The EITC and Employment Transitions: Labor Force Attachment, Annual Exit, and the Role of Information

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Abstract

Less-educated single women frequently transition in and out of the labor force. Although there is evidence that the Earned Income Tax Credit (EITC) increases annual labor force participation, it is unclear how it affects these high frequency, within year employment decisions and entry and exit. By exploiting the panel nature of the Current Population Survey, I overcome challenges associated with compositional changes and estimate the impact of increases in EITC generosity on employment transitions. EITC expansions induce less-educated single women who were previously attached to the labor force to work more months, leading to stronger labor force attachment and more annual weeks worked. This leads to less annual exit, suggesting that the documented impact of the EITC on labor force participation rates in part operates by keeping previously employed single women in the labor force. This highlights the importance of understanding how income support programs affect not only labor force participation, but transitions as well. Employment decisions respond to increases in the maximum EITC credit eligible to *receive* in the current year, rather than the maximum credit eligible to *earn*, which differ because the EITC is a tax credit transferred with a one year lag. This would be consistent with workers basing their current work decisions on their lagged experience with the EITC. Further evidence additionally suggests that the employment response to the lagged EITC amount is likely due to information about the return to work, rather than to the relaxation of liquidity constraints.

Keywords: EITC, labor supply, turnover, employment stability
JEL Codes: H24, H31, J22, J63

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I Introduction

The Earned Income Tax Credit (EITC) is one of the largest components of the social safety net in the United States, transferring over $67 billion to 27 million households (IRS, 2017) and lifting over 6 million people out of poverty each year (Short, 2011; Hoynes & Patel, 2016). The EITC unambiguously incentivizes households to work at some point during the year, and the literature has consistently found evidence that the EITC increases annual employment rates of less educated single women, a group often eligible for the program (Nichols & Rothstein, 2015). However, both longitudinal data and ethnographic evidence suggest less-educated single women frequently transition in and out of employment and on and off of welfare within a year (Schochet & Rangarajan, 2004; Edin & Lein, 1997). At present it is unclear how the work incentives of the EITC impact these frequent, within year and across year employment transitions. In this paper, I evaluate how increases in EITC generosity affect less educated single women's within year labor force attachment and transitions out of the labor force.

For a less-educated single woman, the returns to a low-wage job are often offset by monetary and psychic employment costs as well as forgone means-tested benefits. When the net returns to work are low, even small week-to-week cost fluctuations, such as the need to stay home with a sick child or a minor car repair, can induce a woman to reduce labor supply. If faced with labor market rigidities that prevent adjustment at the intensive margin, this can result in volatile labor force attachment. For low levels of income the EITC operates as a wage subsidy, essentially raising the opportunity cost of dropping out of the labor force. In theory, this should increase the probability of staying in the labor force at any given time and mechanically increase the length of employment spells leading to less annual level exit. In this paper I empirically explore these hypotheses.

The annual, repeated cross-section data used by most of the EITC literature cannot inform us about within year decisions. I exploit the short panel nature of the CPS by

linking individuals across months and years to estimate how year-to-year increases in federal EITC generosity in the 1990s affect these high frequency employment decisions. Unlike the previous work, this strategy allows me to evaluate within year measures and exploit within person differences. By linking individuals' monthly CPS surveys across years I observe a four month snap-shot of within year employment decisions and can estimate the impact of the EITC on within year employment transitions. For a one hundred dollar (2010$) increase in the maximum EITC a woman is eligible to receive, the probability of being employed during a four month period increased by one percentage point. The share of months working also increases by one percentage point. These estimates would suggest the large expansion in 1994 increased the share of months employed by 10 percentage points (12 percent). However, this response is only observed among women with recorded labor force participation during the initial year. The increase in EITC generosity slightly increased the share of months employed, but many women still eventually dropped out during the sample period. Accordingly, the incidence of multiple exits fell, suggesting that within year exit was reduced but not eliminated. These women still transitioned between employment and non-employment within the year, but less frequently than before. These patterns are robust and not present among similarly educated single women that report household incomes above the EITC region, or among more educated single women who generally fall outside the EITC region.

Given this increased labor force attachment within the year, I next use the linked annual ASEC March CPS supplement, to see if this affects annual level transitions out of the labor force. Consistent with the monthly analysis, less-educated single women responded to an increase in EITC generosity by working more weeks during the year. This response is concentrated among women who worked before the increase in EITC generosity, and results in more women staying in the labor force from year to year, effectively reducing annual level exit. No increase was detected among women who were not initially working, suggesting the EITC expansions during this period increased labor force participation largely

by reducing exit among women with a previous labor force attachment, rather than pulling in new participants.

In the data, employment decisions respond to changes in the maximum credit eligible to *receive* in the current year rather than changes in the maximum credit eligible to *earn* in the current year. Previous work has suggested that during this time period, many EITC eligible households were unaware of the EITC (Mead, 2014). Since the EITC is a tax credit transferred with a one year lag, individuals can learn about the program and respond *ex post* (Nichols & Rothstein, 2015). The data are consistent with women lacking information about the program and updating their employment decisions after observing the added work incentives when they filed their taxes. Alternative explanations, such as the EITC relaxing liquidity constraints and allowing women to continue working by increasing cash on hand (e.g., they can continue paying for childcare) are less supported by the data.

Overall, the data suggest that the EITC increases labor force attachment among less educated single women with previous labor force participation, in part by delaying exit from the labor force. This increase in employment stability might generate potential benefits of the EITC not captured by the previous annual level analysis. However, as employment behavior only responds to changes in the maximum credit the individual is eligible to receive, it is important for individuals to have information about the program.

II The EITC and Labor Force Attachment of Single Women

A large literature explores the structure and impacts of the EITC. For brevity I highlight the related work exploring labor supply impacts and refer the reader to Hotz and Scholz (2003) or Nichols and Rothstein (2015) for a more complete review. The EITC was introduced in 1975 as a refundable annual tax credit and is structured to reward work.[1] A household with no earned income does not receive a credit, but for each additional dollar of income

[1]The Advance EITC allowed recipients to receive their credit in advance with their paycheck throughout the year. However, take-up was extremely low (2-3%) and this provision was removed in 2011.

the credit increases, creating large negative tax rates for a short phase-in region, followed by a zero marginal tax rate plateau, and a gradual phase-out region (see Figure 1 for sample parameters in 1989, 1991, and 1994). The program has expanded several times since 1975, with the largest expansions occurring in 1994, 1995 and 1996, as seen in Figure 2.

Eissa and Liebman's (1996) pioneering work on the EITC exploits variation from the 1986 expansion and compares single mothers with a high school degree or less to similarly educated single women without children and to more educated single mothers, to show that this early expansion increased labor force participation by 2.8 percentage points. Later expansions between 1993 and 1996 differentially affected households with one child and multiple children and also introduced a small credit for households without children. Much of the work exploring the EITC has focused on these expansions and compared single mothers with one child to single mothers with multiple children before and after the expansion, finding that annual employment increased by approximately 3-6 percentage points (Meyer & Rosenbaum, 2001; Hotz, Mullin, & Scholz, 2005). Most of the work has relied on repeated cross-sections from the March ASEC CPS supplement (Eissa & Liebman, 1996; Meyer & Rosenbaum, 2001; Eissa & Hoynes, 2004), although some have made use of longitudinal administrative data (Hotz, et al., 2005), and the National Longitudinal Survey of Youth (NLSY) in relatd work exploring annual transitions when households become no longer EITC eligible (Moulton, Graddy-Reed, & Lanahan, 2016).[2] During this time period, other things that might differentially affect the single mothers with one child and multiple children were also changing, such as welfare reform (Looney & Manoli, 2013). This might lead to differential trends by family status and must be accounted for in the estimation (Meyer & Rosenbaum, 2001).

