

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

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ABSTRACT:

The cash and near cash safety net in the U.S. has undergone a dramatic transformation in the past fifteen years. Federal welfare reform has led to the “elimination of welfare as we know it” and several tax reforms have substantially increased the role of “in-work” assistance. In 2012, we spent more than 7 dollars on the Earned Income Tax Credit (EITC) for every dollar spent on cash benefits through Temporary Assistance for Needy Families (TANF), whereas in 1994 on the eve of federal welfare reform these programs were about equal in size. In this paper, we evaluate and test whether the EITC demonstrates a defining feature of a safety net program—that it responds to economic need. In particular, we explore how EITC participation and expenditures change with the business cycle. The fact that the EITC requires earned income leads to a theoretical ambiguity in the cyclical responsiveness of the credit. We use administrative IRS data to examine the relationship between business cycles and the EITC program. Our empirical strategy relies on exploiting differences in the timing and severity of economic cycles across states. The results show that higher unemployment rates lead to an increase in EITC recipients and total dollar amounts of credits for married couples. On the other hand, the effect of business cycles on use of the EITC is insignificant for single individuals, whether measured by the number of recipients or expenditures. Estimates that further cut by education show that the protective effects of the EITC are concentrated among those with higher skills (and potential earnings). In sum, our results show that the EITC serves to mitigate the effects of income shocks for married couples with children and other groups likely to have moderate earnings, but does not do so for the majority of recipients—single parents with children. The patterns we identify are consistent with the predictions of static labor supply theory, which we confirm with an analysis of earnings, and with expectations about how economic shocks are likely to vary across family type and skill group.

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1. Introduction

The Earned Income Tax Credit provides a refundable tax credit to lower-income working families through the tax system. As a consequence of legislated expansions in the EITC and the dismantling of welfare through the 1996 federal welfare reform, the EITC is now the most important cash transfer program for low- and moderate-income families (Bitler and Hoynes 2010). In 2012, the EITC reached 27.8 million tax filers at a total cost of \$64.1 billion. Almost 20 percent of tax filers receive the EITC, and the average credit amount is \$2,303. In contrast, fewer than 2 million families received cash welfare benefits (TANF) in 2011, a 62 percent decline since 1994.

One feature of a safety net program is that it raises disposable income for those at the bottom of the income distribution. Using this definition, the EITC is the most important safety net program for low-income families with children: based on the U.S. Census Supplemental Poverty Measure, in 2013 the EITC (and the child tax credit) lifted 4.7 million children out of poverty in a static sense, more than any other program (Short 2014). Among all persons in the U.S. there is only one government program that lifts more persons out of poverty – Social Security (Short 2014).

A second key feature of a safety net program is that protection responds in times of need. For example, a negative shock to family earnings as a result of job loss is mitigated by social insurance benefits (e.g., unemployment compensation), public assistance benefits (e.g., food stamps and to a lesser extent TANF), as well as (for higher income families), the progressive income tax system (Auerbach and Feenberg 2000). Kniesner and Ziliak (2002) refer to these as “explicit” income smoothing (e.g., transfers) and “implicit” income smoothing (e.g., taxes). This stabilizing feature of the EITC has not been explored and is the focus of our work. We recognize that protecting against shocks to income is not a stated goal of the EITC. But as the social safety net has been dramatically reformed with a new emphasis on *in-work* assistance (through welfare reform and the expansion of the EITC), it is important to evaluate the degree to which this central piece of the current safety net provides protection against shocks to income.

To examine this issue, we use high quality administrative data on tax returns from the Internal Revenue Service, supplemented by data from the Current Population Survey. Our empirical strategy relies on exploiting differences in the timing and severity of economic cycles across states in a panel fixed

effects model in order to estimate the relationship between business cycles and EITC reciprocity and expenditures per potential filer. We measure the business cycle using the state unemployment rate. Additionally, our results are robust to using the log of employment as a measure of the state business cycle, to using other functional forms for our outcome variables (logs), and to using other timings for the effects of the business cycle (lags).

A defining feature of the EITC, and a general characteristic of “in-work” assistance programs, is that positive earnings are required for eligibility for the tax credit. The prior literature has established that the EITC has led to sizable increases in the employment rates of single mothers (Eissa and Liebman 1996, Meyer and Rosenbaum 2000, 2001, Hoynes and Patel 2015) and has led to modest reductions in the employment of married women (Eissa and Hoynes 2004). Given the earnings requirement that is at the center of EITC eligibility, the response of EITC use to cycles (and economic need) is theoretically ambiguous, and may vary depending on where in the eligibility range tax filers lie. On the one hand, a downturn may lead to net higher rates of EITC participation – if the bulk of downturn-induced decreases in earnings move taxpayers down into the EITC eligibility range. As we will see below, this change is most likely to occur for married couples with children and for the more highly educated among married and unmarried families with children. On the other hand, a downturn could lead to lower rates of EITC participation – if downturn-induced decreases in employment bring earnings to zero for the majority of participants. This is most likely for unmarried tax filers with children and low education groups, based on their locations in the earnings distributions. Thus our predictions are different for different groups, and the stabilization effect of the program may well not be uniform.

This ambiguous role of the EITC in the presence of economic shocks has been discussed by some legal scholars in the context of assessing the tradeoffs of efficiency, equity and stabilization (Listokin 2012, Ryan 2013). And more generally, it is well known that a progressive income tax structure serves as an automatic stabilizer (see e.g., Auerbach and Feenberg 2000). However, ours is the first study to empirically examine the stabilizing feature of the EITC over the business cycle. Moreover, we are also the first to explore differences across groups of taxpayers and to analyze whether the overall effects capture heterogeneous, offsetting effects across these groups, consistent with their locations in the budget set, and

to place such a discussion in the context of static labor supply theory predictions.¹

Our main results use IRS Statistics of Income Micro data for tax years 1996–2008. We choose this period because the EITC schedule was relatively fixed, thereby allowing us to focus on how the program stabilizes income without confounding these effects with policy induced changes in participation and earnings. We collapse these data to cells defined by state, tax year, marital (filing) status, and number of children. We then estimate models separately for different demographic groups defined by marital status and number of children.

Our overall estimates suggest that, pooling all tax filers, EITC reciprocity rates are modestly counter-cyclical, with a one percentage point increase in the unemployment rate—our primary measure of downturns in the business cycle—leading to a 1.8 percent increase in the number of recipients per potential filer. However, this overall, net effect masks important differences across different family types and across groups with different levels of education (and associated skill). We find that higher unemployment rates lead to higher rates of EITC recipients per potential filer and expenditures per potential filer for married couples with children. For example, a 1 percentage point increase in the unemployment rate leads to a 6.1 percent increase in the EITC reciprocity rate for this group. Filers without children, who are eligible for a much smaller credit, also exhibit counter-cyclical movements – a one percentage point increase in the unemployment rate leads to a 3.2 percent increase in the reciprocity rate. These findings suggest that for these groups an adverse labor market shock causes them to move from a point perhaps above the EITC eligibility threshold (or along the phase-out region) to a lower level in the earnings distribution relative to where they would have been absent the shock, leading to higher EITC participation rates and benefits -- thereby *mitigating* the adverse effects of labor market shocks.

In contrast, the effect of business cycles on EITC use is negative (but due to large standard errors, generally uninformative) for single tax filers with children, the largest group of recipients, whether measured by reciprocity or expenditures. This negative point estimate is consistent with expectations for a “one earner” labor supply model – whereby an adverse labor market shock would eliminate family

¹ Jones (2015) uses linked CPS-IRS data to look at the effect of the Great Recession on having earned income and family structure that makes families eligible to claim the EITC, finding results consistent with ours.

earnings, thus reducing EITC participation. Further investigation shows that this statistically uninformative estimate for single tax filers with children masks protective effects for high skill unmarried filers. On net, we find the EITC mitigates labor market shocks for married couples with children and higher skill groups more generally, but does not do so for the largest group of recipients, single parents with children.

To extend these findings and connect them to labor supply, we analyze the effects of cycles on the distribution of earnings. In particular we use the SOI micro data on earnings to examine effects of cycles on the propensity to have earnings in various parts of the EITC-eligible range (the phase-in, flat and phase-out regions). Our results show that in recessions, married couples' earnings on net shift down into the EITC-eligible range. Single taxpayers also experience a shift down in earnings but most of this shift occurs within the EITC schedule or in a way that moves them outside the taxable region (into likely non-filing status).

To put these results in context, we compare our results to estimates of the cyclicalities of other key safety net programs including Unemployment Compensation, Food Stamps, and TANF. We show that the EITC exhibits less countercyclical movement than do TANF, Food Stamps, and Unemployment Compensation. Estimating similar models for the same time period for recipients in each of these programs per capita, we find that a one percentage point increase in the unemployment rate leads to an increase in caseloads per capita of 14.5 percent for Unemployment Insurance payments (UI), 8.4 percent for Food Stamps, and 7.7 percent for TANF, compared to 2.3 percent for the EITC.

As a second way to put these results in context, we use the March Current Population Survey to explore how the EITC affects the cyclicalities of income. In particular, we estimate the effects of unemployment on poverty rates, using similar state panel data models. Our baseline results use the official poverty measure, which depends on a family's pre-tax cash income. We then recalculate poverty rates after adding our measure of the imputed EITC (using the NBER TAXSIM model) to pre-tax cash income. Consistent with the analysis of administrative SOI tax data, poverty fluctuates less across the business cycle when including the EITC than when it is excluded, with the strongest protective aspect of

the EITC being among married couples with children.²

These results are valuable for several reasons. First, post-welfare reform, the U.S. social safety net for low income families is centered on work. Yet eligibility for the EITC requires employment and, to the best of our knowledge, no one has explored how the EITC performs over economic cycles. This is critical for understanding the potential for the social safety net to provide protection against income shocks. Secondly, as many OECD countries adopt or consider adopting similar in-work policies (Owens, 2005), understanding the effect of business cycles on in-work programs like the EITC is fundamental for policy makers' decision-making and budget planning. Third, given the rising importance of the EITC within the federal income tax system, learning about the net automatic stabilizing features of the EITC is important, and up until now, this question was largely unstudied. Additionally, our work contributes to the empirical literature on the cyclicalities of safety-net programs such as food stamps (e.g., Ziliak et al., 2003; Bitler and Hoynes 2010), AFDC/TANF (Blank 2001; Ziliak et al., 2000; Bitler and Hoynes 2010) and other food and nutrition programs (Corsetto 2012). Our paper also contributes to the macro public finance literature on the automatic stabilizing features of the tax system (e.g., Auerbach and Feenberg 2000; Kniesner and Ziliak 2002).

The remainder of this paper proceeds as follows. Section 2 outlines the EITC and the recent evolution of the safety net and discusses the relevant theoretical predictions. Section 3 discusses the data and Section 4 presents our empirical model. The results are presented in Section 5, sensitivity analysis is in Section 6, and we conclude in Section 7.

2. The EITC, the Prior Literature, and Theoretical Predictions

The U.S. safety net for low-income families has undergone a dramatic transformation in the past fifteen years from being an out-of-work means-tested program to one requiring work. Many aspects of this transformation are illustrated in Figure 1. In this figure, we plot real per capita expenditures from 1980 to 2013 (2012 for the EITC) for the three main cash or near-cash programs for low-income families

² This comparison is static and does not reflect possible behavioral differences if the EITC program did not exist.

with children: the EITC, Temporary Assistance for Needy Families (TANF), and Food Stamps (now called the Supplemental Nutrition Assistance Program or SNAP). The shaded regions are contractionary periods (annualized based on the NBER recession dates and national unemployment peaks and troughs).³

The expansion of the EITC between 1986 and 1998, coupled with the decline in cash welfare expenditures beginning with the welfare waivers of the early 1990s and continuing through the 1996 federal welfare reform, led to the rise in the importance of the EITC and a corresponding fall in the importance of cash welfare (TANF). By 2012, spending on the EITC was more than 7 dollars for every dollar on TANF cash benefits (in 1994, on the eve of federal welfare reform, these programs were about equal in size). This evolution represents a tremendous change in the safety net for low-income families with children – a transformation from out-of-work aid (cash welfare) to in-work aid (EITC).

