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

Marianne Bitler
Hilary Hoynes
Elira Kuka

ABSTRACT

We test the EITC's response to economic need. Using IRS data we exploit differences in timing and severity of economic cycles across states. Because the EITC requires earned income, there is a theoretical ambiguity in the credit's cyclicality. We find higher unemployment leads to increased likelihood of EITC recipiency and in credit amounts received for married couples but has insignificant effects for single individuals. The EITC's protective effects are concentrated among skilled workers. The EITC mitigates income shocks for married couples with children and groups likely to have moderate earnings, but does not for most recipients: single parents with children.

I. Introduction

The Earned Income Tax Credit (EITC) 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

Marianne Bitler is a professor of economics at U.C. Davis and a faculty research associate at NBER. Hilary Hoynes is a professor of public policy and economics at U.C. Berkeley and a research fellow at NBER. Elira Kuka is an assistant professor at the Department of Economics, S.M.U. *Funding for this project was provided by the Center for Poverty Research at UC Davis. The authors thank Dan Feenberg for help with the NBER SOI data. They are grateful to Sheldon Danziger, Laura Kawano, Yair Listokin, Jacob Goldin, Doug Miller, and Bruce Meyer and participants at the NBER Universities Research Conference "Poverty Inequality and Social Policy," the 2013 CELS Meeting, the 2014 AEA meetings, the 2015 SOLE meeting, APPAM, U.C. Berkeley, and U.C. Davis for useful comments. The authors also thank Janet Holtzblatt, Jeff Liebman, Laura Wheaton, and Ed Harris for help with constructing the "at-risk"' population to accompany the data from SOI tax filing units. The data used in this article can be obtained beginning October 2017 through September 2020 from Hilary Hoynes, hoynes@berkeley.edu.*
[Submitted June 2014; accepted December 2015]; doi:10.3368/jhr.52.2.0614-6433R1
ISSN 0022-166X E-ISSN 1548-8004
Supplementary materials are freely available online at: http://uwpress.wisc.edu/journals/journals/jhr-supplementary.html

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, in 2011, fewer than 2 million families received cash welfare benefits, such as Temporary Assistance for Needy Families (TANF), 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 United States, only one government program 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 (such as unemployment compensation), public assistance benefits (such as 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 providing "explicit" income-smoothing (transfers) and "implicit" income-smoothing (such as 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 (IRS), supplemented by data from the Current Population Survey (CPS). 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 recipiency 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 alternate functional forms for our outcome variables (logs), and to using different timing 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 a taxpayer to be eligible 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 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 on-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 typical 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 2014). And more generally, it is well known that a progressive income tax structure serves as an automatic stabilizer. (See, for example, 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 modal locations in the budget set, and to place such a discussion in the context of static labor supply theory predictions.[1] Our work also contributes to the empirical literature on the cyclicality of safety-net programs such as Food Stamps (for example, Ziliak et al. 2003; Bitler and Hoynes 2010), Aid to Families with Dependent Children (AFDC)/TANF (Blank 2001; Ziliak et al. 2000; Bitler and Hoynes 2010), and other food and nutrition programs (Corsetto 2012).

Our main results use IRS Statistics of Income (SOI) microdata for tax years 1996–2008. We choose this period because the EITC schedule was relatively fixed during this era, 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 recipiency rates are modestly countercyclical, 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 a higher unemployment rate leads to a higher rate of EITC recipients per potential filer and higher expenditures per potential filer for married couples with children. For example, a one percentage point increase in the unemployment rate leads to a 6.1 percent increase in the EITC recipiency rate for this group. Filers without children, who are eligible for a much smaller credit, also exhibit countercyclical movements—a one percentage point increase in the unemployment rate leads to a 3.2 percent increase in the recipiency 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 limit (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. This thereby *mitigates* 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

1. Jones (2015) uses linked CPS-IRS data to look at the effect of the Great Recession on the probability a family has both the earned income and the relevant family structure to make the family eligible to claim the EITC, finding results consistent with ours.

group of recipients, whether measured by recipiency 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 earnings, thus reducing the likelihood of 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 on average 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 microdata to examine effects of business 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 region with tax liability (and into nonfiling status).

To put these results in context, we compare our results to estimates of the cyclicality 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 cyclicality 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 pretax cash income. We then recalculate poverty rates after adding the EITC to pretax cash income. Consistent with the analysis of administrative SOI tax data, poverty fluctuates less across the business cycle when the EITC is included than when it is excluded, with the strongest protective aspect of the EITC being among married couples with children.[2]

The remainder of this paper proceeds as follows. Section II outlines the EITC and the recent evolution of the safety net and discusses the relevant theoretical predictions. Section III discusses the data and Section IV presents our empirical model. The results are presented in Section V, sensitivity analysis is in Section VI, and we conclude in Section VII.

II. 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 15 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

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

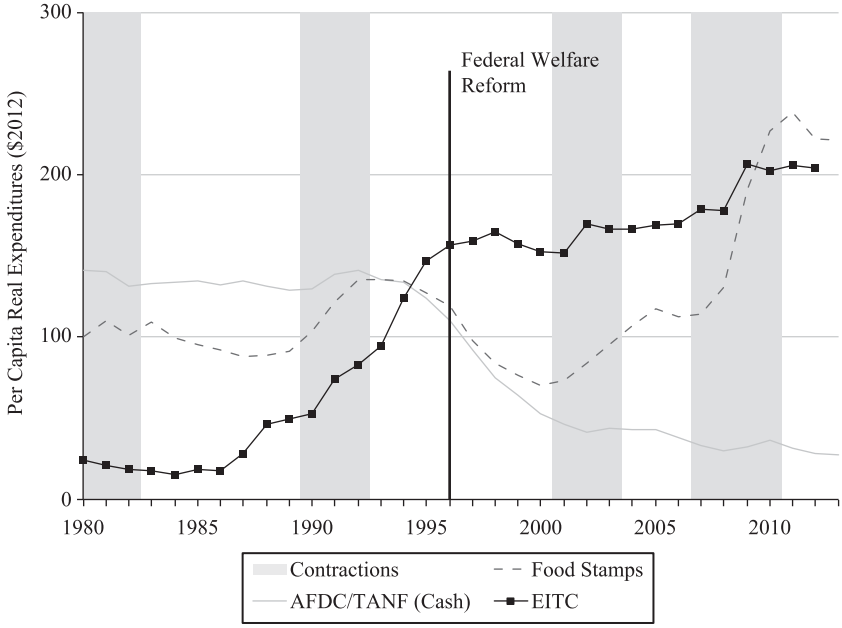


Figure 1

Per Capita Expenditures on Cash and Near Cash Transfer Programs for Families ($2012)

Notes: 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.