Mead (2014) raises the concern that many potential recipients lacked information about

[2]To the best of my knowledge, only one concurrent working paper uses the longitudinal nature of the CPS to explore the EITC. Yucong (wp, 2016) links individuals in the March ASEC supplements to capture employment in the previous year and then estimates a repeated cross-section difference-in-differences by previous employment status to explore the effect of welfare reform and the 1993 EITC expansion on annual entry and exit. These results are difficult to interpret because the sample is conditioned on previous employment (the lagged outcome) which is potentially responding to the policy change.

the program during this time period, casting doubt that it was the EITC driving employment rates during the 1990s. However, because the EITC is designed as a tax credit, annual tax filing provides an automatic mechanism for informing potential recipients about the program (Nichols & Rothstein, 2015). Even if potential recipients were not aware of the credit *a priori*, they might become aware of the program when filing taxes and adjust labor supply behavior *ex post* after perceiving that the returns to work are larger than initially believed.

Despite the ample evidence of a strong, extensive margin effect, there is less conclusive evidence on how individuals adjust at the intensive margin. Nichols and Rothstein (2015) highlight several reasons why this might be. Because the EITC induces participation, the composition of workers changes and repeated cross-sectional data cannot separately identify behavioral responses by those already working and compositional changes due to new entrants. In order to capture these intensive margin adjustments, an individual's work history must be observed both before and after the policy, which has not been available for most of the previous work. Labor market frictions also make it difficult to adjust at the intensive margin. Presumably, many low wage workers face fixed work schedules and cannot flexibly adjust the number of hours worked. This rigidity might prevent them from adjusting at the intensive margin, even if they would prefer to do so. Finally, the EITC is a function of annual income, which might be difficult for individuals with volatile labor force attachment to predict. Uncertainty about annual income can lead to uncertainty about marginal incentives, which might lead to less adjustment at the intensive margin.

Recent work has exploited detailed administrative data to understand intensive margin responses to the EITC. Saez (2010) looks at kink points in the EITC schedule and finds no evidence of bunching or intensive margin responses among wage workers, but substantial bunching among self-employed workers at the first kink in the EITC schedule. Chetty and Saez (2013) randomly assign H&R Block clients to receive individualized information from the tax preparer about where they fall on the EITC schedule and how additional work would affect their credit in the subsequent year. This information did not change earnings in the

following year on average, but there is significant heterogeneity across tax preparers. Using tax data, Chetty, Friedman, and Saez (2013) find that when people move to areas that have more "knowledge" of the EITC schedule they report incomes closer to the refund-maximizing level. This is even true among wage workers. Overall the previous work would suggest that either intensive margin elasticities are small or highly dependent on the information people have access to.

Despite the EITC's annual incentives, the empirical patterns suggest that less educated single women make extensive margin employment decisions at a much more frequent interval. From the CPS in the 1990s, 16-28 percent of single women with a high school degree or less who ever reported employment during a four month period, also entered or exited employment (see Table 1). In comparison, among single women with a college degree, this rate is less than 10 percent. From the 1996 SIPP, 38 percent of women in low-wage jobs had left the job by four months, and 53 percent had left by eight months (Schochet & Rangarajan, 2004). Over half of these exits were to non-employment. Edin and Lein (1997) present ethnographic evidence from the early 1990s that single mothers frequently transition between welfare and employment, and cycled through multiple jobs in a year. They conclude that when deciding to work or claim welfare, these single mothers often weighed the costs and benefit of each option and, "made reasonable assessments of how much they would need to earn to offset the added costs of work (p. 63)."[3]

It is reasonable to presume that some subset of these less educated women face labor market rigidities (such as inflexible work schedules) that make it infeasible to adjust at the intensive margin, and the only way to adjust labor supply when faced with an unexpected psychic or monetary cost associated with work (i.e., a sick child or a car repair), is to drop out of the labor force. For less-educated women facing minimum wage employment opportunities, the net benefits of working are already small or non-existent, and even small

[3]Sometimes this comparison was crude or approximate, while other mothers were able to recall or provide exact calculations on scraps of paper or the back of envelopes.

employment cost shocks can undo the benefits of working.[4]

Given the empirical evidence it seems likely that many less educated single women make frequent (monthly or weekly) employment decisions. To understand how the work incentives of the EITC affect within year labor supply decisions, consider a conceptual model where a less educated single woman is making the decision to work ($y_t = 1$) or not ($y_t = 0$) in the current week (t) by comparing the lifetime expected utility she could achieve in both cases. Assume labor market rigidities prevent her from adjusting labor supply on the intensive margin and she can only adjust by entering or dropping out of the labor force. If she works she receives wages (w_t) and faces both psychic and monetary costs associated with working. The monetary costs (c_t) such as paying for transportation or childcare, can vary from period to period according to a known distribution F, but the current costs are observed by the woman before making her labor supply decision. The psychic utility cost (ϕ_t) associated with working is distributed according to G. This cost can range from the disutility associated with interacting with difficult managers or coworkers to the emotional cost of leaving children without adequate supervision as suggested by Edin and Lein (1997) (p. 133-136). For simplicity assume c_t and ϕ_t are independent.

If the woman does not work she receives an outside option benefit (b_t), that is taxed away if she works, similar to Aid to Families with Dependent Children (AFDC), Temporary Assistance for Needy Families (TANF), or Supplemental Nutritional Assistance Program (SNAP) benefits. The woman begins period t with wealth a_{t-1}, and can save or borrow from the future, where a_t^w represents the optimal wealth she carries forward to the next period if she chooses to work, and a_t^n is the optimal amount if she chooses not to work. She will decide to work in the current period if

$$u_t(w_t - c_t + a_{t-1} - a_t^w) - \phi_t + EV(a_t^w, y_t = 1) \geq u_t(b_t + a_{t-1} - a_t^n) + EV(a_t^n, y_t = 0). \quad (1)$$

[4] An alternative way to consider this decision is to think of women facing a probability of being fired if they do not show up at work. For low wages (low returns to work) the expected loss associated with missing work will be smaller, making them more likely to skip work and be fired when facing a large employment cost shock.

In the case of both employment and non-employment, $u_t(\cdot)$ is the current period utility where $u' > 0$ and $u'' < 0$. $EV(\cdot,\cdot)$ is the expected future value, which is a function of wealth and employment status in period t. Allowing $EV(\cdot,\cdot)$ to depend on the employment status accounts for costs or frictions that potential entrants might face as well as potential long run benefits associated with employment.[5] I will remain agnostic about the functional form of $EV(\cdot,\cdot)$, but assume that it is increasing in wealth ($\frac{\partial EV(a_t,y_t)}{\partial a_t} > 0$). This assumption is fairly standard as the individual's future self faces the same problem, but is endowed with more resources.

From equation (1), there will be a threshold psychic cost where the woman is indifferent between employment and non-employment in the current period, defined as

$$\phi^* = u_t(w_t - c_t + a_{t-1} - a_t^w) - u_t(b_t + a_{t-1} - a_t^n) + EV(a_t^w, y_t = 1) - EV(a_t^n, y_t = 0). \tag{2}$$

Given Ω_t (defined as wages, monetary costs, wealth, and the outside option) as well as the distribution of ϕ_t the probability the woman works will be $Pr(y_t = 1|\Omega_t) = Pr(\phi_t \leq \phi^*|\Omega_t)$.