As is suggested by Figure 1, the EITC is now one of the most costly cash or near-cash safety net programs for low-income families with children. In 2012 (the most recent year for which data are available), the EITC was received by 27.8 million families (or, more accurately tax filing units, which can include single individuals as well), at a cost of almost \$64.1 billion. This amounts to an average credit of about \$2,303 (IRS 2014).

The EITC is distributed through the federal tax system, and the goal is to increase the after-tax income of lower earning taxpayers, primarily those with children, while incentivizing work. The EITC schedule has three regions. In the first, known as the phase-in region, the credit is phased in at a constant rate: for each dollar earned, taxpayers currently receive 34–40 cents from the credit. In the second region, the flat region, taxpayers receive the maximum amount of EITC benefit. In the phase-out region, the credit is phased out at a constant rate: taxpayers lose 16–20 cents of credit for each extra dollar earned. Appendix Figure 1 illustrates the relationship between earned income and the EITC for the largest subgroup of recipients, single filers with two children. The potential income transfer is substantial – the maximum credit for singles with 2 or more children is \$5,460 and the phase-out range extends to earned

³ The official NBER recession dating is monthly; this figure presents annual data. We constructed an annual series for contractions based on the official monthly dates, augmented by examination of the peaks and troughs in the national unemployment rate. See Bitler and Hoynes (2010) for more information on the annual dating.

income of \$43,756 (2014 tax year). There are separate schedules for taxpayers depending on the number of children, and in some years, marital status. Importantly, individuals without children are only eligible for a very small credit—in 2014 the maximum benefit for childless filers is \$496, less than one-tenth the size of the credit for two-child families.⁴

Figure 2 plots the real maximum benefit by family size from 1983-2014. Our analysis focuses on the period 1996-2008, explicitly targeting a period of stability in the EITC tax schedule. We do this to isolate the effect of the business cycle. Unlike most of the EITC literature (see reviews by Hotz and Scholz 2003, Eissa and Hoynes 2006, & Nichols and Rothstein 2015), we do not leverage policy variation in our research design. Our period lies after the large expansion due to OBRA93 and before the expansion as part of the stimulus (in 2009).⁵

Table 1 provides descriptive statistics for EITC filers for 2008, the last year in our analysis period. The table shows that the recipients are split between singles with children (59%), married couples with children (19%), and taxpayers without children (21%). In 2008, the average credit per filer was \$2,613 for single parents with children, \$2,471 for married couples with children, and \$253 for childless individuals. Overall, the majority of the dollars spent on the program go to families with children: 74.1% of the credit dollars go to single filers with children and 23.2% go to married filers with children. The small share of dollars claimed among those without children (2.7%) reflects their much lower potential credit amounts and participation rates. In fact, while among taxpayers with children take-up of the EITC is high (and has been steady) at about 75 to 80 percent (e.g., Scholz 1994, Plueger 2009), EITC take-up for childless taxpayers is much lower at 56 percent.

Given the prominence of the EITC in the U.S. safety net, it is not surprising that many studies

⁴ Adjusted gross income (AGI) also plays a role in calculating EITC eligibility and benefits. First, AGI must also be less than the amount at the end of the phase-out region. Second, for filers in the phase-out region, their credit is the lower of the credit calculated based on earned income and the credit based on AGI. When we analyze EITC eligibility (e.g., as in Table 3 and Figure 4 below) we use only earned income and do not impose the AGI requirement. For more information on the EITC program, see Eissa and Hoynes (2006) and Hotz and Scholz (2003).

⁵ During the period we analyze, some minor expansions of the EITC occurred. Beginning in 2002, the phase-out range was increased for married taxpayers filing jointly. In our sample period, between 2002 and 2008, the phase-out range was extended by between \$1000 (in 2002-2004) to \$3000 (in 2008); in 2014 the phase-out range was \$5,430 higher. Additionally, in 2001 a “modified” AGI measure was replaced with AGI for analysis of eligibility and benefits in the phase-out region. In our analysis, time dummies will absorb the overall effects of these minor policy expansions.

have evaluated its effects. We have two decades of research on the effect of the EITC on labor supply showing that the credit leads to substantial increases in employment for single parents and small reductions in employment for secondary earners in married couples. Additionally, the literature has examined the effects of the EITC on poverty and the income distribution, child well-being, infant and maternal health and family structure. For more information, see reviews by Hotz and Scholz (2003), Eissa and Hoynes (2006), and Nichols and Rothstein (2015).

We contribute to the literature by evaluating and testing whether the EITC satisfies a defining feature of a safety-net program – the use of such a program should go up in times of economic need. In particular, we explore how EITC participation and expenditures change with the business cycle. This focus links our paper to the empirical literature on the cyclicalities of safety-net programs such as food stamps (e.g., Ziliak et al., 2003; Bitler and Hoynes 2010), AFDC/TANF (Blank 2001; Ziliak et al., 2000; Bitler and Hoynes 2010) and other food and nutrition programs (Corsetto 2012). Our paper also contributes to the macro public finance literature on the automatic stabilizing features of the tax system. While it is well known that a progressive income tax system stabilizes income in downturns (for recent empirical studies, see Auerbach and Feenberg 2000 and Kniesner and Ziliak 2002), the implications of having the non-linear EITC schedule within the more generally progressive federal income tax code have not been explored thus far in the literature.

Predictions about how use of transfer and social insurance programs and regular federal income tax payments will respond to economic downturns are straightforward; tax receipts should go down and transfers and UI use should go up. In contrast, theoretical predictions about the effect of cycles on EITC use are ambiguous. Eligibility for the EITC requires that earnings are strictly greater than zero and less than the amount defining the end of the phase-out range. As illustrated in Appendix Figure 1, on the one hand, a downturn may lead to higher rates of EITC participation – if decreases in earnings move taxpayers down into the EITC eligibility range (rightmost arrow). On the other hand, a downturn could lead to lower EITC participation – if the main effect of the downturn is to cause individuals to leave the labor force; reducing earnings to zero.

One can also examine these different scenarios for earnings losses within the context of EITC

dollars received (rather than effects on EITC reciprocity). This provides another measure of whether the EITC provides income stabilization. A reduction in earnings from above the end of the phase-out range to within the EITC eligible range or movement down within the phase-out range illustrate the potential income-stabilizing feature of the EITC. However, the movement out of the labor market or a movement down within the phase-in region represents the income de-stabilizing features of the EITC. The overall net effect of economic downturns on EITC receipt and benefits depends on the breakdown between taxpayers brought into eligibility and those knocked out of the labor force and out of eligibility. Of course this is partially complicated by the calendar year nature of the tax accounting period.

Figure 3 serves to sharpen these theoretical predictions for our main demographic groups of interest. Here we present histograms for tax-return-reported earned income in 2006, the peak year just prior to the start of the Great Recession (we describe the data and sample in detail below). We present the histograms for six demographic groups (with different EITC schedules): 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. For each, the dashed line shows the EITC schedule and we force the x - and y -axes to have the same scale across all 6 graphs. We limit the sample in each case 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 $> \$60,000$).

Several observations can be drawn from these figures. First, they well illustrate the variation in the generosity of the schedule across these six groups. The credit is substantially larger for families with children than for those without children and the credit is larger for families with two or more children than for one-child families. Second, the distribution of earned income for single families with children is shifted considerably to the left of the distribution for married families with children. Only 29% of singles with one child and 18% of singles with two children have earnings higher than the top of the phase-out range (compared to 76% and 75% for married families with one and two children). Third, consistent with

Saez (2010), there is evidence of clustering at the first kink of the EITC schedule for single families with children.

In addition to the labor-supply channel, it is possible that our results could also capture effects operating through the cyclicalities of marriage, fertility, and other living arrangements. Schaller (2012), for example, estimates that increases in unemployment rates leads to small declines in marriage and divorce rates (between 1.5 and 1.7 percent), with evidence that the marriage effects are permanent while the divorce effects are more temporary. This “endogenous marital status” would operate against the expected labor supply channel – an increase in unemployment would lead to a reduction in the stock of married families which would potentially decrease the number of EITC married filers and increase the number of EITC single filers. The literature on the cyclicalities of fertility is more mixed, but many studies document a negative effect of unemployment rates on fertility (e.g., Dehejia and Lleras-Muney 2004, Schaller 2013). A final concern might be other changes in living arrangements (e.g., single parents moving in with other relatives). Bitler and Hoynes (2015c) shows that the cyclicalities of such doubling up is small in magnitude (while statistically significant). These issues are particularly important to consider when we stratify our analysis by marital (filing) status, where a clean interpretation requires that the composition of the sample is not changing with the changes in the unemployment rate. In part to address this issue, we normalize the EITC recipients and expenditures by the population of potential filers (by marital status and number of children) as we discuss below. We also directly address this by estimating specifications that test whether our potential filer populations themselves vary cyclically, finding no such evidence. We further note that when we estimate models for the full, pooled, EITC sample, these issues are less important. Overall, our view is that the potential for endogenous changes in marriage, fertility, and living arrangements is likely quite small and second order relative to the changes in labor supply across the cycle.

We also explore a further way to disaggregate the data that allow us to look at different skill groups and their likely locations in the earnings distribution. Appendix Figure 2 uses the CPS data as education is not reported in the SOI data, but resembles Figure 3 in that it shows the empirical 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). This shows further evidence regarding the groups for whom a shock will likely lead to more EITC income (higher skill groups, married couples) and those for whom it will likely lead to a loss of EITC eligibility. We use the CPS to explore this further.

Given this discussion and empirical evidence on the distribution of income by demographic group, we conclude that the effect of a downturn on EITC participation and dollars of stabilization is likely to vary by family structure and skill level. Singles with children, being in one-earner families with relatively low potential earnings, are at higher risk of losing the EITC in the event of an adverse labor market shock. On the other hand, given their higher potential earnings and two potential earners, married families are more likely to gain EITC dollars in the event of an adverse labor market shock. Therefore, we predict that the EITC is more likely to serve as an income stabilizer for married couples facing shocks (or more generally, for those with higher skill levels and or moderate incomes) while single parent (or more generally, lower-education) families are less likely to experience income stability from the EITC, and may theoretically experience increased income in-stability from the EITC.

3. Data

To empirically analyze the effect of business cycles on the size of EITC claims, we utilize data from a variety of sources. Our primary data are administrative data from the IRS compiled from tax returns; our sample uses annual cross-sections for years 1996–2008.⁶ The Statistics of Income (SOI) is a nationally representative sample of federal income tax returns and contain sample weights that allow us to infer results about the U.S. population of tax filers as a whole. There are approximately 104,300 observations per year on average and these data are representative of all tax filers, and, therefore, also representative of EITC claimants. The SOI data are limited to information on the federal tax return. We use information on filing status (single, head of household, married filing jointly, married filing

⁶ We note however, that with summary totals by state and filing status for 2009–2010 appended to our main data, results through 2010 are quite similar to our main findings. The summary data are based on a sum of zipcode level data with zipcodes having fewer than 10 EITC recipients being suppressed. We thank Myrtis Herrod of the IRS for these data.

separately), number of dependents, earned income, EITC credit amount, number of children qualifying for the EITC, and state of residence.⁷

Our sample is created as follows. First, we exclude all high-income individuals (filers with returns over \$200,000 of AGI), whose state identifiers are not reported in the SOI data for confidentiality issues. This sample exclusion is not problematic because these high-AGI filers have income far beyond the end of the EITC eligibility range.⁸ Second, we exclude individuals from Puerto Rico, the Virgin Islands, Guam or U.S. citizens living abroad, as well as military personnel stationed abroad. In the SOI data, these filers all have the same geographic identifier, making it impossible for us to assign them to the labor market conditions that they face. Third, we drop late filers, who are individuals filing tax returns in one year but whose returns correspond to some previous tax year. By dropping late filers, we exclude 59,835 observations from the pooled 1996–2008 sample, which represents around 3% of the weighted sample. In a robustness check, we analyze whether our results are sensitive to this sample restriction (finding it is not). In addition, we exclude married individuals filing separately, since these filers are not eligible for the EITC. Finally, when examining the total number of filers, we exclude childless tax payers age 65 and above, given that EITC eligibility for this group is limited to those between 25 and 64. Since age is not reported in the SOI data for our full time period, we proxy age 65 and above by those who claim Social Security Benefits (the vast bulk of whom are 65 or above).