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 with children: the EITC, Temporary Assistance for Needy Families, and Food Stamps (now called the Supplemental Nutrition Assistance Program or SNAP). The shaded regions are contractionary periods, annualized based on the National Bureau of Economic Research (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. By 2012, spending on the EITC was more than seven dollars for every dollar spent 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 to in-work aid.

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.

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 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 of the program is to increase the aftertax 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. The potential income transfer is substantial—the maximum credit for single filers with 2 or more children is $5,460 and the phase-out range extends to earned 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, and 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 that was 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 percent), married couples with children (19 percent), and taxpayers without children (21 percent). 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 percent of the credit dollars go to single filers with children and 23.2 percent go to married filers with children. The small share of dollars claimed among those without children (2.7 percent) reflects their much lower potential credit amounts

4. Adjusted gross income (AGI) also plays a role in calculating EITC eligibility and benefits. First, AGI also must 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 (as in Table 4 and Figure 5 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.

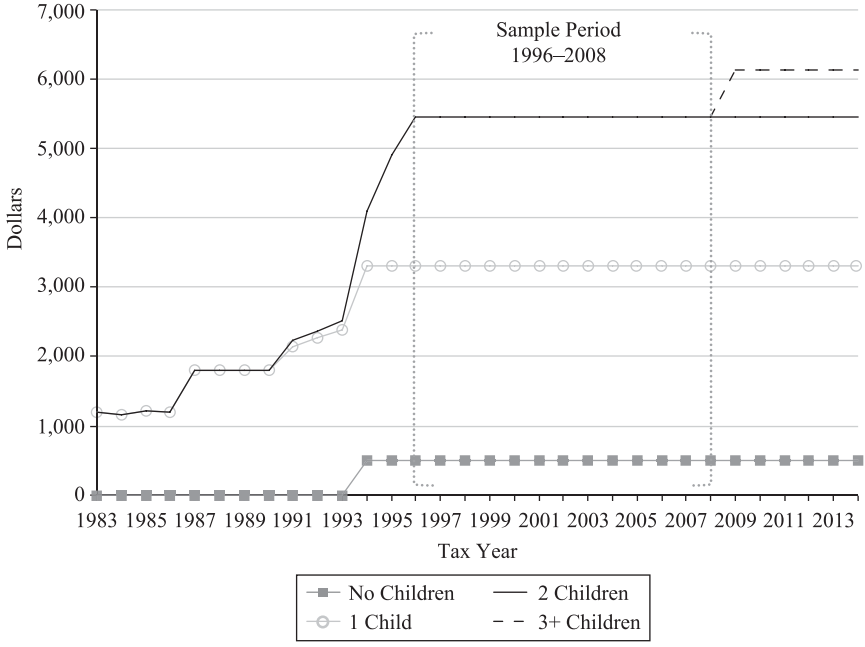


Figure 2

EITC Maximum Benefits by Number of Children ($2,012)

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

and participation rates. In fact, while among taxpayers with children takeup of the EITC is high (and has been steady) at about 75 to 80 percent (for example, Scholz 1994; Plueger 2009), EITC takeup for childless taxpayers is much lower at 56 percent.

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. On the one hand, a downturn may lead to higher rates of EITC participation and dollars received; if decreases in earnings move taxpayers down into the EITC eligibility range. On the other hand, a downturn could lead to lower EITC participation and dollars received; if the main effect of the downturn is to cause individuals to leave the labor force, reducing earnings to zero. 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.

Figure 3 serves to sharpen these theoretical predictions for our main demographic groups of interest. 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

Table 1
Summary Statistics, EITC Recipients and Expenditures, 2008

A. Total Recipients and Expenditures	
Total EITC recipients (millions)	24.4
Total EITC expenditures (billions $2008)	$50.5
B. Percent Distribution of Recipients, by Demographic Group	
No children	21.9%
Single with children	58.7%
Married with children	19.4%
C. Percent Distribution of Expenditures, by Demographic Group	
No children	2.7%
Single with children	74.1%
Married with children	23.2%
D. Average Credit Amount ($2008), by Demographic Group	
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.

sample in detail below). We present the histograms for six demographic groups: single individuals with no children, married couples with no children, single with one child, married with one child, single with two or more children, and married with two or more children. For each, the dashed line shows the EITC schedule and we force the *X*- and *Y*-axes to have the same scale across all six 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 $1,000 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 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 percent of singles with one child and 18 percent of singles with two children have earnings higher than the top of the phase-out range (compared to 76 percent and 75 percent for married families

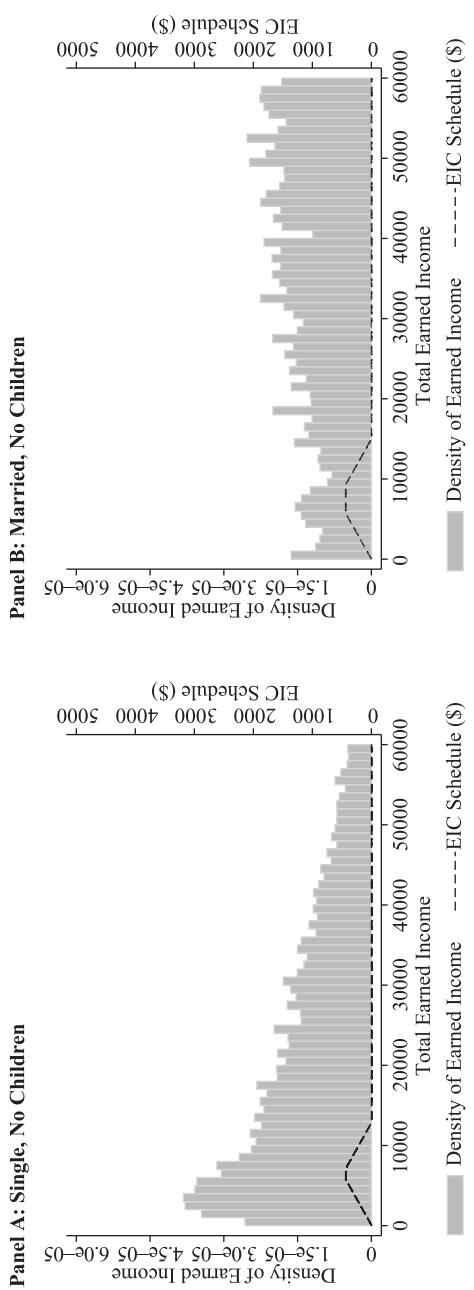


Figure 3

EITC Eligibility and the Earned Income Distribution in 2006

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.