Comparative statics suggest that an increase in the wage will have a direct effect through its impact on utility, but will also have an indirect effect through its impact on the optimal amount of wealth carried over, a_t^w. Because of the smoothing motives associated with u_t, this indirect effect will be positive, but less than one for one ($0 < \frac{\partial a_t^w}{\partial w_t} < 1$).[6] As future utility is increasing in wealth, the total impact of wages on the cost threshold is

$$\frac{\partial \phi^*}{\partial w_t} = u_t' * \big(1 - \frac{\partial a_t^w}{\partial w_t}\big) + \frac{\partial EV(a_t, y_t)}{\partial a_t}\frac{\partial a_t^w}{\partial w_t} > 0. \tag{3}$$

A small increase in the wage will increase the cost threshold, meaning the woman is now willing to incur a higher psychic cost and still work. This in turn increases the probability of working. Similar calculations show that an increase in c_t or b_t will reduce the probability of

[5]For example, stable employment might lead to longer job tenure and change the lifetime trajectory of wages.

[6]See Appendix B for a more detailed explanation.

working. For a single women facing wages at or near the minimum wage, working might be a "financial wash (p.67, Edin & Lein, 1997)," and even a small psychic cost shock, such as the inability to leave work when a child is sick, might induce her to exit from employment.

Now suppose a tax policy is introduced, which gives positive transfers associated with work, similar to the EITC. Through this policy, low-income households received an income transfer, equal to some percentage (τ_t) of earnings (w_t). This income transfer is refunded with a lag like the EITC, where benefits are paid out in a future period.[7] The threshold cost now becomes

$$\phi^* = u_t(w_t - c_t + a_{t-1} - a_t^w) - u_t(b_t + a_{t-1} - a_t^n) + EV(a_t^w + \tau_t w_t, y_t = 1) - EV(a_t^n, y_t = 0). \quad (4)$$

It is worth noting that this policy does not increase net wages in the current period, but only enters the expected utility in the future by providing more wealth in the future if the woman worked.[8] As with wages, an increase in τ_t will have a direct effect through additional future income, as well as an indirect effect through its impact on wealth carried over from period t. If we assume for simplicity that the EITC refund is transferred with a one period lag, then $-w_t < \frac{\partial a_t^w}{\partial \tau_t} < 0$.[9] Intuitively, the refund increases wealth in the future and reduces the need to save today, but, smoothing motives make this a less than one for one trade off. As such

$$\frac{\partial \phi^*}{\partial \tau_t} = \frac{\partial EV(a_t^w + \tau_t w_t, y_t = 1)}{\partial a_t} \Big(\frac{\partial a_t^w}{\partial \tau_t} + w_t \Big) > 0 \quad (5)$$

because future utility is increasing in wealth. All else equal, the woman's threshold cost is now higher, and she is willing to incur a higher psychic cost to work. If τ_t increases, then

[7] This transfer system is a simplified version of the EITC. In reality, the refund rate of the EITC is not a constant, but a function of earnings.

[8] There has been a recent literature exploring the incidence of the EITC and resulting impacts on market wages (Rothstein, 2008; Leigh, 2010). However, during this time period many less educated single women were paid wages at or near the minimum wage, constraining general equilibrium adjustments.

[9] In reality, the EITC transfers benefits as a lump sum in the following year when the individual files her taxes and the size of this income transfer is a function of aggregate earnings over all sub-periods in a calendar year. As such, the average effect and marginal effect of an additional dollar of earnings might be different (see discussion below). The result presented here will be similar if we assume that the EITC is refunded with a longer lag, but does not capture the annual level determination of the transfer.

$Pr(y_t = 1|\tau_t, \Omega_t)$ will increase. This mechanically reduces the probability of exit ($Pr(y_t = 0|y_{t-1} = 1)$), which lengthens employment spells in expectation. The work incentives of the EITC increase the opportunity cost of dropping out of the labor force in any given period, leading to more weeks of employment, longer employment spells, and more stable employment with less frequent exit. Enriching this model to reflect the nuances of real-world decisions (such as fixed entry costs or liquidity constraints) generally affect the magnitude, not sign of these predictions.[10]

Average versus Marginal Tax Rates. The implications of this model will depend on whether people consider average or marginal tax rates. The increase in EITC generosity between 1993 and 1994 unambiguously lowered the EITC component of the average tax rates (making them more negative) for EITC eligible households with two children (see Figure 3). However, the effect on EITC component of the marginal tax rates varied across the EITC schedule. The marginal tax rate became more negative in the phase-in region, the marginal tax rate increased in the phase-out region (became more positive), and the plateau region shortened, with some households experiencing higher, lower, or the same marginal tax rate.[11] If people consider average tax rates, an increase in the maximum EITC credit unambiguously increases the refunded transfer, and will lead to more weeks of employment and longer employment spells with less frequent exit. However if people consider marginal tax rates, households in the phase-in region will experience a more negative marginal tax rate leading to a higher opportunity cost of employment exit, while households in the phase-out region will face more positive marginal tax rates and the returns to working in the current

[10]Introducing fixed costs associated with entering the labor force increases labor force attachment of those already employed and deters non-working single women from entering employment. The tax transfer (τ_t) will still increase the opportunity cost of dropping out of the labor force. If less educated single women are liquidity constrained and cannot borrow against the future, there will be some probability (γ) that the woman cannot cover the monetary costs of work even if the psychic cost is low and lifetime value is high. However, with probability $1 - \gamma$ she can still account for the future benefits of the tax transfer, so an increase in τ_t will still increase the dropout threshold, but by a smaller magnitude because there is a positive probability the liquidity constraint will bind.

[11]For reference, from the 1994 CPS ASEC, approximately 30.5 percent of single women with children had family income in the phase-in region where both average and marginal tax rates were negative. An additional 10.3 percent were in the plateau region where the average tax rate was negative and the marginal tax rate was zero.

period actually fall. In this case the theoretical predictions about average behavior are less clear and ultimately an empirical question. Previous work suggests that people facing a multipart tax schedule, such as the EITC, respond to average tax rates rather than marginal tax rates, a phenomenon referred to as "ironing" in the public finance literature (Liebman & Zeckhauser, 2004).[12]

Information about EITC Policy and Learning. If women did not know about the EITC, as suggested by Mead (2014), and never learn about it, we would expect no employment response. However, the EITC is issued as a tax credit, meaning that all households that qualify or are close to qualifying will potentially learn about the credit and how it changes the returns to work when they file their taxes.[13] If a woman does not know about the EITC, or a change to the EITC, she will operate under the decision represented by equation (1) until the lagged EITC is refunded. For simplicity, once again assume the refund is transferred with a one period lag. If the woman did not work in the previous period, her optimization problem remains unchanged. She does not receive the EITC income transfer ($\tau_t w_t$) and continues to operate under equation (1). However, if she did work in the previous period, she will start the new period with an unexpected transfer $\tau_t w_t$. If by receiving the transfer she learns that it pays to work, she will now make decisions based on equation (4). This is equivalent to increasing τ_t which will lead to a higher probability of employment and more stable employment in expectation. The scenario is similar if individuals know about the EITC, but are unaware of an increase in EITC generosity. The model would suggest that if people lack information and learn about the EITC with a delay, the employment responses to changes in the EITC should be concentrated among those who were previously employed

[12] One explanation for this is that it might be difficult for households with volatile labor force attachment to accurately predict their location on the schedule to identify the marginal tax rate, whereas average tax rates might be more salient. This logic has been used to explain the strong extensive margin response and weaker evidence of intensive margin responses (Liebman, 1998). During the 1990s and even through the 2000s, only the amount of the EITC credit was reported on the IRS Form 1040. As such, a filer using a tax preparer would only know the amount of the credit in relation to her earned income. Even self-prepared filers using Schedule 596 EITC instructions would only see a table similar to a tax table, which does not report marginal tax rates, although they could be calculated.

[13] A majority of EITC recipients used a tax preparer (Nichols & Rothstein, 2015), who was likely aware of the EITC and shared some level of information with the filer.

and potentially learned about the program, and might occur with a year lag, after households observe the increased EITC generosity and update their perceptions of the returns to work.

