics, as well as state and year fixed effects. The results are weighted by the population of potential filers in each cell. Standard errors are clustered by state and shown in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table A.6: Effect of Cycles on Filing Propensity and EITC Eligible Filers per Potential Filer, By Earned Income Ranges

	(1) Total	(2) Eligible	(3) Phasein	(4) Flat	(5) Phaseout	(6) Near Phaseout	(7) Above	(8) Non-positive
A: Married with Kids								
Unemployment Rate	0.189	1.044***	0.283***	0.070	0.608**	0.212	-1.092**	0.027
	(0.586)	(0.327)	(0.105)	(0.069)	(0.272)	(0.258)	(0.517)	(0.045)
Share of Filers	1.00	0.24	0.03	0.04	0.17	0.24	0.52	0.01
Mean Y	0.826	0.194	0.026	0.030	0.144	0.199	0.428	0.012
Percent Impact (%)	0.2	5.4	10.9	2.4	4.2	1.1	-2.6	2.2
Observations	1326	1326	1326	1326	1326	1326	1326	1326
B: Single with Kids								
Unemployment Rate	-1.862*	-0.604	0.149	-0.181	-0.573	-0.736**	-0.598***	0.076
	(1.065)	(1.054)	(0.481)	(0.368)	(0.620)	(0.348)	(0.199)	(0.119)
Share of Filers	1.00	0.74	0.18	0.15	0.41	0.17	0.07	0.02
Mean Y	1.152	0.851	0.198	0.178	0.476	0.195	0.086	0.020
Percent Impact (%)	-1.6	-0.7	0.8	-1.0	-1.2	-3.8	-6.9	3.8
Observations	1323	1323	1323	1323	1323	1323	1323	1323

Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filing units from the CPS ASEC corresponding to the tax year (tax year X matched with survey done in year X). The sample excludes high-income earners, individuals living abroad, late filers and married couples filing separately. Regressions present the effect of the unemployment rate on the total number of filers per potential filers (column 1) or the number of filers in various ranges of the EITC schedule according to earnings denominated by the number of potential filing units (columns 2–8). All regressions include controls for demographic characteristics, as well as state and year fixed effects. The results are weighted by the population in each cell. The unemployment rate is measured in percentage points. Percent impact is calculated as the effect of a 1 percentage point (1 unit) increase in the unemployment rate divided by the mean value of the dependent variable. Standard errors are clustered by state and shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table A.7: Effects of the Unemployment Rate on EITC Recipiency Rates, Sensitivity to Treatment of Late Filers

	Tax Year, with Late Filers		Filing Year
	Excluded [Baseline] (1)	Included (2)	Late Filers Included (3)
A: Married with Children			
Unemployment Rate	0.473*	0.433	0.516*
	(0.278)	0.299)	(0.295)
Mean Y	0.144	0.148	0.148
Percent Impact (%)	3.3	2.9	3.5
Observations	918	918	918
B: Single with Children			
Unemployment Rate	-1.242	-1.208	-1.142
	(1.596)	(1.617)	(1.682)
Mean Y	0.850	0.869	0.869
Percent Impact (%)	-1.5	-1.4	-1.3
Observations	918	918	918
C: Childless			
Unemployment Rate	0.417*	0.505**	0.415*
	(0.214)	(0.227)	(0.226)
Mean Y	0.073	0.078	0.077
Percent Impact (%)	5.7	6.5	5.4
Observations	918	918	918

Notes: Data are from the 1996–2004 Statistics of Income, with denominators measuring the number of potential filing units from the CPS ASEC corresponding to the tax year (tax year X matched with survey done in year X). The sample excludes high-income earners, individuals living abroad and married couples filing separately. The dependent variable is total number of tax returns with EITC claims divided by the total number of potential filing units in each cell. All regressions include controls for demographic characteristics, as well as state and year fixed effects. The results are weighted by the population of potential filers in each cell. The unemployment rate is measured in percentage points. Percent impact is calculated as the effect of a 1 percentage point (1 unit) increase in the unemployment rate divided by the mean value of the dependent variable. Standard errors are clustered by state and shown in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table A.8: Sensitivity of Effects of Unemployment Rate on Recipiency Rates and Expenditures per Potential Filer to Definition of Population (Denominator)