After these sample restrictions, we collapse the data to totals for cells based on year, state, marital status (married or single) and number of children (zero, one, or two or more).⁹ For each cell, we calculate

⁷ Note that these are corrected for arithmetic errors but have not yet been audited to ensure that no one is mistakenly or fraudulently claiming the EITC. Thus, they are representative of what tax-filers claim, including both impacts of take-up and noncompliance. Evidence suggests that take-up is acyclical, and Scholz (1994) and Plueger (2009) estimate quite similar take-up rates by group for 1990 and 2005.

⁸ This group is relatively small, accounting for around 2.3% of the weighted sample.

⁹ We assign taxpayers to be married if they file married filing jointly, and single if the filer declared he/she is filing singly or as a head of household (meaning single with dependent children). The number of children is assigned using the declared number of EITC qualifying children. When tabulating total filers, we instead use the number of child exemptions (because the number of EITC qualifying children is obviously not observed for non-EITC filers). Determinations for EITC qualifying children and child exemptions are very similar and empirically more than 90 percent of EITC filers have equal values for the two measures. The main differences since 2005 between the two definitions of children is that for exemptions, children must be U.S. citizens or permanent residents and must satisfy the support test, while to be qualifying for the EITC children do not have to satisfy the support test but have to live with the taxpayer in the U.S. for more than 50% of the time and have a valid Social Security number.

the total number of filers, the total number of filers claiming the EITC, and the total amount of EITC benefits received; all as the weighted sums of these variables, using the sample weights provided in the SOI data.

Our main outcome variables are the count of EITC recipients (where each unit claiming the EITC is a recipient) and EITC expenditures per “potential filer.” Hence, we need to construct denominators of potential filers, an “at risk population”, to convert the administrative tax data counts to rates. To do so, we use data from the March Current Population Survey to create population estimates (weighted using the family head’s weight) of the number of potential EITC filers in each state-year-marital status-number of children cell.¹⁰ The March CPS is administered to most households in March and collects labor market, income, and program participation information for the previous calendar year as well as demographic information from the time of the survey. We start by using the CPS to identify the same six demographic groups used in the SOI: each family (or subfamily) is assigned to a cell based on the marital status of the family head and the family’s number of children. We identify children using the EITC filing rules: a child must be less than or equal to 19, a full-time student whose age is less than or equal to 24, or individuals who report being disabled and that they cannot work. Potential filers for childless individuals are limited to those units whose heads are aged 25-64 (following the EITC rules). The summary statistics for the sample are presented in Appendix Table 1.¹¹

We also use the CPS to examine how the EITC affects the cyclicalities of income and poverty, examining whether families have income below 50%, 100%, 150%, and 200% of the official federal poverty line. Official poverty status in the U.S. is determined by comparing total pre-tax family cash income to poverty thresholds, which vary by family size, number of children, and presence of elderly persons. In 2012, for example, the poverty threshold for a family of three (one adult, two children) was \$18,498. Notably, official poverty does not reflect the effects on income of the tax system (e.g., the EITC)

¹⁰ To be explicit, we pair estimates of the number of EITC filers for tax year X from the SOI (normally filed at the beginning of year X+1) with estimates of potential filers from CPS survey year X (measures in March of year X).

¹¹ As shown in Appendix Table 1, the resulting variable EITC recipients per at risk population is close to 1 for single filers with children. Others have noted this difference, which may reflect complicated living arrangements (children moving between custodial parents during the year) or noncompliance. We explore the sensitivity of our findings to how we construct these denominators below and find that these choices make very little difference to our estimates.

or the non-cash transfer system (e.g., food stamps). We calculate a second poverty measure where we add imputed EITC to pre-tax income; the EITC amount is assigned using the NBER TAXSIM model. We also calculate cash poverty and cash plus EITC poverty using the equivalence scales implicit in the Supplemental Poverty Measure (Short 2014).¹² We calculate these four poverty measures for each family and then collapse the data to cells based on state, year, and family type.¹³

To put our results on the cyclicity of the EITC in further context, we estimate similar models for other safety net programs including AFDC/TANF, Food Stamps, and Unemployment Insurance (UI). As with the EITC, we measure administrative counts of caseloads (here at the state-by-year level) that cover the same time period as our SOI data. We choose to normalize these caseloads by total state population, given the differences in eligibility determinations and units across programs (and also present EITC results normalized in the same way). The AFDC/TANF and Food Stamps caseloads are average monthly measures (of families), while the UI data represent the total population probability of being on UI on a weekly basis (total weeks of any UI benefits claimed divided by the product of 52 weeks times state population). These data can be found at DHHS (2013), USDA (2013) and DOL (2010).

4. Empirical Strategy

Our empirical strategy exploits variation in the timing and severity of cycles across states to estimate the causal effect of labor market conditions on EITC use. Specifically, we measure the business cycle using the state unemployment rate. We start with the following pooled model:

$$(1) \quad y_{gst} = \beta \cdot UR_{st} + \theta_g + \alpha_s + \delta_t + Z_{st}\pi + year_t \cdot \gamma_s + \varepsilon_{gst}$$

where subscripts refer to demographic cell g (filing status x number of children [0, 1, 2+]), state s , and tax

¹² The Supplemental Poverty Measure is a broad post-tax resource measure that incorporates in-kind transfers (food stamps, housing assistance, school lunch) and other large categories of expenses (e.g., out of pocket medical expenses, child care, and fixed costs of work, child support) and allows the thresholds to vary with geographic area and by expenditures on housing, food, clothing, and utilities and with an equivalence scale for various different units. We cannot use the SPM measure for our analysis, however, as it is unavailable in public-use micro data for our sample period.

¹³ We weight each unit by the weight of the individual denoted as the head (if a family/subfamily) or the weight of the individual themselves (for the single childless filers).

year t . UR_{st} is the state unemployment rate and θ_g are demographic group-specific intercepts. The state unemployment rate is an annual measure, obtained from the Bureau of Labor Statistics. Our outcome variables are EITC recipients per potential filer and EITC expenditures per potential filer. We cluster the standard errors at the state level and weight the regressions by the relevant denominators (potential filers at the state-year-demographic group level).

Equation (1) contains controls for state and year fixed effects, α_s and δ_t , respectively. By adding year fixed effects, we absorb changes in use of the EITC that are due to national business cycles. This approach is necessary because it allows us to differentiate between changes in EITC use due to labor market conditions and changes due to national EITC expansions (which by design are minimal during this time period), secular changes in EITC take-up rates, and other national level confounders.

To explore our theoretical predictions, we analyze models stratified by demographic group and, in some places, skill level (education). In particular, we separately estimate equation (1) for our main three groups of interest: Married couples with children, single parents with children, and childless couples/individuals. We give limited attention to the childless given the very modest EITC for this group. We augment the SOI regressions by using the CPS to construct EITC recipients and expenditures (per potential filer) for the six groups g above further stratified by the education level of the family head.

Our main coefficient of interest is β , which represents the effect of the state unemployment rate on use of the EITC.¹⁴ If the estimate of β is positive, it implies that the EITC is countercyclical and therefore during a recession, the EITC acts as a net automatic stabilizer (there are more dollars of EITC benefits or more new recipients per potential filer). If β is negative, it implies that the EITC is procyclical and is de-stabilizing on net. As we discussed above, this may obscure differences within a group; for example single women with children may consist of some who lose benefits when hit with a labor market shock (earnings fall to zero) while others, with higher potential earnings, may gain benefits with a

¹⁴ The unemployment rate is the annual average for the calendar year corresponding to the tax year. Thus the dependent variable, EITC recipients per potential filer, and the key independent variable, the state unemployment rate, are both measured over the tax year. It is worth pointing out that that most EITC participants receive the credit as a tax refund early in the calendar year following the tax year.

negative shock (earnings fall into the EITC eligibility range or down the phase-out region). Our estimates capture the average effect, what we term the net automatic (de)stabilizing effect.

In order to control for possible confounders at the state-year level, in some specifications, we include various state-level measures of the safety net as well as the state-level EITC (in states with a state credit). The vector Z_{st} includes measures of state welfare reform, indicators for the presence of state EITC programs, and state Medicaid/SCHIP income eligibility limits. Additionally, we explore the sensitivity of the findings to controlling for state-specific linear time trends (γ_s).

Similar models are estimated for our analysis of poverty rates and other program caseloads.

5. Results

Table 2 presents our main results. Column 1 presents estimates for the pooled sample, while the remaining columns are estimates stratified into our three demographic groups. The pooled sample contains 663 observations (51 states including DC X 13 years) while the other columns have 1326 observations (51 states X 13 years X 2 children groups [for singles/married with children] or 2 marital status groups [for the childless]). Panel A presents estimates for EITC recipients and Panel B presents estimates for EITC expenditures (in real 2008 dollars), each per potential filer.

The results for the pooled sample show that a one percentage point increase in the state unemployment rate leads to a 0.4 percentage point increase in EITC participation (statistically significant at the 10% level). (Here and throughout, unemployment is expressed in percentage points, and the mean over the full period is 5.0.) For each regression, we include the mean of the dependent variable and the “Percent Impact” (calculated as the coefficient on the unemployment rate divided by the mean of the dependent variable). For the pooled sample, the effect of a one-percentage point increase in the unemployment rate translates to 1.8 percent impact on recipients per potential filer. The effect on total EITC dollars per potential filer is also positive, with a one percentage point increase in unemployment rate leading to a 1.2 percent increase in expenditures per potential filer, although this coefficient is

statistically insignificant. These results suggest that, overall, the EITC program is weakly countercyclical and serves as a net automatic stabilizer - providing additional resources in economic downturns.

The remaining columns of Table 2 present results for our three main subsamples: married couples with children, single parents with children, and childless individuals. Column 2 shows that the EITC is strongly countercyclical for married parents, both when measured by the reciprocity rate and by total dollars per potential filer. A one percentage point increase in the state unemployment rate leads to a 6.1 percent increase in the reciprocity rate and a 5.7 percent increase in real credits per potential filer, with both estimates significant at the 1 percent level. In addition, the EITC is estimated to be weakly countercyclical also for childless individuals (Column 4) – a one percentage point increase in unemployment leading to a 3.2 percent increase in the reciprocity rate (significant at the 10 percent level). In contrast, the largest group of EITC participants, single parents, has negative - but statistically insignificant - coefficients for the effect of the cycle on EITC use. These results, taken at face value, suggest pro-cyclical movements and income de-stabilization for single-parent families, although we note the confidence interval for the single-parent families is large.¹⁵

We illustrate the differential patterns by marital status another way in Appendix Figure 3. Each panel provides a scatterplot where the observations are at the state level (and where the size of the circle is weighted to reflect the state's potential filers). The horizontal axis denotes the change in annual unemployment rates between 2000 and 2008 and the vertical axis the change in EITC recipients per potential filer (in percent) over the same period.¹⁶ We also include the linear fit (using the states' potential filers as weights). We present these “long-difference” scatterplots for four groups: The pooled sample, childless filers, single parents with children, and married couples with children. Consistent with the regressions, the figures for married couples and childless filers show a positive relationship between

¹⁵ 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 results for the childless are primarily driven by the sample of single childless filers.

¹⁶ The vertical axis has the same scale for each figure to aid the visual comparisons across groups. There are a few small states that are off the scale for married couples with children. The linear fit, however, uses all of the observations.

changes in unemployment rates and EITC recipients per potential filer. Single parents with children, however, exhibit a negative relationship, with rising unemployment rates associated with declining EITC reciprocity rates.

We extend our main results in several ways. First, we estimate models that allow for differential effects in expansions and recessions. In all cases we fail to reject that the coefficients are the same for the two periods, suggesting no evidence in favor of asymmetric responses (Appendix Table 3). Second, we explore a possible lag structure including the current unemployment rate and a one-year lag of the unemployment rate. Those results, shown in Appendix Table 4, show total effects quite similar to our main results.¹⁷ 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.