As noted earlier, there is an established literature evaluating the role of information in the context of labor supply responses to the EITC (Chetty & Saez, 2013; Chetty, Friedman, & Saez, 2013). This information considered in this paper varies from the previous work in several important ways. First, the previous work focuses on intensive margin responses to information during the mid-2000s, when the overall economic climate and knowledge of the EITC is markedly different than in the 1990s. Unlike the previous work, which has focused on information about an individual's location on the EITC schedule, this work explores the role of information and learning associated with changes in EITC policy. Optimal responses are also likely to change in response to the policy changes. The information exploited here reflects variation in the timing of learning while the previous work has addressed salience, which might affect decisions differently. Although the policy changes explored in this paper are several decades old, and overall knowledge of the program has changed, examining this type information can help identify the interaction between information and new policy creation.

III Data

Testing these predictions requires frequent, within-year observations of labor supply. Tax data only provides annual measures, while administrative unemployment insurance data is only quarterly. To approximate these high frequency decisions, I exploit the monthly panel nature of the CPS obtained through IPUMS (Flood et al., 2015). Much of the previous work has relied on annual repeated cross-sections of the CPS and ignored the short panel nature of the survey. Since 1953, the CPS has conducted repeated interviews with households (Rivera Drew, Flood, & Warren, 2014). Each household is interviewed for four consecutive months (a survey wave), rotated out of the sample for eight months, and then re-enters

the survey for four consecutive months.[14] In theory, each household will be interviewed for the same four consecutive months two years in a row (e.g., January-April in both 1993 and 1994). During each monthly survey round, participants are asked about hours worked and employment status in the previous week, making it possible to create a four month employment history for each participant at the same point in two consecutive years. In the ASEC March supplement, participants are also asked about the total number of weeks worked during the previous calendar year, allowing researchers to look at annual outcomes.

Previous work has documented the concerns and constraints associated with linking the CPS (Lefgren & Madrian, 2000) as well as identified more accurate ways of linking individuals (Rivera Drew et al., 2014). I follow the practices explained in these papers to link participants across months and across ASEC supplements from year to year.[15] As seen in Table 1, the linked sample of single women is similar to the full sample, although slightly more positively selected. The linked sample is slightly more educated, more likely to be Non-Hispanic white, and more attached to the labor force. In Appendix Table A.1 I reweight the linked sample to look like the full sample, and show that the pattern of results is similar and the coefficients are only slightly smaller.

I use the household roster to determine how many EITC eligible children each woman has in the household during any month. Current college enrollment status is not available in the monthly survey, so only children ages 0-18 are counted as EITC eligible children. For each individual I define the number of EITC eligible children as the maximum number of eligible children reported at any time during the sample period.[16] I then restrict my sample to single

[14]For an in-depth description of the design, panel nature, and linking methods of the CPS, see Lefgren & Madrian (2000) or Rivera Drew et. al, (2014).

[15]Following Lefgren and Madrian (2000) I preserve matches across months as valid if the individual's sex, race, and age (within two years) is consistent across all months. To further improve match quality, I then use detailed industry information, education, and number of children to see if invalid matches are the same along these characteristics. If these characteristics are exactly the same, I keep these matches as any difference in sex, race, or age is likely a coding error. The results are virtually the same if these additional matches are dropped.

[16]This removes changes in the maximum EITC that are due to changes in household composition, such as births.

mothers who were 19 or older and less than 45 during the survey months.[17] Using the survey year and number of eligible children, I combine the CPS data, with historic federal EITC parameters from the Tax Policy Center (2015) which vary with the number of children and across years to determine the maximum credit each woman could receive. This is converted to 2010 dollars using the personal consumption index from the Bureau of Economic Analysis. This EITC measure captures the height of the plateau, and is a function of the number of qualifying children and current program parameters, not individual household income.

Monthly Data. In the monthly data, women who are first surveyed between October and December will potentially face different EITC generosity across months within a survey wave. Rather than make assumptions about how this affects decisions, I limit the sample to single women that entered the CPS between January and September so that the EITC schedule is consistent for all months in a survey wave.[18] The sample is restricted to less educated single women that entered the CPS from January 1989 to May of 1994. In 1994 there was an institutional change in the survey format, making it infeasible to link households across months from the latter half of 1994 and 1995. This leaves monthly data for 14,476 single women with a high school degree or less. As seen in Figure 2, during this period there was one moderate expansion in 1991 for households with children, small increases for households with children in 1992 and 1993, a very large expansion in 1994 for all households (which increased with the number of children), and a large expansion in 1995 for households with two or more children.[19]

The month to month information captures several short term labor market outcomes not available at the annual level. I create an indicator for whether or not the woman is employed at any point during the four months surveyed in the year, to see if the probability of being

[17]Previous work also excludes women who are enrolled as full time students, ill or disabled, or had positive income but zero hours worked. This level of information is not available in the monthly basic interview and I cannot make these restrictions. This will likely introduce measurement error into my estimation.

[18]The results are similar when women whose survey wave crossed years are included.

[19]Unfortunately, changes in the CPS methodology prevent linking households between 1995 and 1996, when some of the largest increases in the EITC for single mothers with multiple children occurred. Results are similar if I exclude the cohort surveyed in 1994 and 1995 that experienced the two largest expansions.

employed changed. I then calculate the share of months during the four month period the woman was employed.[20] I create dummy variables that indicate if the woman ever exited employment (was employed in the previous month but is currently not employed) during the four month period.[21]

Annual Data. Using the annual data, I can also construct measures to capture employment during the year. The annual number of weeks worked is only available in the CPS ASEC supplement. As this supplement was conducted only in March over my sample period, only single mothers interviewed in March for two consecutive years will be included. For this analysis the sample includes 6,919 single women with a high school degree or less that enter the CPS between 1989 and 1994 and can be linked from one March supplement to the next. The number of weeks reported correspond to the previous calendar year and all data is appropriately lagged. I also construct an annual employment indicator (weeks worked greater than zero). The impacts on annual entry and exit can be estimated by conditioning the sample on employment status linked from the initial year. Because annual outcomes are reported with a one year lag, the data corresponds to employment between 1988 and 1994.

IV Graphical Evidence

Using this data, I first descriptively explore the relationship between EITC generosity and labor force attachment among single women with a high school degree or less in Figure 4. Using the four month CPS employment history, I construct the share of months employed during each survey year for each individual in the sample. I then plot the average share of

[20]Participants are asked about work in the previous week. As such, it is possible that women have simply found a new job by the next month. During this sample period, participants of the March ASEC who were currently unemployed, were asked about the duration of their unemployment. Among my sample, nearly 75 percent of unemployment spells were four or more weeks. Although this does not directly relate to the number of individuals that would become unemployed and re-employed during a one month period, it does suggest that this is a small fraction of individuals. Also, if I examine employment in the same occupation from one month to the next, the results are virtually the same.

[21]These measures capture the same patterns observed in the previous literature. When looking at the probability of being ever employed during the four month period in the traditional difference in differences comparison of high school or less single mothers with one qualifying child and multiple before and after 1993, the estimated coefficient is 0.051 (s.e. = 0.014), consistent with the previous literature.

months employed in solid black for women with children relative to women without children. These plots are presented separately for women with any reported work in the first survey year in Panel A and for women without reported work in the first survey year in Panel B. For reference, the maximum EITC a single woman with two children is eligible to receive in the current year is plotted in the background. This measure captures the lagged EITC generosity, and is associated with the EITC policy the individual would encounter when they file their taxes in that year. There was a $304 (2010$) increase in 1992, gradual increases in 1993 and 1994, and a $1,312 increase in 1995 (from the 1994 expansion). During this period, households without children were ineligible for the EITC until it was first available in 1995 at $407 (2010$).