	(1) Children, Married	(2) Children, Single	(3) No Children
A: EITC Recipients			
a) Kids: ≤ 18	0.935***	-0.828	0.236*
	(0.295)	(1.437)	(0.126)
b) Kids: ≤ 18, or ≤ 23 and FT students	0.902***	-0.579	0.244*
	(0.279)	(1.399)	(0.130)
c) Kids: b) and disabled, citizens only	0.945***	-0.889	0.243*
	(0.267)	(1.371)	(0.129)
d) Kids: b) and disabled, and filer maximization	0.866***	-0.655	0.259*
	(0.258)	(1.142)	(0.141)
B: EITC Dollars (2008$)			
a) Kids: ≤ 18	2091.7***	-2511.3	44.1
	(732.9)	(4266.4)	(44.3)
b) Kids: ≤ 18, or ≤ 23 and FT students	2014.2***	-1847.1	45.4
	(693.4)	(4133.3)	(45.7)
c) Kids: b) and disabled, citizens only	2107.7***	-2326.4	45.2
	(673.0)	(4033.6)	(45.1)
d) Kids: b) and disabled, and filer maximization	1929.0***	-1887.5	47.9
	(646.8)	(3434.8)	(49.4)
Observations	1326	1326	1326

Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filing units from the CPS ASEC corresponding to the tax year (tax year X matched with survey done in year X) using various definitions of this population. The sample excludes high-income earners, individuals living abroad, late filers and married couples filing separately. The dependent variables are total number of tax returns with EITC claims and real EITC expenditures ($2008), each divided by the total population of potential filers in each cell. All regressions include controls for state and year fixed effects. The results are weighted by the population of potential filers in each cell. The unemployment rate is measured in percentage points. Standard errors are clustered by state and shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table A.9: Effects of Unemployment Rate on Employment— Heterogeneity Across Demographic Groups—CPS

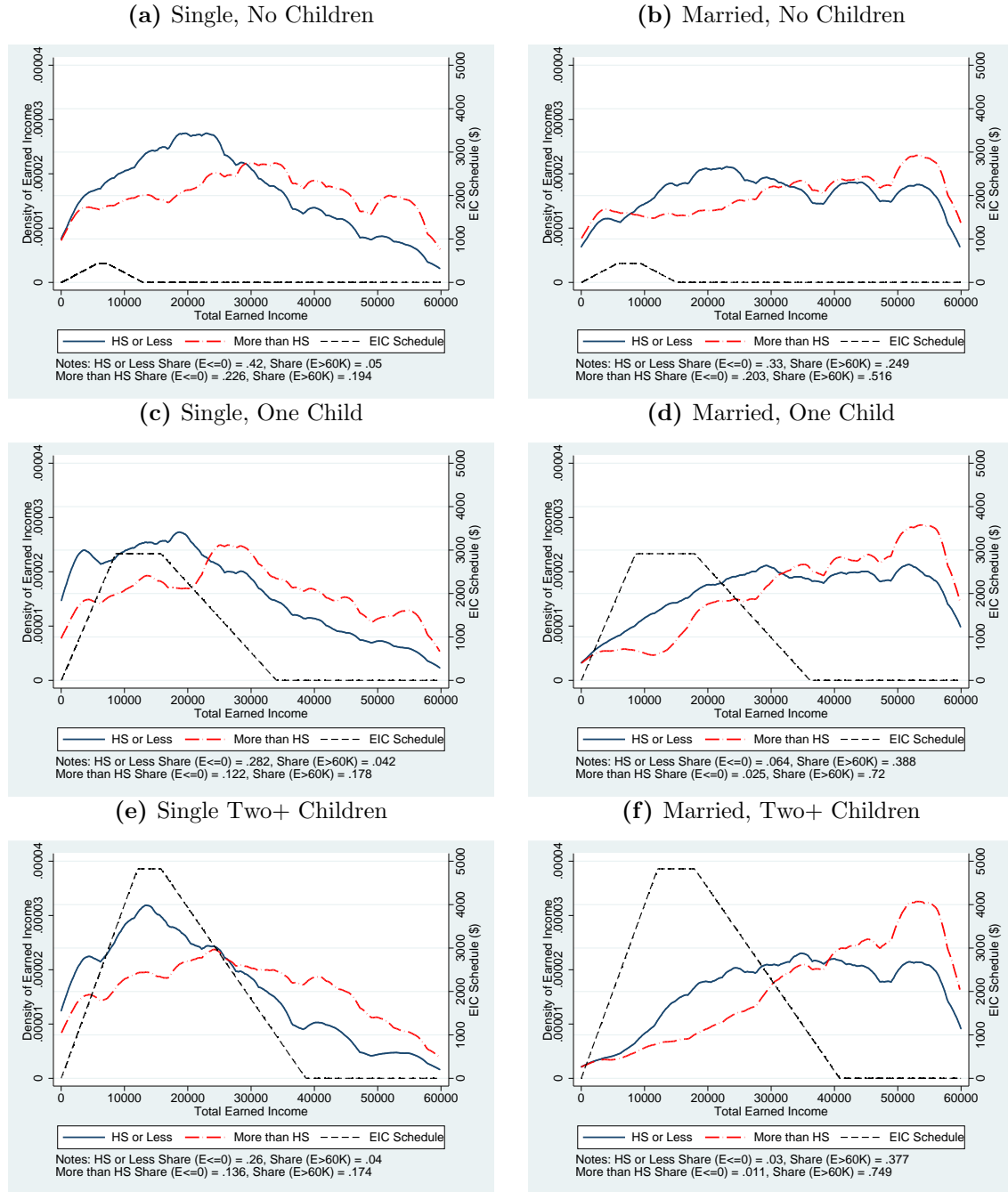|	No Children		Children		Singles		Married	
	Single	Married	Single	Married	Male	Female	Male	Female
Unemployment Rate	-0.641***	-0.124	-1.187***	-0.016	-0.800***	-0.464***	-0.835***	0.264
	(0.225)	(0.171)	(0.371)	(0.216)	(0.270)	(0.167)	(0.211)	(0.200)
Observations	14091	14743	18946	18423	16192	16452	16845	16714