(*continued*)

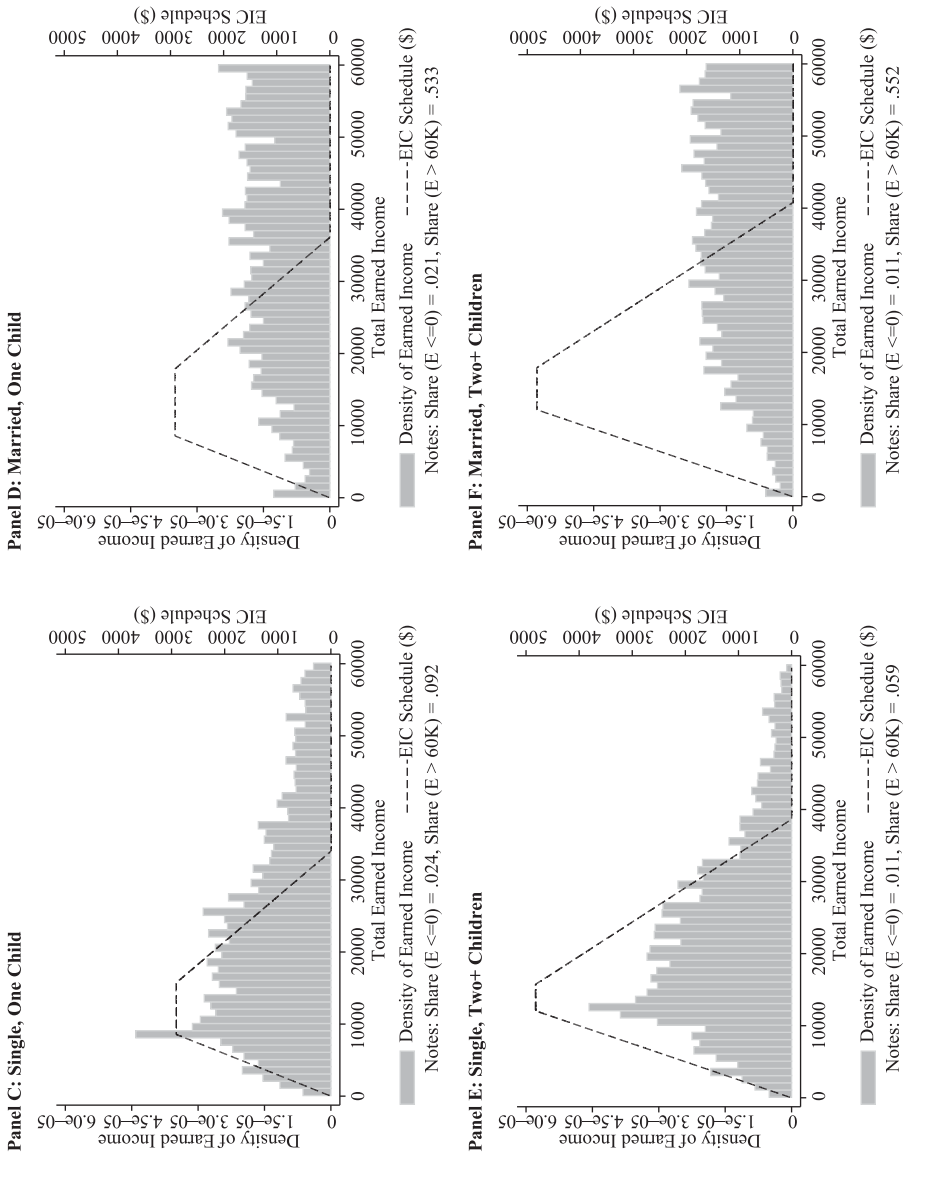


Figure 3 (*continued*)

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.

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 1 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 likely will 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, lower income) families are less likely to experience income stability from the EITC, and may theoretically experience increased income instability from the EITC.

III. 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.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 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 separately), number of dependents, earned income, EITC credit amount, number of children qualifying for the EITC, and state of residence.[6]

Our sample is created as follows. First, we exclude all high-income individuals (filers with returns over $200,000 of adjusted gross income or 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

6. 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 takeup and noncompliance. Evidence suggests that takeup is acyclical, and Scholz (1994) and Plueger (2009) estimate quite similar takeup rates by group for 1990 and 2005.

eligibility range.[7] 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 percent of the weighted sample. Below, we show in a robustness check that the results are not sensitive to this sample restriction. In addition, we exclude married individuals filing separately, as these filers are not eligible for the EITC. We also exclude childless taxpayers age 65 and above, given that EITC eligibility for filers without children is limited to those between 25 and 64. Because age is not reported in the SOI data for our full-time period, we proxy for those age 65 and above with those who claim Social Security Benefits.[8]

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 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, each measured per "potential filer." Hence, we need to construct denominators of potential filers, the "at-risk" populations, in order to convert the administrative tax data counts to rates. To do so, we use data from the March CPS 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

7. This group is relatively small, accounting for around 2.3 percent of the weighted sample.

8. Social Security Benefits claimed on the tax return captures primarily retirement income but also includes Social Security Disability income. We have cross-checked the data for 1994, where the SOI data provides a variable indicating the filer is age 65 and over, and found that, among filers who took no old age exemptions, only 4 percent declared Social Security benefits while among individuals that took one or two age exemption (for themselves and/or their spouse), the percent of filers with Social Security benefits was 60 percent and 68 percent, respectively.

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 are 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 percent of the time and have a valid Social Security number.

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 (measured in March of year X).