When looking at women with any employment during the first survey wave (in Panel A), the gap between women with and without eligible children closes in years when the lagged EITC becomes more generous. This is particularly visible in 1995 when the largest EITC expansion occurs. This is consistent with single women with children responding to the EITC by increasing labor force attachment relative to single women without children. Among women who did not work in the first year, in Panel B, there is no discernible relationship between EITC increases and the share of months employed.

When aggregating up to the annual level a similar pattern emerges (see Figure 5). Using the annual weeks worked reported for the previous calendar year from the March Supplement, I construct the individual's employment status for each year. I then plot in black the share of individuals employed in the second survey year for single women with children relative to single women without children in each year. These plots are also presented separately for women with any work in the first survey year in Panel A and for women without work in the first survey year in Panel B with the lagged maximum EITC in the background for reference. Because the weeks worked is reported for the previous calendar year, the sample covers 1989 to 1994, and the largest expansion in 1995 is no longer in the sample. As seen in Panel A, among single women who worked during the first survey year, the share of women with

children that were employed during the second year increased relative to women without children when the EITC increased. In other words, more single women with children stayed in the labor force when the EITC expanded, and single women with children became less likely to exit at the annual level, relative to women without children. Among women who did not participate during the first survey wave there is no discernible relationship. Consistent with the monthly data, women with previous labor force attachment appear to become more attached when the lagged EITC they face becomes more generous.

V Identification Strategy

To identify the effect of the EITC on within year employment decisions, I exploit the panel nature of the CPS and estimate an individual fixed effects model that allows women with different numbers of children to have different secular trends. For each woman there are four month employment histories for two consecutive years that I collapse to two observations per person. Given this short, two-period individual-level panel, I am able to examine within person changes in employment outcomes from one year to the next when there has been an expansion in EITC generosity. Because each individual is observed for two periods, I can estimate an individual fixed effects specification as follows

$$Y_{it} = \beta_1 Max\ Credit_{i,t-1} + \beta_2 Max\ Credit_{it} + X_{it}'\Gamma + \theta_n * t + \delta_i + \phi_t + \varepsilon_{it}. \tag{6}$$

In equation (6), the outcomes of interest are employment measures, constructed from the monthly data such as an indicator for being ever employed, the share of months employed, or an indicator for any exit from employment. This employment outcome is a function of the maximum credit eligible to *receive* in the current year ($Max\ Credit_{i,t-1}$) as well as the maximum credit eligible to *earn* in the current year ($Max\ Credit_{it}$), both measured in hundreds of dollars (2010$). Given the previous discussion on the potential importance of information and the graphical relationships, it seems relevant to look at employment

responses to both the current policy parameters as well as one year lagged policies, which might be the parameters people are aware of or learn about when they file their taxes. Both measures can be included simultaneously without concerns about collinearity because EITC generosity does not change uniformly every year. Changes in the current and lagged maximum credit have a low correlation ($\rho = 0.22$ in the monthly data, $\rho = 0.27$ in the annual data).[22] These variables are a function of the number of eligible children and year specific parameters of the EITC schedule.

I include a vector of controls including the federal minimum wage, the state minimum wage, and an indicator for whether a state TANF waiver is in place.[23] As highlighted by previous researchers, single women with zero, one, and two children might be differentially affected by other changes over this time period, so I also include number of eligible children specific linear trends ($\theta_n * t$). Given each individual has two observations, these linear trends by the number of children are equivalent to controlling for level differences in transition rates across eligibility groups. For example, if single women with children are on average more likely to exit from one year to the next, this level difference will be captured by these trends.[24] Individual fixed effects are included to control for individual specific characteristics and year fixed effects are included to compare households within the same year. Standard errors are corrected for possible clustering at the state level in this and all other specifications.[25] In this analysis there are two observations per person. When looking at the annual data, the March ASEC supplement reports employment from the previous calendar year, so the sample includes women from the 1989 to 1995 surveys, who reported employment from 1988 to 1994.

[22]In Appendix Table A.2, I estimate the results from Table 2 including the credit currently earning and the credit currently receiving separately. The point estimates are not substantively different from the model that includes the measures jointly (Table 2), suggesting the result is not driven by high levels of collinearity.

[23]Data on state TANF waivers and minimum wages were graciously provided by Kearney and Levine (2015).

[24]The current specification measures the number of qualifying children during the first survey wave. The results hold if I instead include linear trends by the number of children currently living in the house.

[25]Standard errors are smaller if I do not correct for clustering, and are similar if I cluster at the family size by income bin level.

As seen in Table 1, some characteristics of less-educated single women with no children, one child, and two or more children are different. Single mothers are slightly older on average, less educated, and less likely to be Non-Hispanic white. Single mothers with multiple eligible children are even less likely to have a high school degree, more likely to be Non-Hispanic black or Hispanic, and more likely to have a child under five. Among single mothers with multiple eligible children, the average number of children is 2.7, with over 85 percent of these mothers having two or three children.[26] Labor force attachment also falls for single women as the number of eligible children increases. These demographic differences across family size are not inherently problematic to identification, but become so if they result in differential trends across eligibility groups. However, the empirical strategy described above allows for potentially different linear trends by the number of eligible children. As such, the identifying assumption is that differential changes in EITC generosity across eligibility groups are uncorrelated with other potential unobserved factors that affect employment behavior. Although this individual fixed effects specification accounts for unobserved individual characteristics, one limitation is that only short-run responses can be measured and this strategy does not speak directly to long run changes in the stock of employed women over the course of the decade.

VI Results

VI.A Within Year Employment Duration Response to EITC Increases

As suggested by the conceptual framework and graphical evidence, an increase in the EITC might increase the opportunity cost of leaving the labor force, leading to stronger labor force attachment within a year. To explore within year labor force attachment, I turn to the linked monthly data. As responses to increases in the EITC might vary by initial labor force attachment (as seen in Figure 4), I stratify the estimation by labor force participation during

[26] When splitting by employment during the first year, the distribution of the number of children is similar, and excluding mothers with high ordered number of children does not affect the results substantially.

the initial survey wave and report the results in Table 2.[27] For example, women who were never employed might face very high employment costs and even with a wage subsidy such as the EITC, the positive returns to work might fall short of these high costs. Alternatively, if information about the policy is only revealed when taxes are filed, women who were not employed previously will not receive the credit or new information.

All employment responses are concentrated among women who were previously employed and are associated with changes in the maximum EITC eligible to *receive*, rather than the maximum EITC eligible to *earn*. In other words, only women who reported employment in the initial survey year and would be more likely to received the credit responded. This pattern is consistent with both a liquidity constraint framework as well as an information framework where single mothers might be unfamiliar with tax policies that affect them but adjust behavior after information about the current policy is revealed.

Among these women, a one hundred dollar increase in the maximum EITC eligible to receive increased the probability of being employed by 1.0 percentage point (column 1), meaning these women were more likely to be employed during the four months window after an EITC expansion. As seen in column 2, a one hundred dollar increase in the maximum EITC also increased the share of months worked by one percentage point, or approximately 1.2 percent (.01/.86). Meaning there is a small, but significant increase in labor force attachment. As this increase is small, there is not a detectable decrease in the probability of exiting, suggesting many of these women still eventually transitioned out of the labor force. However, increasing employment duration does reduce the frequency of turnover and the probability of exiting multiple times within a survey wave, once again indicative of stronger labor force attachment.[28]

[27] I cannot observe annual employment status for all participants as not all women were surveyed for the ASEC supplement. For the monthly data I measure employment during the first four survey months to proxy for annual employment. Women reported as non-employed might be misclassified if they worked later in the year.

[28] The CPS does allow individuals to report broad categories for why they are unemployed (e.g., laid off, fired, voluntarily left). However, among individuals transitioning out of employment, over 58 percent are reported as not in the labor force in the following month and do not specify why.