Notes: Data are from the 1997–2009 CPS ASEC, and are collapsed at the state-year-marital status-number of children-sex-race group-education group level. The dependent variable is the share of those in the cell that are working at all last year (thus the employment rate is measured for years 1996-2008). All regressions include controls for demographic characteristics, as well as state and year fixed effects. The results are weighted by the number of individuals in each cell. The unemployment rate is measured in percentage points. Standard errors are clustered by state and shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table A.10: Effects of Unemployment Rate on Log(Population of Potential Filers)

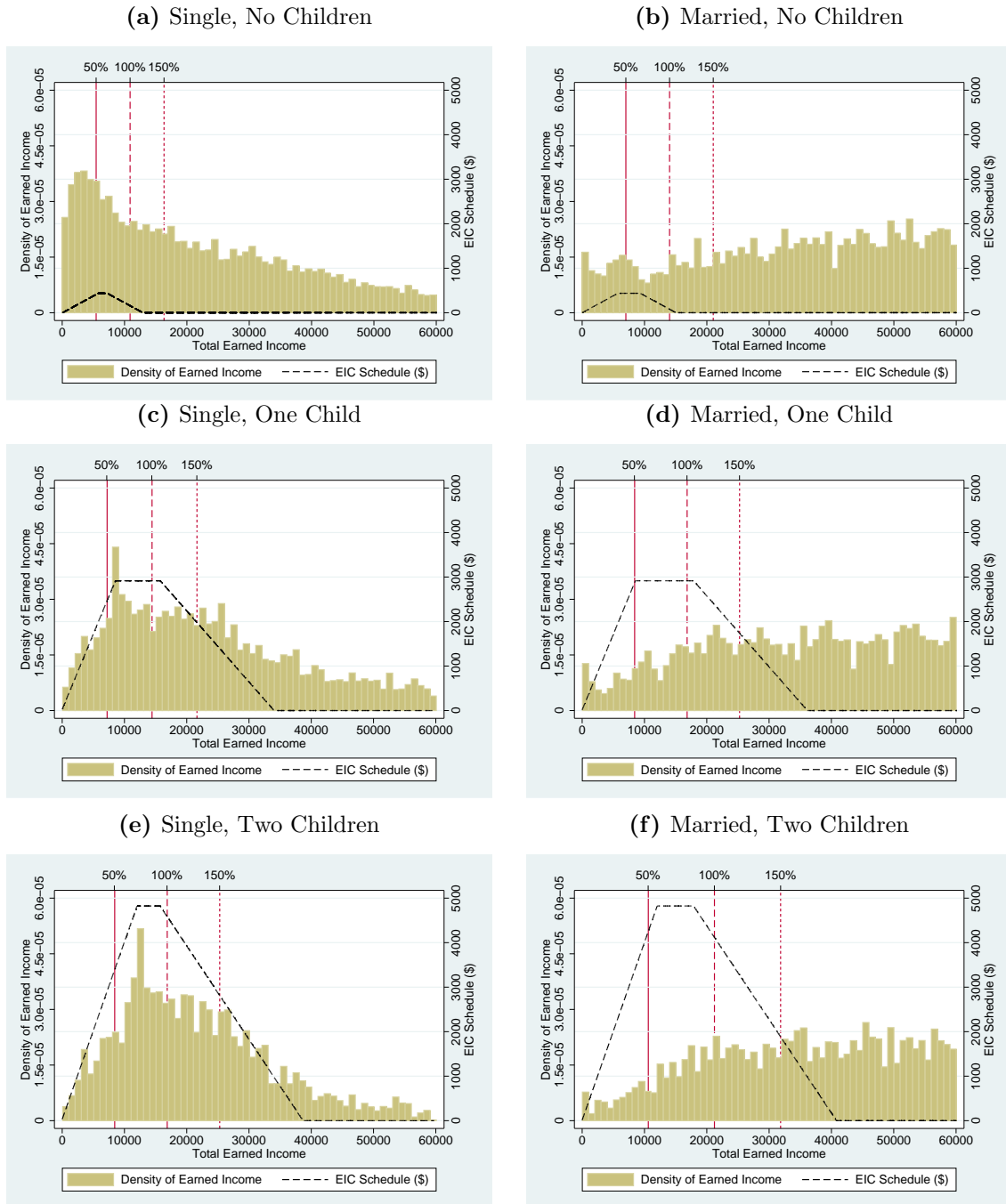|	(1) Children, Married	(2) Children, Single	(3) No Children
Unemployment Rate	0.612	1.273	-0.301
	(0.669)	(0.796)	(0.587)
Mean Y	12.037	11.312	12.579
Percent Impact (%)	0.6	1.3	-0.3
Observations	1326	1326	1326

Notes: Data are from the 1997–2009 CPS ASEC. The dependent variable is the natural logarithm of total population of potential filers in each cell. All regressions include controls for demographic characteristics, as well as state and year fixed effects. The unemployment rate is measured in percentage points. Percent impact is given by the coefficient, as it is a log linear model. Standard errors are clustered by state and shown in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Figure A.1: EITC Eligibility and Earned Income Distribution in 2006, By Education Level—CPS

(a) Single, No Children   **(b)** Married, No Children

(c) Single, One Child   **(d)** Married, One Child