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 age 18, or he/she must be a full-time student whose age is less than or equal to 23, or he/she must be an individual who reports being disabled and that he/she cannot work. Potential filers among 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 cyclicality of the EITC varies by skill group, which we measure using the education of the head (education is not observed in the tax data). We use the NBER TAXSIM model to simulate EITC receipt and credit amounts. We then collapse the data to get average receipt rates and average EITC amounts per family for cells based on education (high school or below, some college or higher), marital status, number of children, state and year. Additionally, we use the CPS to examine how the EITC affects the cyclicality of poverty, examining whether families have income below 50 percent, 100 percent, 150 percent, and 200 percent of the official federal poverty line. Official poverty status in the United States is determined by comparing total pretax 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 capture the tax system (such as the EITC) or the noncash transfer system (such as Food Stamps). We calculate a second poverty measure where the income measure includes pretax income and TAXSIM simulated EITC. We also calculate cash poverty and cash plus EITC poverty using the official threshold for a family of four and the equivalence scales from the Supplemental Poverty Measure that adjust for unit size and composition (Short 2014). We calculate these four poverty measures for each family and then collapse the data to cells based on state, year, and family type.[12]

To put our results on the cyclicality 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 analyze 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 the U.S. Department of Health and Human Services (2013), U.S. Department of Agriculture (2013), and the U.S. Department of Labor (2013).

11. As shown in Appendix Table 1, the resulting variable EITC recipients per at risk population of filers is above 1 for single filers with children. Others have noted this high measured participation rate, 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.

12. For creating the collapsed cells in the CPS, we use 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).

IV. 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 cells g (filing status x number of children [0, 1, 2+]), state s, and tax 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 takeup 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.[13] 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 destabilizing 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 negative shock (earnings fall into the EITC eligibility range or down the phase-out region). Our estimates capture the average effect, which is 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

13. 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 same calendar year. It is worth pointing out that most EITC participants receive the credit as a tax refund early in the calendar year following the tax year.

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/State Children's Health Insurance Program (SCHIP) income eligibility limits. Additionally, we explore the sensitivity of the findings to controlling for state-specific linear time trends ($year_t * \gamma_s$).

The validity of this design requires that the composition of the sample across the six marital status-number of children cells is not changing with the unemployment rate. This seems reasonable, given that the literature on the cyclicality of marriage, fertility, and living arrangement shows either no responses or small responses. Schaller (2013), for example, estimates that increases in unemployment rates lead to small declines in marriage and divorce rates (between 1.5 and 1.7 percent). The literature on the cyclicality of fertility is mixed but generally shows a small negative effect of unemployment rates on fertility (Dehejia and Lleras-Muney 2004; Schaller 2013a). Bitler and Hoynes (2015b) find that the cyclicality of living arrangements such as "doubling up" is small in magnitude. Below, we provide a within sample test of this assumption by estimating whether our potential filer populations themselves vary cyclically, finding no such evidence.

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

V. Results

Table 2 presents our main results. Column 1 presents estimates for the pooled sample, while the remaining columns are estimates using each of our three demographic groups. The pooled sample contains 663 observations (51 states including DC ×13 years) while the other columns have 1,326 observations (51 states ×13 years ×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 percent 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

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

	All (1)	Children, Married (2)	Children, Single (3)	No Children (4)
Panel A: EITC Recipients per Potential Filer				
Unemployment rate	0.386*	0.889***	−0.899	0.252*
	(0.219)	(0.273)	(1.329)	(0.132)
Mean Y	0.220	0.146	0.868	0.079
Percent impact (%)	1.8	6.1	−1.0	3.2
Observations	663	1,326	1,326	1,326
Panel B: Real EITC Expenditures per Potential Filer ($2008)				
Unemployment rate	550.6	1992.4***	−2457.2	47.3
	(608.2)	(679.4)	(3919.4)	(46.0)
Mean Y	460.9	348.6	2234.0	19.9
Percent impact (%)	1.2	5.7	−1.1	2.4
Observations	663	1,326	1,326	1,326

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

when measured by the recipiency 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 recipiency 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 for childless individuals (Column 4)—a one percentage point increase in unemployment leads to a 3.2 percent increase in the recipiency 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 procyclical movements and income destabilization for single-parent families, although we note the confidence interval for the single-parent families is large.[14]

14. 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

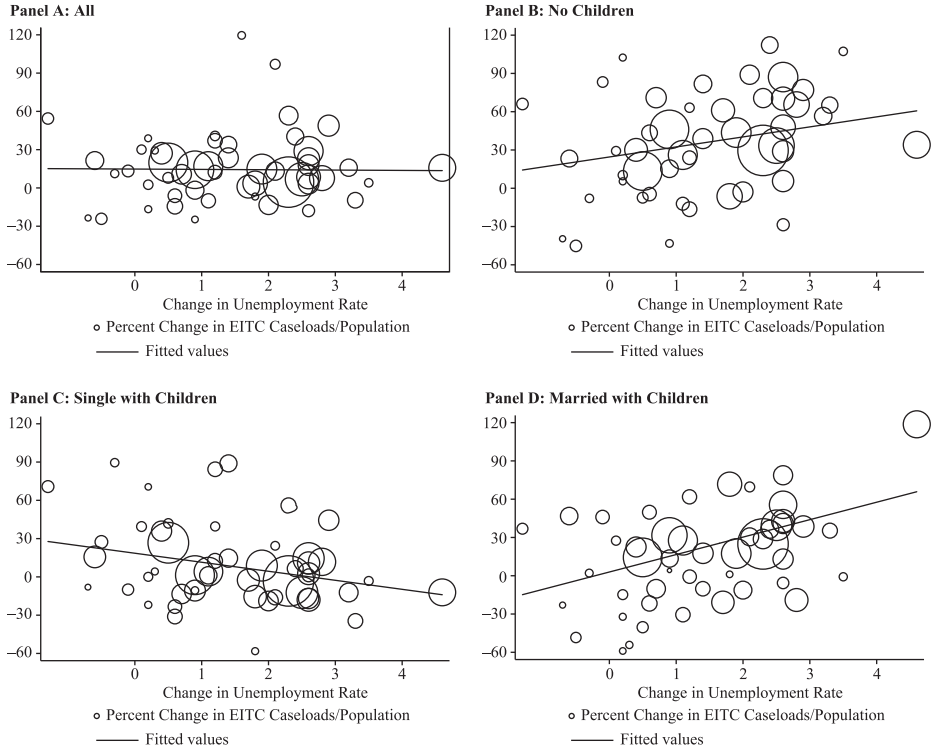


Figure 4

EITC Recipiency 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; recipiency 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 the CPS ASEC data collected in the year corresponding to the tax year. 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.