Between 1994 and 1995 the maximum EITC a household with children was eligible to receive (the 1993 to 1994 expansion) increased by just over one thousand dollars on average. These estimates would imply that this increase in the EITC increased the probability of working in the next year by 10 percentage points, and increased the share of months worked by nearly 12 percent. The magnitude of this effect is consistent with about 40 percent of single women with children who worked during the first survey wave working one extra month in the second year after the expansion. The data suggests that the EITC induced single women to work more months, leading to stronger labor force attachment and potentially longer employment spells.[29]

VI.B Robustness

Most households with earned income above the EITC schedule should be unaffected by increases in EITC generosity, although some households might become eligible. In Table 3, I partition the sample of previously employed women with a high school degree or less into groups based upon whether the reported family income from the previous 12 months falls within the corresponding EITC schedule. This income measure is endogenous and likely exhibits considerable measurement error, as households might contain several families or tax filing units, and should therefore be interpreted with caution. The employment effects are only observed among women that reported EITC eligible income levels suggesting this is not simply capturing a trend faced by all single women with a high school degree or less. For these women, an additional hundred dollars of EITC credit received increased the probability of being employed during the four month period by 1.4 percentage points, increased the share of months employed by 1.7 percent (.014/.82), and led to a reduction in multiple exits during the four month period. As expected, women above the EITC phase-out

[29]Previous work suggests self-employed workers are the most able to adjust income to EITC incentives (Saez, 2010). Looking at self-employment suggests a hundred dollar increase in the maximum EITC credit increased the probability of being self-employed during the four months by 0.5 percentage points. One might be concerned that this potential job stability is preventing upward mobility. However, the average Occupational Prestige Score (Davis et al, 1991) for occupational changes does not change when the EITC becomes more generous, suggesting the EITC is not preventing upward job moves.

region did not significantly adjust the probability of employment, share of months worked or exit behavior.[30] As further evidence that identification is not capturing more general aggregate trends, single mothers with a bachelor's degree, who are generally located higher in the income distribution, do not respond to changes in EITC generosity (see Table 4).

VI.C Annual Employment Response to EITC Increases

The monthly data suggest that increased EITC generosity leads to stronger labor force attachment and potentially longer employment duration. I next turn to the linked ASEC CPS to see how this affects annual outcomes as reported in Table 5. As with the monthly data, I stratify the estimation by reported employment during the first ASEC survey wave. Once again, employment decisions respond to changes in the maximum credit eligible to *receive* in the current year rather than the maximum credit eligible to *earn* in the current year. Women who did not work during the initial survey year did not significantly respond to increases in EITC generosity. However, among women who previously worked, a hundred dollar increase in the maximum EITC credit eligible to receive is associated with 0.83 additional weeks of work a year on average. This increase in weeks of work leads to a significant 1.5 percentage point increase in the probability of working at least 10 weeks, a 2.1 percentage point increase in the probability of working 30 weeks, and 2.1 percentage points increase in the probability of working at least 40 weeks.[31]

To understand how this affects annual labor force transitions, I examine the impact of the EITC on any annual employment in Table 6. On average, the EITC expansions in the early 1990s did not significantly change the employment stock among less educated single women. However, when stratified by employment status in the initial survey year, increases in the

[30] I have also look separately at households in the phase-in, plateau, and phase-out regions of the EITC schedule. The samples become quite small, but the effects are largest and significant among households in the phase-in and phase-out regions.

[31] Women that worked less than full year and were only weakly attached to the labor force, might be more marginal and responsive to changes in the EITC. In Appendix Table A.3 I estimate the impact separately for women who reported 1-51 weeks of work and exactly 52 weeks of work during the initial survey year. These effects are concentrated among women who worked less than full year and were less attached to the labor force. Approximately 35 percent of working women worked less than full year.

maximum EITC eligible to receive increase the probability that those previously employed continued employment in column (2) (i.e., reduced annual exit), but did not induce single women without previous participation in column (5) to enter the labor force (although the standard errors are large). A hundred dollar increase in the maximum EITC credit received reduced year-to-year exit by 2.5 percentage points. During this sample period from 1988 to 1993, the largest year-to-year expansion was $365 (2010$), implying that at most annual exit was reduced by 9.1 percentage points. In columns (3) and (4) I separately look at women by labor force attachment during the first survey year. The reduction in annual exit associated with the EITC is concentrated among women who worked less than 52 weeks during the year and were initially less attached to the labor force. This is consistent with women facing lower net benefits from work becoming more attached after the EITC becomes more generous. This reduction in exit provides one channel through which the EITC expansions in the 1990s might have increased the annual employment stock of less-educated single women.

VI.D Information vs. Liquidity Mechanism

Both the monthly and annual data provide evidence that increases in the lagged EITC (the EITC received in the current year) led to stronger labor force attachment, more weeks worked, and less annual exit. This is consistent with the information mechanism proposed by Nichols and Rothstein (2015), but actually receiving the EITC transfer could also affect decisions by relaxing liquidity constraints that would otherwise induce women to drop out of employment. Previous work has noted that EITC recipients file taxes and receive refunds sooner than other tax payers (Barrow & McGranahan, 2000; LaLumia, 2013; Hoynes, Miller & Simon, 2015). As seen in Figure 6, in 1989 15.6 percent of refund dollars with EITC payments were distributed in February, 40.2 percent in March, and 23.4 percent in April, and 14.4 percent in May, meaning that by May, nearly 94 percent of all refund dollars with an EITC had been distributed. The literature also suggests that EITC recipients spend the money rather quickly, using their refund to pay down bills and fund the purchase of

large durable goods, while saving is less common (Smeeding et al., 2000; Goodman-Bacon & McGranahan, 2008). In years when the maximum EITC credit increased, women surveyed during tax season (February through May) might have both new information and extra cash on hand, while women surveyed later in the year might have new information, but were less likely to still have the additional cash on hand. To determine if a response to lagged EITC policy is more likely due to information or liquidity, I test to see if the employment response changes for women surveyed during tax season as follows

$$Y_{it} = \beta_1 Max\ Credit_{i,t-1} + \beta_2 Max\ Credit_{i,t-1} * Share_i + X'_{it}\Gamma + \theta_n * t + \delta_i + \phi_t + \varepsilon_{it} \qquad (7)$$

where $Share_i$ equals the share of months individual i was interviewed during the tax season (February through May). The purpose of this estimation is to see if β_2 is positive and statistically significant. An insignificant β_2 would suggest that women, whose survey period overlapped with tax season, responded similarly to women surveyed throughout the year, suggesting the response is not due to liquidity. However, as this infusion of income might also introduce income effects, these results are suggestive and should be interpreted with caution. As seen in Table 7 the probability of being employed and the share of months employed increased when the EITC expanded, but the additional effect for those surveyed during the tax season is negative (but insignificant).[32] Rather than observing larger effects during tax season due to liquidity and relaxed constraints, the data suggest that survey participants throughout the year responded to the EITC, even those who are unlikely to have extra cash on hand. This is less consistent with a framework where the EITC refund relaxes liquidity constraints, allowing women to work, but is perhaps suggestive that EITC receipt revealed information about the returns to work.

[32]The observation that individuals interviewed during tax season might be less responsive would be consistent with income effects or the unemployment spell pattern documented by LaLumia (2013). Results are similar if instead the model includes an indicator that equals one if a woman is surveyed during the tax season.