(e) Single Two+ Children   **(f)** Married, Two+ Children

Notes: Figures show the 2007 CPS ASEC earned income distributions (for calendar year 2006) by education level, overlaid with the 2006 EITC schedule. Education level is defined according to the family head. Figures on left are for single filers; figures on right are for married filers. Figures in Panels (a) and (b) are for filers with no children; those in Panels (c) and (d) are for filers with one child, and those in Panels (e) and (f) are for filers with two or more children. Histograms are weighted to represent the U.S. population. Data on nominal EITC benefits are from the Tax Policy Center.

Figure A.2: EITC Eligibility, Earned Income Distribution, and Poverty Thresholds in 2006

(a) Single, No Children

(b) Married, No Children

(c) Single, One Child

(d) Married, One Child

(e) Single, Two Children

(f) Married, Two Children

Notes: Figures show the earned income distribution and the EITC schedule overlaid with data on poverty thresholds. Figures on left are for single filers; figures on right are for married filers. Figures in Panels (a) and (b) are for filers with no children; those in Panels (c) and (d) are for filers with one child, and those in Panels (e) and (f) are for filers with two children. Data on earned income are from Statistics of Income for tax year 2006 (income earned during calendar year 2006). The sample excludes high-income earners, individuals living abroad, late filers and married couples filing separately. Histograms are weighted to represent the population of tax filers. Data on nominal EITC benefits are from the Tax Policy Center. Data on poverty thresholds are from the US Census Bureau.