We illustrate the differential patterns by marital status another way in Figure 4. 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.[15] We also include the linear fit (using the states' potential filers as weights).

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.

15. 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.

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 changes in unemployment rates and changes in EITC recipients per potential filer. Single parents with children, however, exhibit a negative relationship, with rising unemployment rates associated with declining EITC recipiency 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. Second, we explore a possible lag structure including the current unemployment rate and a one-year lag of the unemployment rate, suggesting total effects quite similar to our main results.[16] In addition, our results are robust to using the natural log of employment as an alternative measure of the business cycle. These results are available in the online appendix.

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.

However, 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 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 as the dependent variable, with and without a control for population.[17] Second, we estimate models with the total state population as the denominator (rather than the potential filers in each demographic group). Table 3 presents these estimates. There are two important findings from this analysis. First, the percent effects are remarkably similar across the alternative specifications for all three marital status/children groups. Second, the standard errors for single parents with children 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

16. 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.

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

Table 3

Effects of Unemployment Rate on EITC Recipiency Rates—Sensitivity to Definition of Outcome Variable

	Children, Married (1)	Children, Single (2)	No Children (3)
Panel A: Y = EITC/Population [Baseline Specification]			
Unemployment rate	0.889***	−0.899	0.252*
	(0.273)	(1.329)	(0.132)
Mean Y	0.146	0.868	0.079
Percent Impact (%)	6.1	−1.0	3.2
Observations	1,326	1,326	1,326
Panel B: Y = Log(EITC/Population)			
Unemployment rate	7.468***	−1.057	3.333
	(1.964)	(1.602)	(3.295)
Mean Y	−2.017	−0.183	−2.882
Percent Impact (%)	7.5	−1.1	3.3
Observations	1,290	1,322	1,249
Panel C: Y = Log(EITC)			
Unemployment rate	5.733**	−0.300	4.095
	(2.350)	(1.785)	(6.246)
Mean Y	10.032	11.068	9.587
Percent impact (%)	5.7	−0.3	4.1
Observations	1,290	1,322	1,249
Panel D: Y = Log(EITC), Control for Population			
Unemployment Rate	5.595**	−0.416	4.057
	(2.349)	(1.764)	(6.258)
Mean Y	10.032	11.068	9.587
Percent impact (%)	5.6	−0.4	4.1
Observations	1,290	1,322	1,249
Panel E: Y = EITC/(State Population)			
Unemployment Rate	0.045***	0.009	0.028**
	(0.015)	(0.029)	(0.011)
Mean Y	0.008	0.022	0.007
Percent impact (%)	5.9	0.4	4.1
Observations	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 dependent variable in Panel A is total number of tax returns with EITC claims divided by the total number of potential filing units 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 number of tax returns with EITC claims, and the dependent variable in Panel D is total number of tax returns with EITC claims 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 in Panels A and E 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. Percent impact in Panels B, C, and D is given by the coefficient, as it is a log linear model. Standard errors are clustered by state and shown in parentheses. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table 4
Effects of Unemployment Rate on CPS EITC Recipiency Rates—Heterogeneity by Education Level

	All (1)	Children, Married (2)	Children, Single (3)	No Children (4)
Panel A: Individuals with High School Degree or Less				
Unemployment rate	0.511**	1.177***	–0.384	0.208
	(0.201)	(0.310)	(0.628)	(0.170)
Mean Y	0.250	0.311	0.573	0.093
Percent impact (%)	2.0	3.8	–0.7	2.2
Observations	663	1,326	1,326	1,326
Panel B: Individuals with Some College or More				
Unemployment rate	0.645***	0.581***	1.449***	0.465***
	(0.109)	(0.144)	(0.385)	(0.131)
Mean Y	0.110	0.092	0.458	0.045
Percent impact (%)	5.9	6.3	3.2	10.3
Observations	663	1,326	1,326	1,326

Notes: Data are from the 1997–2009 CPS ASEC, with denominators measuring the number of potential filing units from the CPS ASEC corresponding to the tax year (tax year X matched with survey done in year X). The dependent variable is total number of filers eligible for the EITC, as calculated by the NBER TAXSIM tax calculator, divided by the total number of potential filing units 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. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

are robust and the imprecision (for single parents with children) is likely driven by our denominator rather than the behavior of the EITC.

We further explore the cyclicality of the EITC 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 4. Overall, for each of the three demographic groups, those in 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 6.3 percent increase in EITC claims per potential filer for those with some college or more and a 3.8 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 3.2 percent increase in EITC claims per potential filer. Less educated single parents with children, by contrast, show

negative but statistically uninformative estimates. These results based on the CPS show that the earlier SOI results reflect averages across skill subgroups with different levels of cyclicality.

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 *number of total 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 (for example, 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 5 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 procyclical filing status—a one percentage point increase in the unemployment rate leads to a 1.6 percent reduction in the number of filers per potential filer. Childless filers also show procyclical 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 potential filer mirror the main results for EITC recipients in Table 2, with married couples showing a significant counter-cyclical EITC eligibility.

Figure 5 presents similar results for filers 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 for each outcome. (Appendix Table 6 contains the full set of coefficients and standard errors.) Figure 5a 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 5b, 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 5 serve to deepen our understanding of the income stabilizing (or destabilizing) 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

Table 5
Effect of Unemployment Rate on Filing Propensity and EITC Eligible Filers per Potential Filer