The results in Table 2 are consistent with our theoretical predictions of the effect of local market conditions on EITC use by family type. Figure 3, presented above, illustrates that only a relatively small share of the total filing population of single parents with children has incomes above the EITC phase-out range. With such a large share of their earned income distribution contained within the EITC eligibility range, it is likely that a negative labor market shock will lead to no change in EITC filing (a reduction in earnings within the eligibility range) or a reduction in EITC filing (due to job loss and earnings falling to zero). On the other hand, among married families with children, far more than half the distribution lies above the phase-out range. A labor market shock to this group, therefore, would be much more likely to lead to an increase in use of the EITC (by moving earnings into the EITC-eligible range). Given the presence of two potential earners in the married households, it is less likely that a shock would lead both members of the family to leave the labor market entirely.

We further test these predictions about EITC cyclicalities with data from the CPS, where we can stratify our analysis using the education level of the family head (high school degree or less; some college or more). The results are shown in Table 3. Overall, for each of the three demographic groups, those in

¹⁷ For married filers with children, we find some persistence of the effect: when we include the one year lag we get 0.50 on $UR(t)$ and 0.50 on $UR(t-1)$. The results for single filers with children are both insignificant. The effects for filers without children are loaded onto the one period lag of the UR .

the higher-education group exhibit statistically significant stabilizing effects of the EITC. Both the higher- and lower-education groups of married couples with children show such stabilizing effects. A one percentage point increase in the unemployment rate leads to a 6.1 percent increase in EITC claims per potential filer for those with some college or more, and a 3.9 percent increase for those with a high school degree or less. Single parents with children with some college or more also experience a stabilizing effect of the EITC; a one percentage point increase in the unemployment rate leads to a statistically significant 3.3 percent increase in EITC claims per potential filer. Single parents with children, with lower education levels, show negative but statistically uninformative estimates. These results based on the CPS show that the earlier SOI results reflect averages across skill subgroups.¹⁸

To more fully explore the differences by marital status and the connections to labor supply predictions, we return to the SOI data and estimate our models on the *full sample of tax filers* (rather than EITC recipients). In particular, we assign each filer to one of six earnings regions: 1) phase-in, 2) flat, 3) phase-out, 4) “near” phase-out (the region up to \$25,000 above the end of the phase-out for families with children; or \$15,000 above for the childless), 5) above the “near” phase-out, and 6) the remaining filers (negative or zero earned income). These regions are assigned using the appropriate tax schedule for each group and tax year (e.g., using the appropriate filing status and number of dependents). It is important to point out that our SOI data are (necessarily) censored to include only those who file taxes. In particular, many families whose earnings drop to zero will not be required to file taxes.

Table 4 presents estimates for total tax filers per potential filer (panel A) and EITC-eligible filers per potential filer (panel B). The results show that single parents with children exhibit pro-cyclical filing status – a one percentage point increase in the unemployment rate leads to a 1.6 percent reduction in the filers per potential filer. Childless filers also show pro-cyclical filing status probabilities. In contrast, married couples show a very small and statistically insignificant relationship between cycles and the probability of filing. The insensitivity of the propensity to file taxes among married couples is consistent with their having two potential earners. The results for EITC eligible filers per capita mirror the main

¹⁸ Appendix Figure 2 illustrates how the CPS distribution of earnings varies across these demographic-skill groups.

results for EITC recipients in Table 2, with married couples showing a significant counter-cyclical EITC eligibility.

Figure 4 presents similar results for filers per potential filer with earnings in the phase-in, flat, phase-out, “near” phase-out, and above near phase-out regions. We plot the coefficient on the unemployment rate along with its 95 percent confidence interval. (Appendix Table 6 contains the full set of coefficients and standard errors.) Figure 4a shows that, for married parents with children, an increase in the unemployment rate leads to a reduction in the propensity to have earnings in the highest category (above “near” phase-out) and an increase in the propensity to have earnings at all other, lower, levels. Notably, they have statistically significant increases for earnings in the phase-out and phase-in regions, consistent with the higher EITC participation and dollars distributed per potential filer. The results for single parents with children, in Figure 4b, show that an increase in unemployment leads to reductions in the propensity to have earnings in all regions above the very lowest (phase-in region). However, only the reductions for the near phase-out and above near phase-out are statistically significant. The propensity to have earnings in the phase-in increases (although not statistically significantly so).

The results in Tables 3 and 4 and Figure 4 serve to deepen our understanding of the income stabilizing (or de-stabilizing) nature of the EITC. It also reveals that our findings are consistent with a static labor supply model and potential earnings interpretation. One-earner families with relatively low potential earnings experience reductions in earnings *within* the EITC schedule, however they also experience earnings losses that send them out of tax filing status. For two potential-earner families, whose baseline earnings are significantly shifted to the right of those for single-parent families, economic downturns lead on net to a shift from being above the EITC eligibility schedule range down into the EITC eligibility range, with no corresponding change to tax-filing status. Single parents with higher education (and potential earnings) exhibit responses more similar to those of married couples, reflecting the fact that a decline in earnings could move them into EITC eligibility (or to higher benefit levels as they move down the phase-out).

To put these results in context, it is useful to compare these results to estimates for the cyclicalities of other key safety net programs. These results are presented in Table 5, where we compare results for the

EITC to those for AFDC/TANF (column 3), Food Stamps (column 4) and UI (column 5). For each model, the data are at the state-year level covering 1996–2008, and we divide the caseloads by the state population (as we no longer can stratify by demographic group). For the EITC, we present two measures – all EITC participants per capita (column 1) and EITC participants with children per capita (column 2). The results in these first two columns show that a one percentage point increase in the unemployment rate leads to a 2.2 percent increase in EITC recipients per capita, and a somewhat smaller 1.8 percent increase for EITC participants with children per capita.¹⁹ The remaining columns show that a one percentage point increase in the unemployment rate leads to an increase in per capita caseloads of 7.7 percent for TANF, 8.4 percent for Food Stamps, and 14.5 percent for UI. Thus (in aggregate) the EITC provides significantly less protection in recessions than is provided by the other programs. Even the most “cyclical” EITC group, or the one with the most income stabilization, married families with children (for whom a one percentage point increase in the unemployment rate leads to a 6.1 percent increase in recipients per potential filer), exhibits less countercyclical movements than do caseloads per capita of TANF, Food Stamps, or unemployment compensation. This result is echoed in work by Kniesner and Ziliak (2002) who find more “explicit” insurance (e.g., transfers) for low-income households than “implicit” insurance (e.g., taxes).

As a second way to put these results in context, we use the March CPS to explore how the EITC affects the cyclicity of income and poverty. We measure whether a family has income below 50%, 100%, 150%, and 200% of official poverty; both measured using official pre-tax income and also by adding in the EITC. The results, estimated by the same model as (1), are presented in Table 6. We present estimates for married couples with children and single parents with children. The first four columns show official poverty and confirm existing research documenting a positive relationship between unemployment rates and poverty (Bitler and Hoynes 2010, 2015a, Blank 1989, 1993, Blank and Blinder 1986, Blank and Card 1993, Cutler and Katz 1991, Freeman 2001, Gunderson and Ziliak 2004, Hoynes et

¹⁹ The results for the pooled EITC sample (column 1, table 5) differ slightly from the results for the pooled sample in table 2 (column 1)—2.2% in Table 4 versus 1.8% in Table 2. Here, in Table 5, we want to use a consistent definition for the denominator across the columns in the table. Given the range of programs here, we opt to use the state total population as the denominator (rather than the number of potential filers that we used in Table 2).

al. 2006, Meyer and Sullivan 2011) with larger cyclicalities for single parents with children. For example, a one percentage point increase in unemployment leads to a 2.0 percentage point increase in official poverty (income below 100% poverty) for single families with children and 0.7 percentage point increase in official poverty for married couples with children. We repeat the exercise in columns 5-8 but recalculate poverty incorporating income from the EITC. Incorporating EITC income significantly reduces the cyclicalities of poverty for married couples. The effect of a one percentage point increase in unemployment is reduced by 42% for incomes below 50% of poverty, by 21% for incomes below 100% of poverty, by 6% for incomes below 150% of poverty, with a very small and insignificant effect on the propensity to have incomes below 200% of poverty. Given the relationship between poverty rates and the EITC schedule (see Appendix Figure 4), and given the results on earnings regions in the SOI data (Figure 3), this is precisely the pattern we would expect. In contrast, for single parents with children, the EITC has minimal effects on the cyclicalities of income. The results are very similar for the poverty measures using the supplemental poverty measure equivalence scales (Panels C and D of the table).²⁰

6. Additional Results, Sensitivity Tests and Threats to Interpretation

The validity of our estimates requires that the changes in state unemployment rates are not reflecting other policies or trends at the state level that are both correlated with the unemployment rate and drive EITC participation. We explore this in several ways, with results presented in Table 7. First, we control for other state policies including welfare reform, indicators for the presence of state EITC programs, and state Medicaid/SCHIP income eligibility thresholds. The results show (main results in column 1, results adding state-year controls in column 2) that the results are highly robust to these controls. Second, we include state-specific linear time trends (in column 3). Adding state linear trends changes the coefficients somewhat (leading to increases in the magnitude of impacts for single families with children and decreases for married couples with children), but the qualitative conclusions are

²⁰ This is a rather mechanical exercise, and in particular we are examining the cyclicalities of poverty rates with and without the EITC in a static setting—assuming that nothing else in the family changes. Notably, this does not capture the channel whereby the EITC affects income and poverty through changing labor supply and earnings (Hoynes and Patel 2015).

unchanged. Finally, we add both trends and controls, with the results in column 4 being very close to those from specifications with state linear trends.

The SOI data include “late filers” (file in year t a return for a year prior to t) and in our main results we drop them 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, but 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 the 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 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.²¹

In the previous section, we presented several results to corroborate our static labor supply model and potential earnings interpretation of the results. However, an alternative interpretation is the differences across groups in the cyclicity of the EITC instead reflect differences in the cyclicity of labor supply across the groups. The evidence from the substantial literature on the cyclicity of employment, hours, and earnings across demographic groups suggests otherwise. For example, Hoynes,

²¹ 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 19 or younger, or individuals 24 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.

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 more cyclical than is employment of married parents with children. We conclude that it is not greater cyclicalities among married couples that is generating our findings. Another possibility is that our results reflect changes in marital status and fertility (hence affecting counts across our demographic groups) across the cycle. We 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. A third possibility is that our results reflect a cyclicalities in tax compliance (or take-up) as it relates to EITC filing. While this is inherently difficult to test, the fact that we find such similar effects between the SOI data (which embeds the empirical take-up and noncompliance) and the CPS (which embeds a 100 percent take-up and no noncompliance) leads us to conclude that this cannot be a major factor. In the end, we think 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.

Finally, and perhaps most importantly, we acknowledge the distinct lack of precision in our main estimates for single filers with children. The results in Table 2 show that the standard errors for this group are more than four times the size of the standard errors for either of the other two groups. These large standard errors render the results for this group to be uninformative; yet this group represents almost three-quarters of EITC expenditures. We further investigate this in several ways. First, we estimate models with the log of EITC recipients (and log of total EITC dollars) as the dependent variable, with and without a control for population.²² Second, we estimate models with the total state population as the denominator (rather than the potential filers in each demographic group). Appendix Table 11 presents these estimates. There are two important findings from this analysis. First, the results for all three groups (married with children, single with children and the childless) are remarkably robust across the specifications (compare the percent impacts). Second, the standard errors for single parents with children

²² Models with the log(EITC) are estimated without weights. In practice, the results are not sensitive to weighting.

decline substantially (relative to the standard errors for the other two groups) when we move away from the specifications with the CPS estimates of potential filers in the denominator. We conclude that our main findings are robust and the imprecision (for single parents with children) is likely driven by our denominator rather than the EITC behavior per se.

7. Conclusion

Welfare reform and the expansion of the EITC have dramatically changed the landscape of redistribution policies for low-income families with children in the United States. This change has led to a movement away from “out of work” benefits, which have strong work disincentives, and an increase in “in work” benefits, which promote employment. This dramatic policy shift has been followed by other developed countries (Owens 2005).