VI.E Generalizability of Responses to EITC

Using the monthly employment reports from the Survey of Income and Program Participation (SIPP) during a similar time period, I can estimate a similar set of equations on a different sample. The 1990-1993 cohorts were surveyed every four months for 32 to 40 months and recalled employment status for the previous four months. It is worth noting that previous work has documented considerable recall bias and "seam" effects in the SIPP (Martini, 2002). After 1993, the SIPP was redesigned and the next cohort began in 1996. Using the 1990 through 1993 cohorts, I construct the probability of employment, the share of months worked, and the incidence of at least one or multiple exits at the annual level. Because I observe individuals for multiple years, conditioning the sample on employment in the previous year would result in an unbalanced sample as individuals transition into and out of employment. To estimate an effect similar to the previous estimates from equation (6), I interact $Max\ Credit_{t-1}$ and $Max\ Credit_t$ with an indicator for whether the woman was not employed in the previous year. This allows women who were and were not employed at the time of the policy change to respond differently. As in equation (6), I control for the federal minimum wage, the state minimum wage, whether or not there is a TANF waiver in place, and include number of eligible children specific linear trends. Because of these interactions, I also include an indicator for whether the woman was not employed during the previous year. These results are presented in Table A.4. In the SIPP data, the maximum credit eligible to earn is associated with a positive effect on the probability of being employed for women who were employed the previous year, but it is not statistically significant. For women who were employed during the previous year, a one hundred dollar increase in the maximum credit eligible to earn is associated with a significant 0.7 percentage point increase in the share of months worked, consistent with the CPS data. For women who were not employed the total effect (0.007-0.005) is not statistically significantly different from zero. In the SIPP data I am unable to detect significant changes in exit probabilities.

Since the 1990s, the economy has undergone drastic changes and overall awareness of

the EITC has also greatly expanded (Chetty & Saez, 2013; Chetty et al., 2013), making it unclear if we should expect the same behavioral responses in today's economy. Since 1996 there has only been one federal expansion of the EITC, in 2009 as part of the post-recession American Recovery and Reinvestment Act (ARRA), leaving little variation at the federal level. However, in the 2000s, many states adopted statewide EITC policies. In most cases, these EITC policies are calculated as a percentage of the federal credit. In 1999, only 8 states had an EITC in place, but by 2016 over half of the states had these policies in place. There is also significant heterogeneity across states, with some states distributing as little as 3.5 percent of the federal credit up to 85 percent among households in the phase-in region. Using these state level policies, I construct the total maximum credit eligible to earn and receive in the current year, which is composed of both the federal and state level credits. I then estimate equation (6) using the sample of single women with a high school degree or less from the 2000 through 2016 monthly CPS surveys. As before, I estimate the effects separately for women by employment status during the initial survey wave. These estimates are reported in Appendix Table A.5.

During this more recent period, when knowledge of the EITC is more ubiquitous, we observe a slightly different response. As before, women who were already employed in the initial wave responded by increasing the probability of being employed and the share of months employed, but this response was to changes in the maximum EITC eligible to *earn* in the current year. However these responses are an order of magnitude smaller. Although this identifying variation is different (i.e., smaller state level increases) making it not directly comparable, this pattern is consistent with more overall awareness of the policy. As awareness of EITC policies rises, people with previous labor force attachment respond to contemporaneous policy.

VII Conclusion

Although less educated single women make frequent employment decisions, the current literature is silent as to how within year employment decisions respond to the EITC. Exploiting the panel nature of the CPS, I provide evidence that the expansions of the EITC in the early 1990s increased employment levels of less educated single women by increasing employment stability and reducing annual exit from the labor force. Increases in the maximum EITC eligible to receive made less educated single women increase the share of months worked, and exit the labor market less frequently. A hundred dollar increase in the maximum EITC credit increased the number of weeks worked in a year by 0.83 weeks and reduced year-to-year exit among single women that were previously employed by 2.1 percentage points. Importantly, employment behavior is responding to changes in the maximum EITC eligible to *receive* rather than the maximum EITC *earned* in the current year and only observed among women who reported employment in the initial year and were therefore likely to receive the credit.

To better understand if the response to receiving the EITC is driven by information or the lack there of I look to see if women surveyed during and after the tax season responded differently. Although women surveyed during the tax season are more likely to experience an increase in both liquidity and information, their employment behavior is not more responsive, suggesting this response is not driven by relaxed liquidity constraints. This paper provides evidence that transfer programs designed like the EITC can increase employment stability of less educated single women, which might have important welfare implications if, for example, labor market experience at this level increases wages or if employment stability leads to positive outcomes for children. However, as these employment responses appear to be influenced by knowledge or information about the policy, it is important that mechanisms be in place for potential recipients to learn or know about the program and how it affects the returns to work. This work also sheds light on the dynamics driving the documented effect of the EITC on employment levels. Often the EITC is cited as a tool to bring households

into the labor force, but these results would suggest that the EITC operates by keeping individuals with previous labor force attachment in the labor force, rather than by bringing in new entrants.

References

[1] Barrow, Lisa and Leslie McGranahan. 2000. "The Effect of the Earned Income Tax Credit on the Seasonality of Household Expenditures," *National Tax Journal*, 53 (4): 1211-1243.

[2] Chetty, Raj and Emmanuel Saez. 2013. "Teaching the Tax Code: Earnings Responses to an Experiment with EITC Recipients," *American Economic Journal: Applied Economics*, 5(1): 1-31.

[3] Chetty Raj, John N. Friedman, and Emmanuel Saez. 2013. "Using Differences in Knowledge Across Neighborhoods to Uncover the Impacts of the EITC on Earnings," *American Economic Review*, 103(7): 2683-2721.

[4] Davis, James A, Tom W. Smith, Robert W. Hodge, Keiko Nakao, and Judith Treas. 1991. "Occupational Prestige Ratings from the 1989 General Social Survey." Chicago, IL: National Opinion Research Center [producer]. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 1991. http://doi.org/10.3886/ICPSR09593.v1

[5] Edin, Kathryn and Laura Lein. 1997. "Making Ends Meet: How Single Mothers Survive Welfare and Low-Wage Work." *Russell Sage Foundation* New York, NY.

[6] Eissa, Nada and Hillary Hoynes. 2004. "Taxes and the labor market participation of married couples: The Earned Income Tax Credit," *Journal of Public Economics*, 88 (9): 1931-58.

[7] Eissa, Nada and Jeffrey Liebman. 1996. "Labor supply response to the earned income tax credit," *The Quarterly Journal of Economics*, 111 (2):605-37.

[8] Flood, Sarah, Miriam King, Steven Ruggles, and J. Robert Warren. 2015. Integrated Public Use Microdata Series, Current Population Survey: Version 4.0. [dataset]. Minneapolis: University of Minnesota, http://doi.org/10.18128/D030.V4.0.

[9] Goodman-Bacon, Andrew and Leslie McGranahan. 2008. "How do EITC recipients spend their refunds?" *Economic Perspectives*, 32 (2): 17-32.

[10] Hotz, V. Joseph, Charles Mullin, and John Karl Scholz. 2005. "Examining the effect of the Earned Income Tax Credit and labor market participation of families on welfare," Working Paper.

[11] Hotz, V. Joseph and John Karl Scholz. 2003. "The Earned Income Tax Credit" In *Means-tested transfer programs in the United States*, ed. Robert A. Moffitt, 141-97. Chicago: University of Chicago Press.

[12] Hoynes, Hilary, Doug Miller, and David Simon. 2015. "Income, the Earned Income Tax Credit, and Infant Health," *American Economic Journal: Economic Policy*, 7 (1): 172-211.

[13] Hoynes, Hilary and Ankur Patel. 2016. "Effective Policy for Reducing Poverty and Inequality? The Earned Income Tax Credit and the Distribution of Income," *Journal of Human Resources*, forthcoming.

[14] Internal Revenue Service (IRS). 2017. "Statistics for Tax Returns with EITC." Eitc and other refundable credits. Calendar Year Report, January 2017. https://www.eitc.irs.gov/EITC-Central/eitcstats. Accessed March 23, 2017.

[15] Kearney, Melissa S. and Phillip B. Levine. 2015. "Investigating recent trends in the U.S. teen birth rate," *Journal of Health Economics*, 41: 15-29.