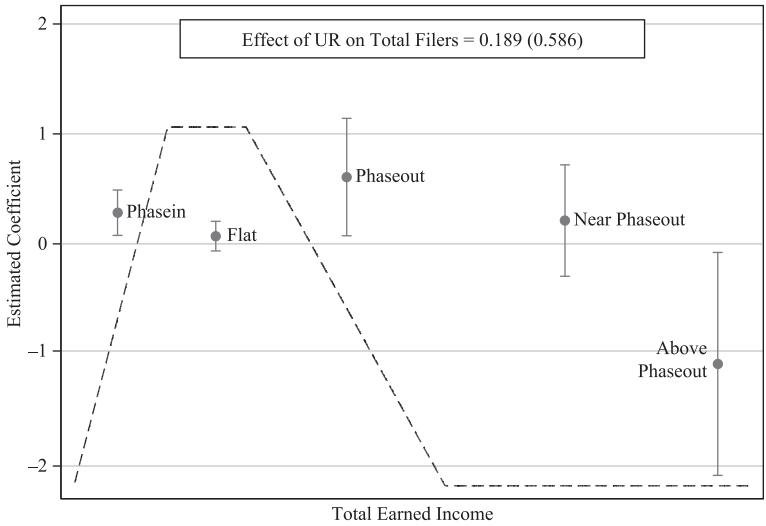
	Children, Married (1)	Children, Single (2)	No Children (3)
Panel A: Total Filers			
Unemployment rate	0.189	−1.863*	−1.776***
	(0.586)	(1.064)	(0.440)
Share of filers	1.00	1.00	1.00
Mean Y	0.826	1.152	0.847
Percent impact (%)	0.2	−1.6	−2.1
Observations	1,326	1,326	1,326
Panel B: Filers in the Eligible Region			
Unemployment rate	1.044***	−0.606	−0.396*
	(0.327)	(1.053)	(0.202)
Share of filers	0.24	0.74	0.24
Mean Y	0.194	0.851	0.238
Percent impact (%)	5.4	−0.7	−1.7
Observations	1,326	1,326	1,326

Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filing units from the CPS ASEC corresponding to the tax year (tax year X matched with survey done in year X). The sample excludes high-income earners, individuals living abroad, late filers, 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 total number of potential filing units 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. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

downturns lead on net to a shift from being above the EITC-eligibility 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).

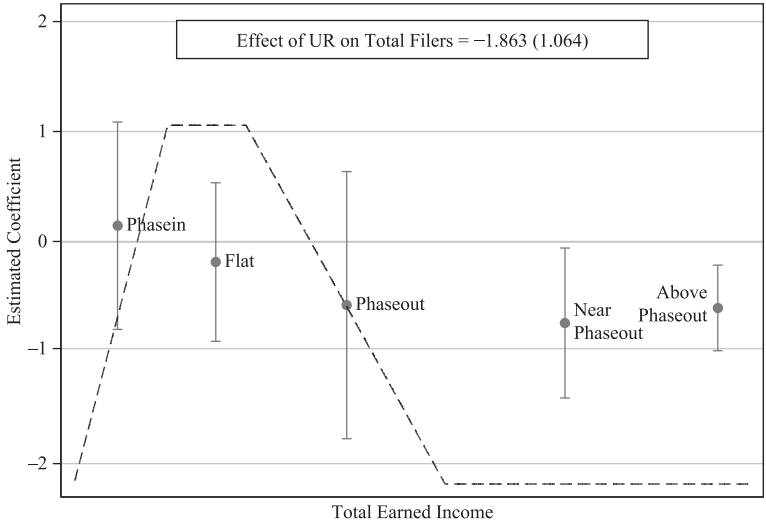
To put these results in context, it is useful to compare these results to estimates for the cyclicality of other key safety net programs. These results are presented in Table 6, where we compare results for the EITC to those for AFDC/TANF (Column 3), Food Stamps (Column 4), and UI (Column 5). For each model, the data are at the state-year level covering the period 1996–2008, and we divide the various caseloads by the state population. For the EITC, we present two measures—all EITC participants per capita

Panel A: Married with Children



Notes: Near Phaseout region: earnings up to $25,000 above phaseout

Panel B: Single with Children



Notes: Near Phaseout region: earnings up to $25,000 above phaseout

Figure 5

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

Notes: Data are from the 1996–2008 Statistics of Income, with denominators measuring the number of potential filing units from the CPS ASEC corresponding to the tax year (tax year X matched with survey done in year X). The sample excludes high-income earners, individuals living abroad, late filers and married couples filing separately. 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 total number of potential filing units 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.

Table 6
Effect of Unemployment Rate on Participation Rate in EITC and Other Safety Net Programs

	EITC All (1)	EITC Children (2)	AFDC/ TANF (3)	Food Stamps (4)	UI (5)
Unemployment Rate	0.163**	0.107*	0.066*	0.284***	0.135***
	(0.068)	(0.063)	(0.033)	(0.061)	(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. Data sources 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. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

(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 2.3 percent increase in EITC recipients per capita, and a somewhat smaller 1.8 percent increase for EITC participants with children per capita.[18] 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 the EITC provides significantly less protection in recessions than is provided by these other programs. Even the most "cyclical" EITC group, or the one exhibiting 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 (such as transfers) for low-income households than "implicit" insurance (such as taxes).

As a second way to put these results in context, we use the CPS to explore how the EITC affects the cyclicality of poverty. We measure whether a family has income below 50 percent, 100 percent, 150 percent, and 200 percent of official poverty; both measured using official pretax income and also by adding in the EITC. The results, estimated by the same model as Equation 1, are presented in Table 7. We present estimates for married

18. The results for the pooled EITC sample (Column 1, Table 6) differ slightly from the results for the pooled sample in Table 2 (Column 1)—2.2 percent in Table 6 versus 1.8 percent in Table 2. Here, in Table 6, 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).

Table 7
Effect of Unemployment Rate on Official Poverty Rate: With and Without EITC

	Official Poverty				Add EITC			
	50%	100%	150%	200%	50%	100%	150%	200%
Panel A: Married with Children								
Unemployment Rate	0.253***	0.698***	0.735***	0.960***	0.147***	0.575***	0.711***	0.968***
	(0.054)	(0.116)	(0.134)	(0.179)	(0.050)	(0.100)	(0.127)	(0.177)
Mean Y	0.024	0.074	0.146	0.230	0.019	0.057	0.136	0.228
Percent change in coefficient due to EITC					−41.9	−17.6	−3.3	0.1
Observations	1,326	1,326	1,326	1,326	1,326	1,326	1,326	1,326
Panel B: Single with Children								
Unemployment Rate	1.036***	1.941***	1.870***	1.742***	0.979***	1.754***	1.859***	1.770***
	(0.282)	(0.342)	(0.413)	(0.309)	(0.285)	(0.331)	(0.438)	(0.303)
Mean Y	0.186	0.354	0.507	0.631	0.166	0.302	0.464	0.614
Percent change in coefficient due to EITC					−5.5	−9.6	−0.6	1.6
Observations	1,326	1,326	1,326	1,326	1,326	1,326	1,326	1,326

(*continued*)