The research shows that these policies have been successful at increasing the employment of single mothers with children (Eissa and Liebman 1996, Meyer and Rosenbaum 2000, 2001) and at removing children from poverty (Hoynes and Patel 2015, Short 2014). In light of the importance of the EITC and the decline of TANF, in this paper we evaluate whether the EITC satisfies a central tenet of safety net programs – that they provide protection in times of economic need. While we do not in any way claim that this protective role is an explicit goal of the EITC, evaluating the current safety net in terms of whether and how it provides protection against income losses is important and understudied.

We examine this issue by using administrative tax records to estimate the cyclicity of the EITC over a period when EITC policy was relatively stable. We do so by leveraging substantial variation across states in the timing and severity of cycles, which we measure with the state unemployment rate. Our results show that for married couples with children (and to a lesser extent the childless), EITC claims and income rise in recessions, and thus the credit acts to mitigate income losses for this group. For the largest group of EITC recipients, single mothers with children, there is a *negative* but generally statistically uninformative relationship between unemployment rates and EITC use. These results can be understood within the context of labor supply theory, and in particular connect to different predictions for how earnings change for one- versus two-earner households, as well as underlying differences in the

distribution of income across different family types. Further evidence breaking the data down by education of the filing unit head also supports these predictions.

We do not view our results as suggesting that the EITC ought to be reformed to address this limitation. Insuring against income shocks is not a stated goal of the EITC and its in-work structure yields important benefits in terms of increasing work and earnings, and reducing poverty and income inequality. Yet, we demonstrate that a consequence of the decline of the move from out-of-work based assistance to in-work based assistance is less protection to income shocks for lower income groups (Bitler and Hoynes 2015ab). In the Great Recession, this was countered to some extent by increases in Food Stamp benefits and unemployment insurance extensions, but these protections were temporary. As employment rates have increased among single women with children in response to this change in the policy landscape, future work should examine whether and to what extent Unemployment Insurance is providing job loss protection for this group.

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Table 1: Summary Statistics, EITC Recipients and Expenditures, 2008

Total EITC Recipients (Millions)	24.4
Total EITC Expenditures (Billions 2008\$)	\$50.5
<i>Percent Distribution of Recipients, by Demographic Group</i>	
No Children	21.9%
Single with Children	58.7%
Married with Children	19.4%
<i>Percent Distribution of Expenditures, by Demographic Group</i>	
No Children	2.7%
Single with Children	74.1%
Married with Children	23.2%
<i>Average Credit Amount (2008\$), by Demographic Group</i>	
No Children	\$253
Single with Children	\$2,613
Married with Children	\$2,471

Notes: Data are from the 2008 Statistics of Income, which contains information on tax returns for tax year 2008 (income earned during calendar year 2008). The sample excludes high-income earners, individuals living abroad, late filers and married couples filing separately. Statistics are weighted to represent the population of tax filers.

Table 2: Effects of Unemployment Rate on EITC Reciprocity Rates and Expenditures per Potential Filer

	(1)	(2)	(3)	(4)
	All	Children, Married	Children, Single	No Children
<i>A: EITC Recipients per Potential Filer</i>				
Unemployment Rate	0.385*	0.881***	-0.820	0.252*
	(0.220)	(0.270)	(1.306)	(0.133)
Mean Y	0.220	0.144	0.855	0.079
Percent Impact (%)	1.8	6.1	-1.0	3.2
Observations	663	1326	1326	1326
<i>B: Real EITC Expenditures per Potential Filer (2008\$)</i>				
Unemployment Rate	547.6	1969.7***	-2168.8	47.2
	(609.2)	(672.9)	(3843.3)	(46.4)
Mean Y	460.5	345.3	2201.6	20.1
Percent Impact (%)	1.2	5.7	-1.0	2.3
Observations	663	1326	1326	1326

Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filers from the corresponding survey years of the CPS ASEC. The sample excludes high-income earners, late filers, individuals living abroad and married couples filing separately. The dependent variables are total EITC recipients and real EITC expenditures (\$2008), each divided by the total population of potential filers 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 3: Effects of Unemployment Rate on CPS EITC Reciprocity Rates—
Heterogeneity By Education Level

	(1)	(2)	(3)	(4)
	All	Children, Married	Children, Single	No Children
<i>A: Individuals with HS Degree or Less</i>				
Unemployment Rate	0.500** (0.207)	1.202*** (0.292)	-0.412 (0.642)	0.193 (0.174)
Mean Y	0.252	0.310	0.572	0.094
Percent Impact (%)	2.0	3.9	-0.7	2.1
Observations	663	1326	1326	1326
<i>B: Individuals with Some College or More</i>				
Unemployment Rate	0.657*** (0.112)	0.565*** (0.142)	1.517*** (0.393)	0.467*** (0.131)
Mean Y	0.110	0.092	0.456	0.045
Percent Impact (%)	6.0	6.1	3.3	10.3
Observations	663	1326	1326	1326

Notes: Data are from the 1997–2009 CPS ASEC, with denominators measuring the number of potential filers from the corresponding survey years of the CPS ASEC. The dependent variable is total EITC recipients, as calculated by the NBER TAXSIM tax calculator, divided by the total population of potential filers in each cell. Education level is defined according to the family head. 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 4: Effect of Unemployment Rate on Filing Propensity and EITC Eligible Filers per Potential Filer

	(1) Children, Married	(2) Children, Single	(3) No Children
<i>A: Total Filers</i>			
Unemployment Rate	0.198 (0.577)	-1.775* (1.053)	-1.797*** (0.449)
Share of Filers	1.00	1.00	1.00
Mean Y	0.818	1.135	0.852
Percent Impact (%)	0.2	-1.6	-2.1
Observations	1326	1323	1326
<i>B: Filers in the Eligible Region</i>			
Unemployment Rate	1.035*** (0.322)	-0.537 (1.031)	-0.402* (0.207)
Share of Filers	0.24	0.74	0.24
Mean Y	0.192	0.839	0.240
Percent Impact (%)	5.4	-0.6	-1.7
Observations	1326	1323	1326

Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filers from the corresponding survey years of the CPS ASEC. The sample excludes high-income earners, individuals living abroad, late filers, married couples filing separately, and childless elderly taxpayers, which are defined as childless individuals with positive gross social security benefits. The dependent variable represents the number of filers in the SOI or the number of filers whose earned income puts them in the EITC eligible range, each divided by the population of total potential filers in the demographic group. 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 5: Effect of Unemployment Rate on Participation Rate in EITC and Other Safety Net Programs

	(1) EITC All	(2) EITC Children	(3) AFDC/TANF	(4) Food Stamps	(5) UI
Unemployment Rate	0.163** (0.068)	0.107* (0.063)	0.066* (0.033)	0.285*** (0.061)	0.135*** (0.012)
Mean Y	0.072	0.058	0.009	0.034	0.009
Percent Impact (%)	2.3	1.8	7.7	8.4	14.5
Observations	663	663	663	663	663

Notes: Participation rates for years 1996–2008. The dependent variables are EITC, AFDC/TANF, food stamps, and UI recipients, each divided by the state population. Sources for recipients are in text. All regressions include state and year fixed effects. The results are weighted by the state population. 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 6: Effect of Unemployment Rate on Official Poverty Rate: With and Without EITC

	Official Poverty				Add EITC			
	50%	100%	150%	200%	50%	100%	150%	200%
<i>A: Married with Children</i>								
Unemployment Rate	0.262*** (0.062)	0.742*** (0.120)	0.793*** (0.138)	1.024*** (0.187)	0.152** (0.057)	0.588*** (0.107)	0.744*** (0.127)	1.028*** (0.186)
Mean Y	0.025	0.077	0.151	0.237	0.020	0.059	0.141	0.235
Percent change in coef. due to EITC					-42.0	-20.8	-6.2	0.4
Observations	1326	1326	1326	1326	1326	1326	1326	1326
<i>B: Single with Children</i>								
Unemployment Rate	1.084*** (0.288)	1.974*** (0.349)	1.822*** (0.445)	1.730*** (0.337)	1.024*** (0.289)	1.775*** (0.337)	1.864*** (0.454)	1.788*** (0.336)
Mean Y	0.199	0.373	0.526	0.649	0.177	0.317	0.481	0.632
Percent change in coef. due to EITC					-5.5	-10.1	2.3	3.4
Observations	1326	1326	1326	1326	1326	1326	1326	1326
<i>C: Married with Children, SPM Equivalence Scales</i>								
Unemployment Rate	0.256*** (0.058)	0.706*** (0.124)	0.868*** (0.145)	1.054*** (0.190)	0.148** (0.063)	0.640*** (0.124)	0.837*** (0.139)	1.041*** (0.191)
Mean Y	0.027	0.081	0.158	0.245	0.021	0.064	0.149	0.244
Percent change in coef. due to EITC					-42.2	-9.3	-3.6	-1.2
Observations	1326	1326	1326	1326	1326	1326	1326	1326
<i>D: Single with Children, SPM Equivalence Scales</i>								
Unemployment Rate	1.263*** (0.303)	1.934*** (0.345)	1.781*** (0.466)	1.731*** (0.322)	1.221*** (0.301)	1.787*** (0.335)	1.941*** (0.469)	1.709*** (0.345)
Mean Y	0.207	0.385	0.534	0.655	0.183	0.330	0.494	0.639
Percent change in coef. due to EITC					-3.3	-7.6	9.0	-1.3
Observations	1326	1326	1326	1326	1326	1326	1326	1326

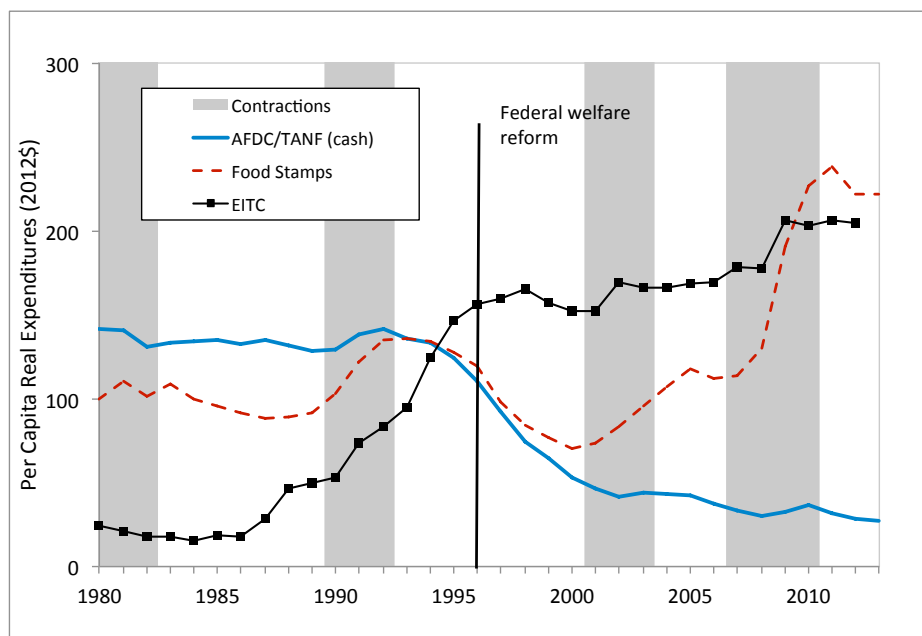
Notes: Data are from the CPS ASEC calendar years 1996-2008 and are collapsed at the demographic group, state and year level. Children are defined following the definition for dependent children (same as children for EITC purposes), and EITC eligibility is calculated by the NBER TAXSIM tax calculator. Panels A and B include the results of regressions for being below various multiples of the official poverty threshold; Panels C and D include the results of regressions for being below various multiples of the official poverty threshold for a family of 4 but incorporate the equivalence scales for families of different sizes from the new Supplemental Poverty Measure. All regressions include controls for demographic characteristics, as well as state and year fixed effects. The results are weighted by the weighted number of families in each cell. The unemployment rate is measured in percentage points. Percent change in the unemployment coefficient due to the EITC is calculated as the percentage change in the coefficient for being below the relevant multiple of the poverty threshold between the specifications for official poverty and official poverty after adding the EITC to income. Standard errors are clustered by state and shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table 7: Effect of Unemployment Rate on EITC Reciprocity Rates,
Sensitivity to Adding State-Year Controls

	EITC Recipients / Population			
	(1)	(2)	(3)	(4)
<i>A: Married with Children</i>				
Unemployment Rate	0.881*** (0.270)	0.888*** (0.263)	0.477* (0.260)	0.464* (0.257)
Observations	1326	1326	1326	1326
<i>B: Single with Children</i>				
Unemployment Rate	-0.820 (1.306)	-0.735 (1.266)	-1.304 (1.585)	-1.504 (1.617)
Observations	1326	1326	1326	1326
<i>C: Childless</i>				
Unemployment Rate	0.252* (0.133)	0.257* (0.135)	0.149 (0.147)	0.118 (0.149)
Observations	1326	1326	1326	1326
State Policies		Yes		Yes
State Linear Trend			Yes	Yes

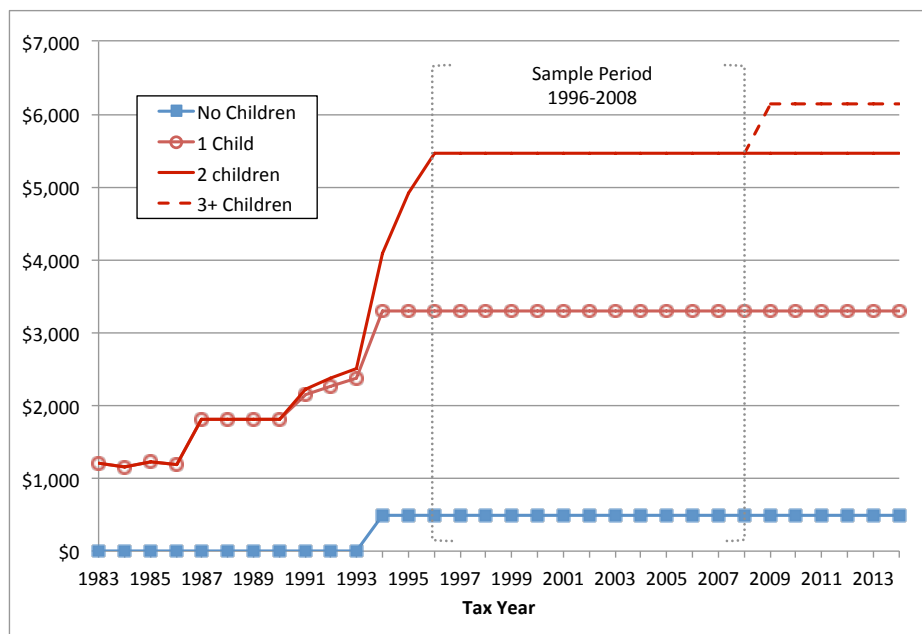
Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filers from the corresponding survey years of the CPS ASEC. The sample excludes high-income earners, individuals living abroad, late filers and married couples filing separately. The dependent variables are total EITC recipients and real EITC expenditures (\$2008), each divided by the total population of potential filers 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. Standard errors are clustered by state and shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 1: Per Capita Expenditures on Cash and Near Cash Transfer Programs for Families (2012\$)



Updated from Bitler and Hoynes (2010) and the sources cited there. The shading indicates years of labor market using annualized adaptation of NBER recession dating.

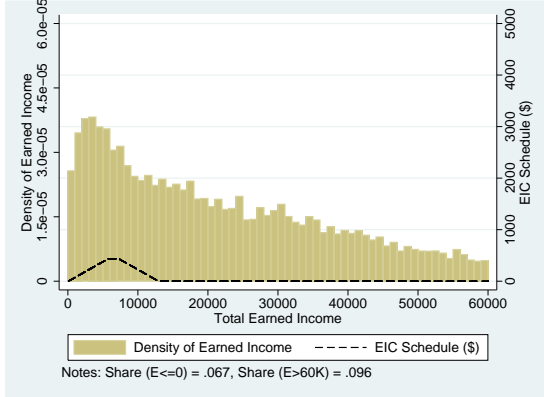
Figure 2: EITC Maximum Benefits By Number of Children (2012\$)



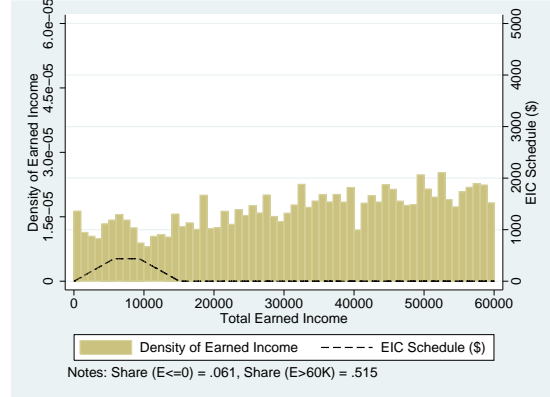
Notes: Data on nominal EITC benefits are from Tax Policy Center. Data on CPI are from the BLS.

Figure 3: EITC Eligibility and the Earned Income Distribution in 2006

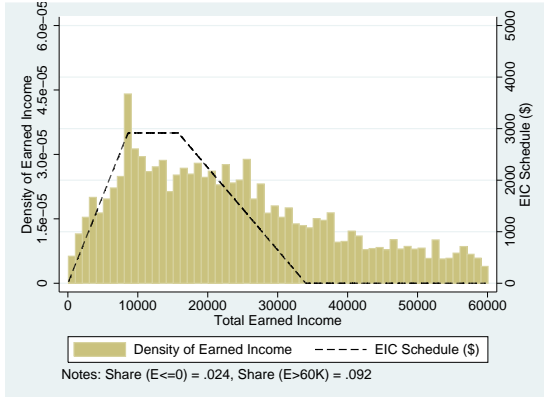
(a) Single, No Children



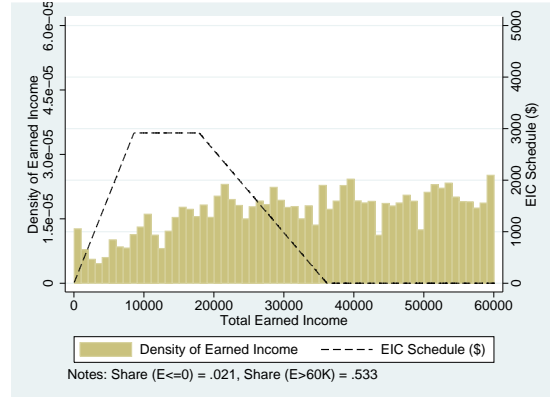
(b) Married, No Children



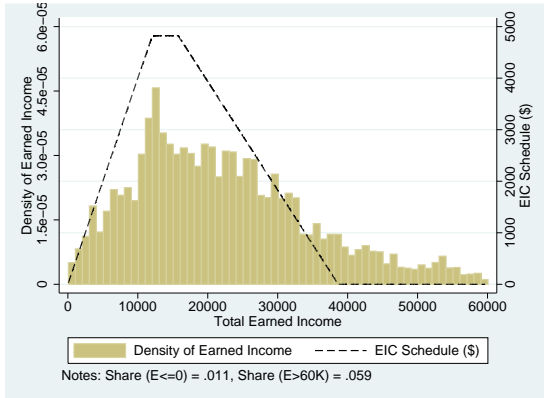
(c) Single, One Child



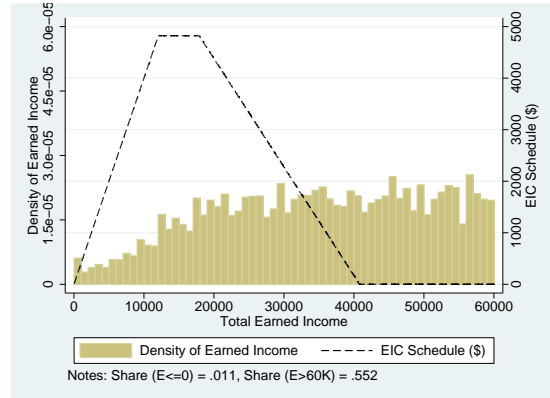
(d) Married, One Child



(e) Single Two+ Children



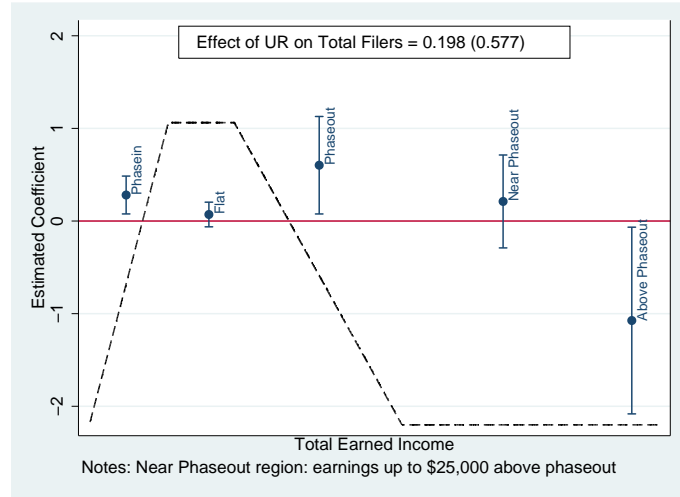
(f) Married, Two+ Children



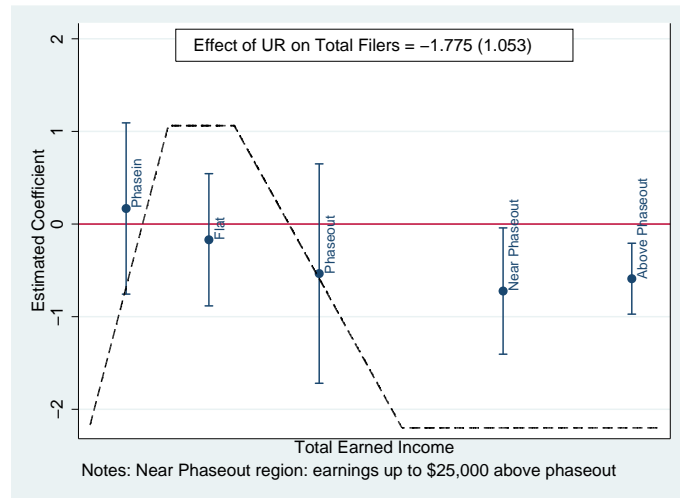
Notes: Figures show the earned income distribution for Tax Year 2006 with the EITC schedule overlaid. Figures on left are for single filers; figures on right are for married filers. Figures in Panels (a) and (b) are for filers with no children; those in Panels (c) and (d) are for filers with one child, and those in Panels (e) and (f) are for filers with 2 or more children. The share of filers with negative or 0 income as well as those with income above \$60,000 are in the figure notes. Data 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, married couples filing separately, and childless elderly taxpayers, which are defined as childless individuals with positive gross social security benefits. Histograms are weighted to represent the population of tax filers.

Figure 4: Effect of Unemployment Rate on Location in EITC Schedule According to Earned Income

(a) Married with Children



(b) Single with Children



Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filers from the corresponding survey years of the CPS ASEC. The sample excludes high-income earners, individuals living abroad, late filers and married couples filing separately. Each point represents an estimated coefficient where the dependent variable is the number of filers whose earned income puts them in each EITC range, each divided by the population of total potential filers in the demographic group. 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. Standard errors are clustered by state.