Table 7 (*continued*)

	Official Poverty				Add EITC			
	50%	100%	150%	200%	50%	100%	150%	200%
Panel C: Married with Children, SPM Equivalence Scales								
Unemployment Rate	0.245***	0.658***	0.735***	0.970***	0.134**	0.575***	0.757***	0.975***
	(0.051)	(0.114)	(0.131)	(0.176)	(0.053)	(0.097)	(0.126)	(0.181)
Mean Y	0.024	0.074	0.145	0.229	0.019	0.056	0.135	0.227
Percent change in coefficient due to EITC					−45.3	−12.6	3.0	0.5
Observations	1,326	1,326	1,326	1,326	1,326	1,326	1,326	1,326
Panel D: Single with Children, SPM Equivalence Scales								
Unemployment Rate	1.124***	1.949***	1.883***	1.678***	1.141***	1.738***	1.955***	1.664***
	(0.289)	(0.345)	(0.421)	(0.286)	(0.292)	(0.336)	(0.471)	(0.309)
Mean Y	0.188	0.359	0.511	0.635	0.168	0.306	0.472	0.618
Percent change in coefficient due to EITC					1.5	−10.8	3.8	−0.8
Observations	1,326	1,326	1,326	1,326	1,326	1,326	1,326	1,326

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 total 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. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

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, 2016; Blank 1989, 1993; Blank and Blinder 1986; Blank and Card 1993; Cutler and Katz 1991; Freeman 2001; Gunderson and Ziliak 2004; Hoynes et al. 2006; Meyer and Sullivan 2011) with larger cyclicality for single parents with children. For example, a one percentage point increase in unemployment leads to a 1.9 percentage point increase in official poverty (income below 100 percent 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 after incorporating income from the EITC. Incorporating EITC income significantly reduces the cyclicality of poverty for married couples. The effect of a one percentage point increase in unemployment is reduced by 42 percent for incomes below 50 percent of poverty, by 21 percent for incomes below 100 percent of poverty, by 6 percent for incomes below 150 percent of poverty, with a very small and insignificant effect on the propensity to have incomes below 200 percent of poverty. Given the relationship between poverty rates and the EITC schedule (see Appendix Figure 2), 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 cyclicality 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).[19]

VI. 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 8. 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 including these additional 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 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 reclassification is imperfect as not

19. This is a rather mechanical exercise, and in particular we are examining the cyclicality 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).

Table 8
Effect of Unemployment Rate on EITC Recipiency Rates, Sensitivity to Adding State-Year Controls

	EITC Recipients/Population			
	(1)	(2)	(3)	(4)
Panel A: Married with Children				
Unemployment rate	0.889***	0.897***	0.474*	0.461*
	(0.273)	(0.266)	(0.262)	(0.260)
Observations	1,326	1,326	1,326	1,326
Panel B: Single with Children				
Unemployment rate	–0.899	–0.812	–1.367	–1.563
	(1.329)	(1.287)	(1.591)	(1.623)
Observations	1,326	1,326	1,326	1,326
Panel C: Childless Unemployment rate				
	0.252*	0.256*	0.150	0.119
	(0.132)	(0.133)	(0.145)	(0.147)
Observations	1,326	1,326	1,326	1,326
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 filing units from the CPS ASEC corresponding to the tax year (tax year X matched with survey done in year X). The sample excludes high-income earners, individuals living abroad, late filers and married couples filing separately. The dependent variables are total number of tax returns with EITC claims and real EITC expenditures ($2008), each divided by the total number of potential filing units in each cell. All regressions include controls for demographic characteristics, as well as state and year fixed effects. The results are weighted by the population of potential filers in each cell. The unemployment rate is measured in percentage points. Standard errors are clustered by state and shown in parentheses. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

all late filers have yet shown up. To explore the sensitivity 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) and examine the sensitivity to adding back in late filers. The results show that our results are not very sensitive to this sample exclusion. 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 show very little difference across the alternative definitions for potential filers. The results for both of these sensitivity tests are available in the online appendix.

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 that the differences across groups in the cyclicality of the EITC instead reflect differences in the cyclicality of labor supply across the groups. The evidence from the substantial literature on the cyclicality of employment, hours, and earnings across demographic groups suggests otherwise. For example, Hoynes, Miller, and Schaller (2012) show that men, less-educated workers, and minorities are more sensitive to cycles than are others. 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. (See online appendix.) We conclude that it is not greater cyclicality among married couples that is generating our findings. Another possibility is that our results reflect changes in marital status and fertility associated with the unemployment rate (which would affect the counts of potential filers across our demographic groups). We explore this by testing 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 the log of potential filers, concluding 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. (See online appendix.) A third possibility is that our results reflect cyclicality in tax compliance (or takeup) 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 takeup and noncompliance) and the CPS (which embeds a 100 percent takeup 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.

VII. 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. Although 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 cyclicality 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 to 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 should 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 2015a, 2016). 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.

References

Auerbach, Alan, and Daniel Feenberg. 2000. "The Significance of Federal Taxes as Automatic Stabilizers." *Journal of Economic Perspectives* 14(3):37–56.

Bitler, Marianne, and Hilary Hoynes. 2010. "The State of the Safety Net in the Post-Welfare Reform Era." *Brookings Papers on Economic Activity* Fall 2010:71–127.

———. 2016. "The More Things Change, the More They Stay the Same? The Safety Net and Poverty in the Great Recession." *Journal of Labor Economics* 34(1):part 2.

———. 2015a. "Heterogeneity in the Impact of Economic Cycles and the Great Recession: Effects Within and Across the Income Distribution." *American Economic Review. Papers and Proceedings*, 105(5):154–60.

———. 2015b. "Living Arrangements, Doubling Up, and the Great Recession: Was This Time Different?" *American Economic Review Papers and Proceedings* 105(5):166–70.

Blank, Rebecca. 1989. "Disaggregating the Effect of the Business Cycle on the Distribution of Income." *Economica* 56(222):141–63.

———. 1993. "Why Were Poverty Rates So High in the 1980s?" In *Poverty and Prosperity in the Late Twentieth Century*, eds. Dimitri Papadimitriou, and Edward Wolff, 21–55. New York: St. Martin's Press.

———. 2001. "What Causes Public Assistance Caseloads to Grow?" *Journal of Human Resources* 36(1):85–118.