Appendix

Table A.1: Summary Statistics of Cell Level Data

	(1)	(2)	(3)	(4)
	All	Children, Married	Children, Single	No Children
EITC Recipients per Potential Filer	0.220 (0.294)	0.144 (0.059)	0.855 (0.246)	0.079 (0.052)
Real EITC Expenditures per Potential Filer (2008\$)	460.5 (853.5)	345.3 (178.8)	2201.6 (967.4)	20.11 (13.65)
Tax Filers per Potential Filer	1.150 (0.451)	0.818 (0.124)	1.135 (0.257)	1.356 (0.499)
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 Reciprocity 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
<i>A: EITC Reciprocity Rate</i>						
Unemployment Rate	0.477** (0.204)	-1.137 (1.706)	-0.472 (1.493)	-0.102 (0.123)	0.693* (0.373)	0.986*** (0.346)
Mean Y	0.115	0.814	0.906	0.023	0.134	0.150
Percent Impact (%)	4.1	-1.4	-0.5	-4.4	5.2	6.6
Observations	663	663	663	663	663	663
<i>B: EITC Dollars/Potential Filer (2008\$)</i>						
Unemployment Rate	95.8 (66.1)	-3419.5 (3906.9)	-767.7 (5195.9)	-31.2 (39.2)	1026.4 (723.8)	2477.1** (1007.3)
Mean Y	29.2	1647.3	2899.1	6.0	239.2	407.5
Percent Impact (%)	3.3	-2.1	-0.3	-5.2	4.3	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 filers from the corresponding survey years of the CPS ASEC. The sample excludes high-income earners, individuals living abroad, late filers and married couples filing separately. The dependent variables are total EITC recipients 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. 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 Reciprocity Rate, Expenditures per Potential Filer, and Propensity to File Taxes

	(1) Children, Married	(2) Children, Single	(3) No Children
<i>A: EITC Reciprocity Rate</i>			
UR * Expansion	0.956*** (0.270)	-0.333 (1.405)	0.280* (0.146)
UR * Recession	0.894*** (0.271)	-0.722 (1.305)	0.257* (0.134)
<i>p</i> -value, rec. coef. = exp. coef.	0.288	0.172	0.497
Observations	1326	1326	1326
<i>B: EITC Dollars/Potential Filer (2008\$)</i>			
UR * Expansion	2111.6*** (679.9)	-1320.6 (4145.0)	53.8 (47.7)
UR * Recession	1995.9*** (672.5)	-1998.3 (3862.8)	48.3 (46.1)
<i>p</i> -value, rec. coef. = exp. coef.	0.463	0.407	0.638
Observations	1326	1326	1326
<i>C: Probability of Filing Taxes</i>			
UR * Expansion	0.232 (0.591)	-1.846* (1.007)	-1.982*** (0.489)
UR * Recession	0.197 (0.577)	-1.777* (1.055)	-1.794*** (0.451)
<i>p</i> -value, rec. coef. = exp. coef.	0.831	0.818	0.226
Observations	1326	1326	1326

Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filers from the corresponding survey years of the CPS ASEC. The sample excludes high-income earners, individuals living abroad, late filers and married couples filing separately. The dependent variables are total EITC recipients, real EITC expenditures (\$2008) and total filers, each divided by the total population of potential filers 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 Reciprocity Rates—
Sensitivity to Adding a Lag for the Unemployment Rate

	Children, Married		Children, Single		No Children	
	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment Rate	0.881*** (0.270)	0.498* (0.292)	-0.820 (1.306)	-1.758 (1.309)	0.252* (0.133)	0.004 (0.162)
1-Yr. Lag Unempl. Rate		0.500* (0.255)		1.248 (1.296)		0.327** (0.159)
Mean Y	0.144	0.144	0.855	0.855	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 filers from the corresponding survey years of the CPS ASEC. The sample excludes high-income earners, late filers, individuals living abroad and married couples filing separately. The dependent variable is total EITC recipients divided by the total population of potential filers 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 Reciprocity Rate and Expenditures
per Potential Filer

	(1)	(2)	(3)	(4)
	All	Children, Married	Children, Single	No Children
<i>A: EITC Reciprocity Rate</i>				
Log(Employment)	-0.127** (0.049)	-0.163** (0.061)	-0.054 (0.272)	-0.070*** (0.026)
Mean Y	0.220	0.144	0.855	0.079
Observations	663	1326	1326	1326
<i>B: EITC Dollars/Potential Filer (2008\$)</i>				
Log(Employment)	-241.6 (155.5)	-307.6 (187.1)	-495.8 (805.9)	-16.3* (9.2)
Mean Y	460.5	345.3	2201.6	20.1
Observations	663	1326	1326	1326

Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filers from the corresponding survey years of the CPS ASEC. 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 EITC recipients and real EITC expenditures (\$2008), each divided by the total population of potential filers 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)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Total	Eligible	Phase-in	Flat	Phase-out	Near Phase-out	Above	Non-positive
<i>A: Married with Kids</i>								
Unemployment Rate	0.198 (0.577)	1.035*** (0.322)	0.281*** (0.104)	0.071 (0.068)	0.602** (0.268)	0.211 (0.256)	-1.074** (0.514)	0.027 (0.044)
Share of Filers	1.00	0.24	0.03	0.04	0.17	0.24	0.52	0.01
Mean Y	0.818	0.192	0.026	0.030	0.142	0.197	0.424	0.012
Percent Impact (%)	0.2	5.4	10.9	2.4	4.2	1.1	-2.5	2.2
Observations	1326	1326	1326	1326	1326	1326	1326	1326
<i>B: Single with Kids</i>								
Unemployment Rate	-1.775* (1.053)	-0.537 (1.031)	0.168 (0.472)	-0.170 (0.364)	-0.535 (0.604)	-0.723** (0.348)	-0.590*** (0.195)	0.075 (0.118)
Share of Filers	1.00	0.74	0.18	0.15	0.41	0.17	0.07	0.02
Mean Y	1.135	0.839	0.195	0.175	0.469	0.192	0.085	0.020
Percent Impact (%)	-1.6	-0.6	0.9	-1.0	-1.1	-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 filers from the corresponding survey years of the CPS ASEC. 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 filers (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 Reciprocity Rates,
Sensitivity to Treatment of Late Filers

	Tax Year, with Late Filers		Filing Year
	Excluded [Baseline] (1)	Included (2)	Late Filers Included (3)
<i>A: Married with Children</i>			
Unemployment Rate	0.462* (0.273)	0.422 (0.293)	0.504* (0.291)
Mean Y	0.143	0.147	0.147
Percent Impact (%)	3.2	2.9	3.4
Observations	918	918	918
<i>B: Single with Children</i>			
Unemployment Rate	-1.101 (1.563)	-1.066 (1.578)	-1.002 (1.648)
Mean Y	0.838	0.856	0.857
Percent Impact (%)	-1.3	-1.2	-1.2
Observations	918	918	918
<i>C: Childless</i>			
Unemployment Rate	0.418* (0.217)	0.506** (0.230)	0.416* (0.229)
Mean Y	0.074	0.079	0.078
Percent Impact (%)	5.7	6.4	5.3
Observations	918	918	918

Notes: Data are from the 1996–2004 Statistics of Income, with denominators measuring the number of potential filers from the corresponding survey years of the CPS ASEC. The sample excludes high-income earners, individuals living abroad and married couples filing separately. The dependent variable is total EITC recipients divided by the total population of potential filers 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 Reciprocity Rates and Expenditures per Potential Filer to Definition of Population (Denominator)

	(1) Children, Married	(2) Children, Single	(3) No Children
<i>A: EITC Recipients</i>			
a) Kids: ≤ 18	0.935*** (0.295)	-0.828 (1.437)	0.236* (0.126)
b) Kids: ≤ 19 , or ≤ 24 and FT students	0.892*** (0.276)	-0.493 (1.379)	0.244* (0.132)
c) Kids: b) and disabled, citizens only	0.938*** (0.265)	-0.794 (1.349)	0.243* (0.130)
d) Kids: b) and disabled, and filer maximization	0.856*** (0.256)	-0.636 (1.121)	0.260* (0.142)
<i>B: EITC Dollars (2008\$)</i>			
a) Kids: ≤ 18	2091.7*** (732.9)	-2511.3 (4266.4)	44.1 (44.3)
b) Kids: ≤ 19 , or ≤ 24 and FT students	1991.0*** (685.4)	-1571.4 (4057.4)	45.4 (46.1)
c) Kids: b) and disabled, citizens only	2088.0*** (666.8)	-2017.9 (3964.0)	45.1 (45.5)
d) Kids: b) and disabled, and filer maximization	1908.6*** (641.4)	-1786.7 (3381.3)	48.3 (49.8)
Observations	1326	1326	1326

Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filers from the corresponding survey years of the CPS ASEC 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 EITC recipients 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		Single		Married	
	Single	Married	Single	Married	Male	Female	Male	Female
Unemployment Rate	-0.589** (0.224)	-0.110 (0.167)	-1.223*** (0.332)	-0.081 (0.216)	-0.764*** (0.276)	-0.464*** (0.167)	-0.839*** (0.212)	0.263 (0.201)
Observations	14062	14731	19513	18840	16507	16648	17068	16923

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. 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)	(2)	(3)
	Children, Married	Children, Single	No Children
Unemployment Rate	0.599 (0.676)	1.286 (0.782)	-0.318 (0.577)
Mean Y	12.045	11.326	12.570
Percent Impact (%)	0.05	0.11	-0.03
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. Standard errors are clustered by state and shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.11: Effects of Unemployment Rate on EITC Recipency Rates—
Sensitivity to Definition of Outcome Variable

	(1) Children, Married	(2) Children, Single	(3) No Children
<i>A: $Y = EITC/Pop.$ (Baseline)</i>			
Unemployment Rate	0.881*** (0.270)	-0.820 (1.306)	0.252* (0.133)
Mean Y	0.144	0.855	0.079
Percent Impact (%)	6.1	-1.0	3.2
Observations	1326	1326	1326
<i>B: $Y = \text{Log}(EITC/Pop.)$</i>			
Unemployment Rate	7.479*** (1.950)	-1.008 (1.588)	3.319 (3.293)
Mean Y	-2.026	-0.198	-2.870
Percent Impact (%)	7.5	-1.0	3.3
Observations	1290	1322	1249
<i>C: $Y = \text{Log}(EITC)$</i>			
Unemployment Rate	5.733** (2.350)	-0.300 (1.785)	4.095 (6.246)
Mean Y	10.032	11.068	9.587
Percent Impact (%)	5.7	-0.3	4.1
Observations	1290	1322	1249
<i>D: $Y = \text{Log}(EITC)$, Control for Pop.</i>			
Unemployment Rate	5.609** (2.348)	-0.423 (1.768)	4.049 (6.259)
Mean Y	10.032	11.068	9.587
Percent Impact (%)	5.6	-0.4	4.0
Observations	1290	1322	1249
<i>E: $Y = EITC/(State\ Pop.)$</i>			
Unemployment Rate	0.045*** (0.015)	0.009 (0.029)	0.028** (0.011)
Mean Y	0.008	0.022	0.007
Percent Impact (%)	5.9	0.4	4.1
Observations	1326	1326	1326

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 dependent variable in Panel A is total EITC recipients divided by the total population of potential filers in each cell, calculated from the corresponding survey years of the CPS ASEC. The dependent variable in Panels B and C is the natural logarithm of total EITC recipients, and the dependent variable in Panel D is total EITC recipients divided by the state population. All regressions include controls for demographic characteristics, as well as state and year fixed effects, and Panel C includes an additional control for the total population of potential filers in each cell. The results are weighted by the population of potential filers in each cell in Panels A and B, and by the state population in Panel E. The results in panels C and D are unweighted. 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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure A.1: EITC Schedule for Single Parents with Two Children (2012) and Predicted Effects

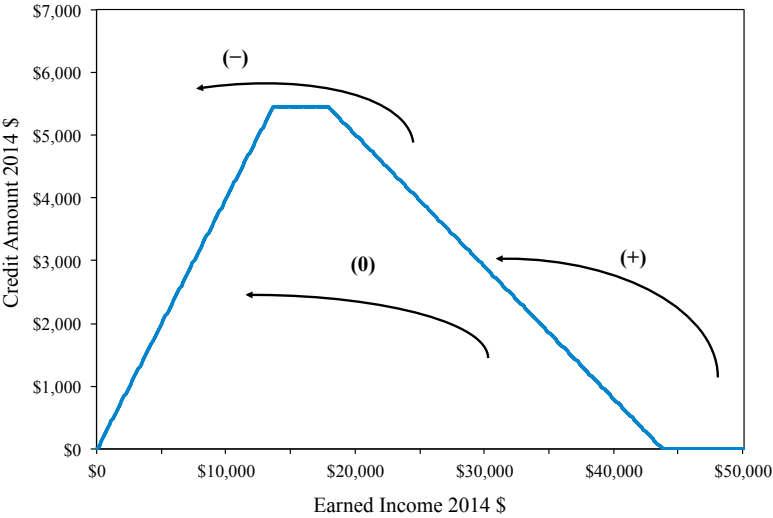
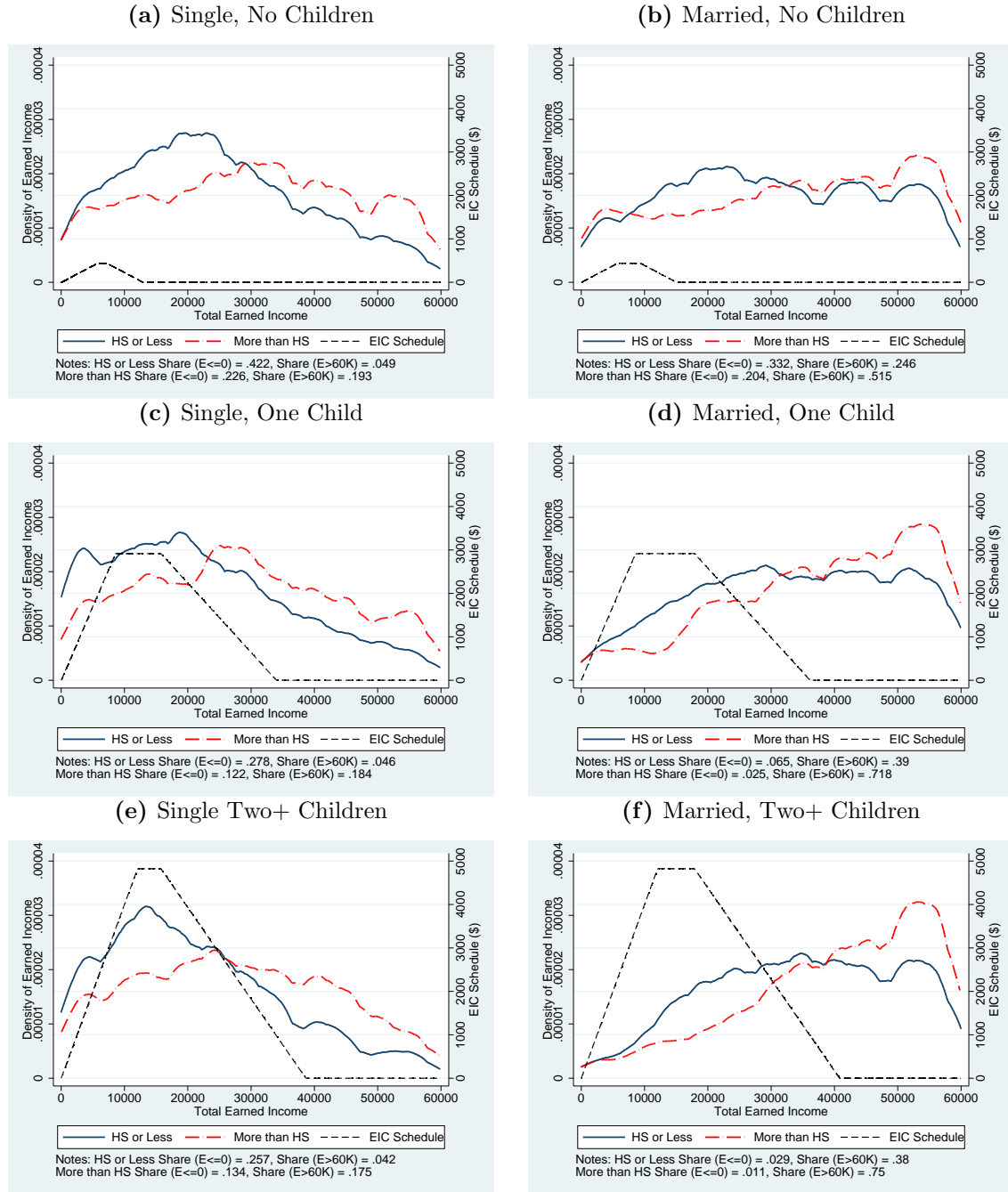
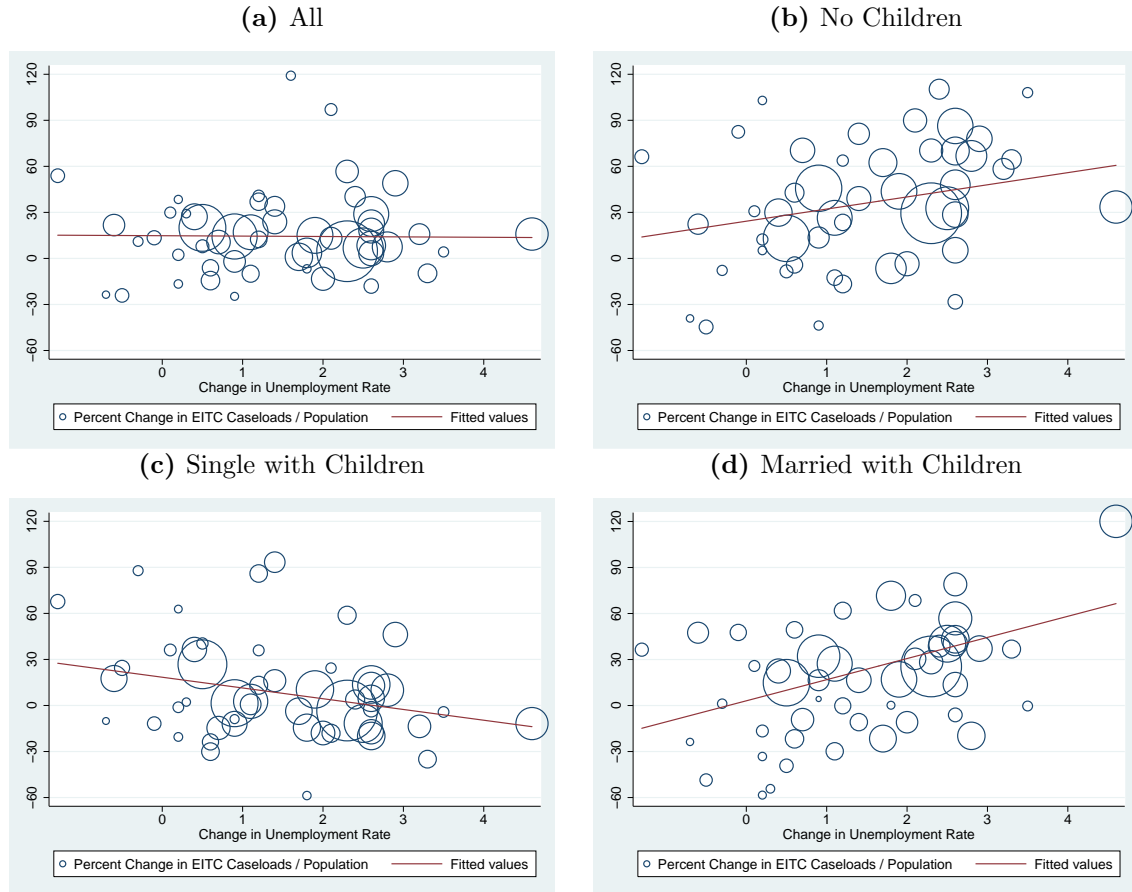


Figure A.2: EITC Eligibility and Earned Income Distribution in 2006, By Education Level—CPS



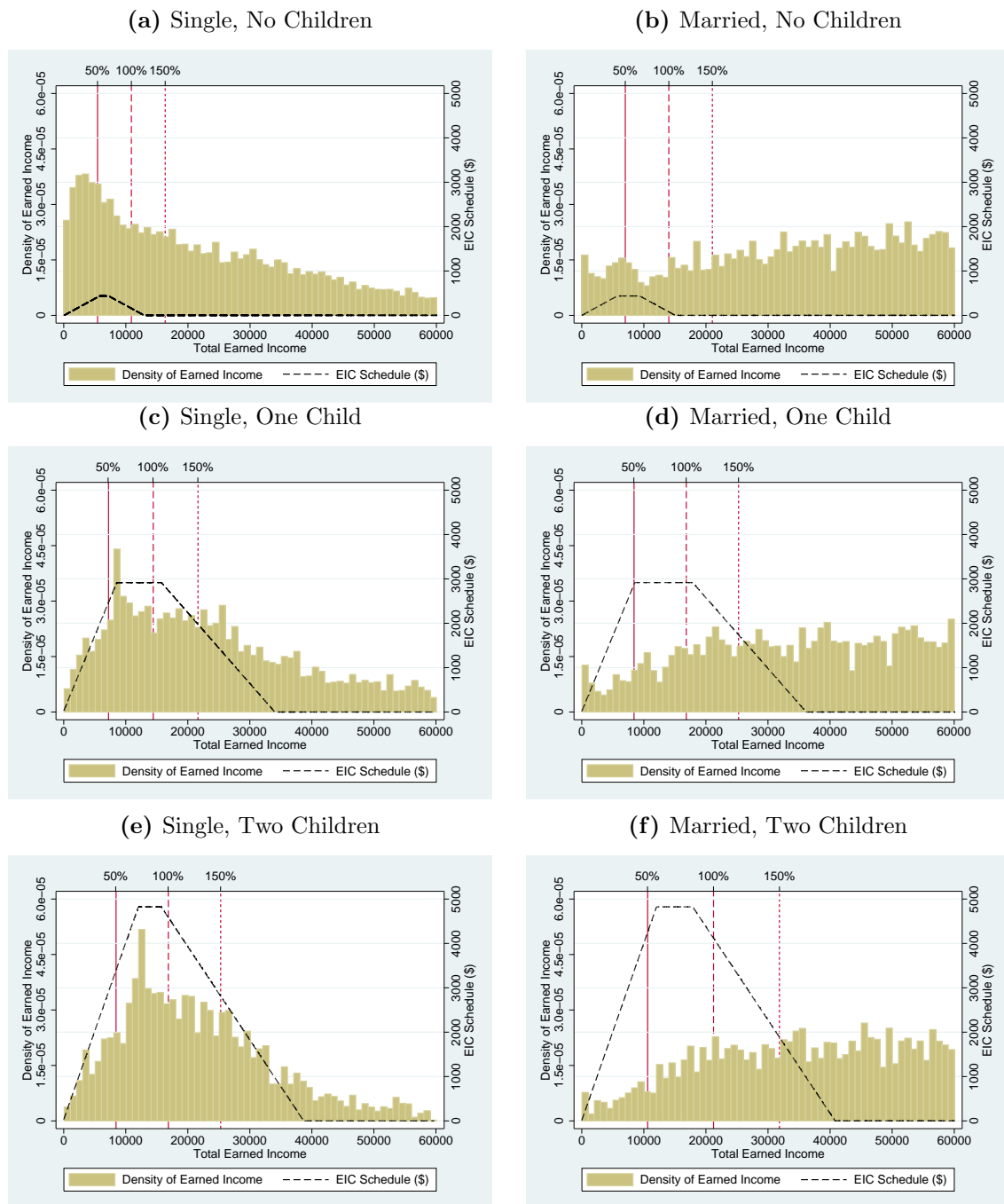
Notes: Figures show the 2007 CPS ASEC earned income distributions (for calendar year 2006) by education level, overlaid with the 2006 EITC schedule. Education level is defined according to the family head. Figures on left are for single filers; figures on right are for married filers. Figures in Panels (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.3: EITC Reciprocity Rates and Unemployment Rates, Changes from 2000 to 2008 by State



Notes: Data are from the 2000 and 2008 Statistics of Income. Unemployment rate changes measured in percentage points; reciprocity rate changes measured in percent. The sample excludes high-income earners, individuals living abroad, late filers and married couples filing separately. Unemployment rates are from the BLS. Circle sizes are proportional to the population of potential filers in each cell, calculated with CPS ASEC data. In order to present results on the same scale, we drop observations where the percent change in EITC recipients divided by population is larger than 130.

Figure A.4: EITC Eligibility, Earned Income Distribution, and Poverty Thresholds in 2006



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.