Blank, Rebecca, and Alan Blinder. 1986. "Macroeconomics, Income Distribution, and Poverty." In *Fighting Poverty: What Works and What Doesn't*, eds. Sheldon Danziger, and Daniel Weinberg, 180–208. Cambridge, Mass.: Harvard University Press.

Blank, Rebecca, and David Card. 1993. "Poverty, Income Distribution and Growth: Are They Still Related?" *Brookings Papers on Economic Activity* Fall 1993.

Corsetto, Lisa. 2012. "Food and Nutrition Program Cyclicality." Mimeo. Davis: U.C. Davis.
Cutler, David, and Lawrence Katz. 1991. "Macroeconomic Performance and the Disadvantaged." *Brookings Papers on Economic Activity* Spring 1994.
Dehejia, Rajeev, and Adriana Lleras-Muney 2004. "Booms, Busts, and Babies' Health." *Quarterly Journal of Economics* 119(3):1091–130.
Eissa, Nada, and Hoynes, Hilary. 2004. "Taxes and the Labor Market Participation of Married Couples: The Earned Income Tax Credit." *Journal of Public Economics* 88(9–10):1931–58.
———. 2006. "Behavioral Responses to Taxes: Lessons from the EITC and Labor Supply." *Tax Policy and the Economy* 20:74–110.
Eissa, Nada, and Jeffrey Liebman. 1996. "Labor Supply Response to the Earned Income Tax Credit." *Quarterly Journal of Economics* 111(2):605–37.
Freeman, Richard. 2001. "The Rising Tide Lifts … ?" In *Understanding Poverty,* eds. Sheldon Danziger and Robert Haveman, 97–126. Cambridge, Mass.: Harvard University Press.
Gundersen, Craig, and James Ziliak. 2004. "Poverty and Macroeconomic Performance Across Space, Race, and Family Structure." *Demography* 41(1):61–86.
Hotz, V. Joseph, and John Karl Scholz. 2003. "The Earned Income Tax Credit," in *Means-Tested Transfer Programs in the United States*, ed. Robert Moffitt, 141–98. Chicago: University of Chicago Press.
Hoynes, Hilary, Douglas Miller, and Jessamyn Schaller. 2012. "Who Suffers During Recessions?" *Journal of Economic Perspectives* 26(3): 27–48.
Hoynes, Hilary, Marianne Page, and Ann Stevens. 2006. "Poverty in America: Trends and Explanations." *Journal of Economic Perspectives* 20(1):47–68.
Hoynes, Hilary, and Ankur Patel. 2015. "Effective Policy for Reducing Inequality? The Earned Income Tax Credit and the Distribution of Income." NBER working paper 21340. Cambridge, Mass.: National Bureau of Economic Research.
Internal Revenue Service (IRS). 2014. *Individual Income Tax Returns*. Publication 1304 Rev 08-2014. Washington, D.C.: Internal Revenue Service.
Jones, Maggie. 2015. *The EITC over the Business Cycle: Who Benefits?* CARRA Working Paper 2014–15. Washington, D.C.: U.S. Census Bureau.
Kniesner, Thomas, and James Ziliak. 2002. "Explicit Versus Implicit Income Insurance." *Journal of Risk and Uncertainty* 25(1): 5–20.
Listokin, Yair. 2012. "Equity, Efficiency, and Stability: The Importance of Macroeconomics for Evaluating Income Tax Policy." *Yale Journal on Regulation* 378:45–78.
Meyer, Bruce, and Dan Rosenbaum. 2000. "A Making Single Mothers Work: Recent Tax and Welfare Policy and its Effects." *National Tax Journal* 53(4):1027–62.
———. 2001. "Welfare, the Earned Income Tax Credit, and the Labor Supply of Single Mothers." *Quarterly Journal of Economics* 116(3):1063–114.
Meyer, Bruce, and James X. Sullivan. 2011. "Consumption and Income Poverty over the Business Cycle." *Research in Labor Economics* 32, 51–82.
Nichols, Austin, and Jesse Rothstein. 2015. "The Earned Income Tax Credit." NBER working paper 21211. Cambridge: Mass.: National Bureau of Economic Research.
Owens, Jeffrey. 2005. *Fundamental Tax Reform: The Experience of OECD Countries.* Background Paper Number 47. Washington, D.C.: Tax Foundation.
Plueger, Dean. 2009. *Earned Income Tax Participation Rate for Tax Year 2005*. Washington, D.C.: Internal Revenue Service.
Ryan, Kerry. 2014. "EITC as Income (In)Stability?" 15 Florida Tax Review 583.
Saez, Emmanuel. 2010. "Do Taxpayers Bunch at Kink Points?" *American Economic Journal: Economic Policy* 2(3): 180–212.
Schaller, Jessamyn. 2013. "For Richer if Not for Poorer? Marriage and Divorce over the Business Cycle." *Journal of Population Economics* 26(3): 1007–33.

———. 2013a. "Booms, Busts, and Fertility: Testing the Becker Model Using Gender-specific Labor Demand." Working paper. Arizona: University of Arizona.
Scholz, John Karl. 1994. "The Earned Income Tax Credit: Participation, Compliance, and Anti-poverty Effectiveness." *National Tax Journal* 47(1):63–87.
Short, Kathleen. 2014. *The Research Supplemental Poverty Measure: 2013.* Current Population Reports P60–251. Washington, D.C.: U.S. Census Bureau.
U.S. Department of Agriculture. 2013. Caseload Data. Unpublished data provided by Katie Fitzpatrick and John Kirlin of the Economic Research Service.
U.S. Department of Health and Human Services, Administration for Children and Families. 2013. Caseload Data. Washington, D.C.: U.S. Department of Health and Human Services, Office of Family Assistance. Available at: http://www.acf.hhs.gov/programs/ofa/data-reports/index.htm.
U.S. Department of Labor. 2013. 1979–2010 Data. Unpublished data provided by DOL OSEC. Washington, D.C.: U.S. Department of Labor.
Ziliak, James, David Figlio, Elizabeth Davis, and Laura Connolly. 2000. "Accounting for the Decline in AFDC Caseloads: Welfare Reform or the Economy?" *Journal of Human Resources* 35(3):570–86.
Ziliak, James, Craig Gundersen, and David Figlio. 2003. "Food Stamp Caseloads over the Business Cycle." *Southern Economic Journal* 69(4):903–19.