[16] LaLumia, Sara. 2013. "The EITC, Tax Refunds, and Unemployment Spells," *American Economic Journal: Economic Policy*, 5 (2): 188-221.

[17] Lefgren, Lars and Brigitte Madrian. 2000. "An Approach to Longitudinal Matching Current Population Survey (CPS) Respondents," *Journal of Economic and Social Measurement*, 26 (1): 31-62.

[18] Leigh, Andrew. 2010. "Who benefits from the Earned Income Tax Credit? Incidence among recipients, coworkers, and firms," *The B.E. Journal of Economic Analysis and Policy*, 10(1).

[19] Liebman, Jeffrey. 1998. "The impact of the Earned Income Tax Credit on incentives and income distribution," In *Tax Policy and the Economy*, ed. James Poterba, 83-119. Cambridge: MIT Press.

[20] Liebman, Jeffrey, and Richard Zeckhauser. 2004. "Schmeduling," https://sites.hks.harvard.edu/jeffreyliebman/schmeduling.pdf.

[21] Looney, Adam and Day Manoli. 2013. "Are there returns to experience at low-skill jobs? Evidence from single mothers in the United States over the 1990s," Unpublished working paper.

[22] Martini, Alberto. 2002. "Seam Effect, Recall Bias, and the Estimation of Labor Force Transition Rates from SIPP," *Mathematica Policy Research*.

[23] Mead, Lawrence. 2014. "Overselling the Earned Income Tax Credit," *National Affairs*, 21:20-33.

[24] Meyer, Bruce and Dan T. Rosenbaum. 2001. "Welfare, the Earned Income Tax Credit, and the labor supply of single mothers," *The Quarterly Journal of Economics*, 116 (3): 1063-14.

[25] Moulton, Jeremy G., Alexandra Graddy-Reed, and Lauren Lanahan. 2016. "Beyond the EITC: The Effect of Reducing the Earned Income Tax Credit on Labor Force Participation," *National Tax Journal*, 69(2): 261-284.

[26] Nichols, Austin, and Jesse Rothstein. 2015. "The Earned Income Tax Credit (EITC)," Working Paper No. 21211, National Bureau of Economic Research, Cambridge, MA.

[27] Rivera Drew, Julia, Sarah Flood, and John Robert Warren. 2014. "Making full use of the longitudinal design of the Current Population Survey: Methods for linking records across 16 months," *Journal of Economic and Social Measurement*, 39 (1): 121-44.

[28] Rothschild, Michael, and Joseph Stiglitz. 1970. "Increasing risk: I. A definition," *Journal of Economic Theory*, 2(3): 225-243.

[29] Rothstein, Jesse. 2008. "The unintended consequences of encouraging work: Tax incidence and the EITC," Princeton University working paper.

[30] Saez, Emmanuel. 2010. "Do Taxpayers Bunch at Kink Points?" *American Economic Journal: Economic Policy*, 2 (August): 180-212.

[31] Schochet, Peter and Ann Rangarajan. 2004. "Characteristics of Low-Wage Workers and Their Labor Market Experiences: Evidence from the Mid- to Late 1990s," Mathematica Policy Research, Inc. Final Report.

[32] Short, Kathleen. 2011. "The Research Supplemental Poverty Measure: 2010," U.S. Census Bureau Department of Commerce. Washington D.C. November.

[33] Smeeding, Timothy, Katherin Ross Phillips, and Michael O'Connor. 2000. "The EITC: Expectations, Knowledge, Use, and Economic and Social Mobility," *National Tax Journal*, 53 (4): 1187-1210.

[34] Tax Policy Center. 2015. "EITC Parameters 1975 to 2015." http://www.taxpolicycenter.org/statistics/eitc parameters Accessed August 27, 2015.

[35] Topel, Robert. 1991. "Specific Capital, Mobility, and Wages: Wages Rise with Job Seniority," *The Journal of Political Economy*, 99 (1): 145-76.

[36] Yucong, Jiao. 2016. "The Impacts of the Earned Income Tax Credit and Welfare Reform on Work Entry and Exit," working paper, University of Illinois at Chicago.

Tables

Table 1: Characteristics and Sample Selection of Linked Singer Mothers with High School or Less in the 1989-1994 CPS

	Single Women 19-44 with High School or Less					
	0 Eligible Children		1 Eligible Child		2+ Eligible Children	
	Full Sample	Linked Sample	Full Sample	Linked Sample	Full Sample	Linked Sample
	(1)	(2)	(3)	(4)	(5)	(6)
Age	26.26	28.49	28.86	30.91	30.17	31.30
Less than High School	0.22	0.22	0.29	0.25	0.40	0.40
Non-Hispanic White	0.66	0.68	0.56	0.55	0.40	0.37
Non-Hispanic Black	0.17	0.17	0.28	0.33	0.42	0.46
Hispanic	0.13	0.11	0.13	0.10	0.15	0.15
Non-Hispanic Other	0.03	0.03	0.02	0.01	0.02	0.02
Number of Eligible Children	0	0	1	1	2.63	2.68
Any Children under 5	0	0	0.49	0.31	0.60	0.54
During Survey Months in Year						
Ever Employed	0.78	0.80	0.65	0.71	0.51	0.53
Ever Enter	0.10	0.08	0.09	0.09	0.09	0.07
Ever Exit	0.10	0.09	0.10	0.08	0.08	0.07
Ever Enter or Exit	0.16	0.13	0.15	0.13	0.14	0.11
Share of Months Continue Employment	0.71	0.74	0.58	0.65	0.44	0.47
Observations	16,423	7,025	6,686	3,293	7,639	4,158

Notes: Data from women who entered the CPS between January 1989 and May 1994. The Full Sample is restricted to the second survey round of single women who were 19-44 and had a high school degree or less, and who entered the CPS between January and September. Sample weighted using population weights provided by the CPS. The Linked Sample is the subset of women who can be linked across waves to their sixth survey round and corresponds to the analysis sample. For reference, the maximum EITC eligible to receive among households with children increased by two hundred dollars (2010$) on average across all years, and by approximately one thousand dollars between 1994 and 1995.

Table 2: Labor Force Attachment Response to EITC Increases

	Ever Employed (1)	Share Months Employed (2)	Ever Exit Employment (3)	Multiple Exits (4)
Panel A.	Reported Any Employment During First 4 Monthly Surveys			
Max Credit$_{t-1}$ ($100s)	0.010**	0.010**	0.0003	-0.001*
(Credit Eligible to Receive)	(0.005)	(0.004)	(0.005)	(0.0004)
Max Credit$_t$ ($100s)	-0.000	-0.002	-0.006	-0.0001
(Credit Eligible to Earn)	(0.003)	(0.002)	(0.004)	(0.0005)
Second Wave Dependent Mean	0.91	0.86	0.07	0.001
Panel B.	Reported No Employment During First 4 Monthly Surveys			
Max Credit$_{t-1}$ ($100s)	-0.003	-0.002	-0.002	-0.0002
(Credit Eligible to Receive)	(0.006)	(0.004)	(0.003)	(0.0001)
Max Credit$_t$ ($100s)	0.003	0.001	0.003	-0.0002
(Credit Eligible to Earn)	(0.005)	(0.004)	(0.002)	(0.0003)
Second Wave Dependent Mean	0.19	0.13	0.06	0.001

Notes: Data from the linked 1989-1995 monthly CPS. Sample includes two observations for all single women with a high school degree or less between the ages of 19 and 44, and for whom survey waves 1-4 were contained within a single year. There are 20,438 observations (10,219 women) included in Panel A (Any employed during first four months), and 8,514 observations (4,257 women) included in Panel B (no employed during first four months). Changes in the maximum credit do not occur every year and the within sample correlation coefficient between changes in the credit currently earning and the credit received this year is 0.22. The maximum credit is converted to real 2010 dollars using the personal consumption index and measured in hundreds of 2010 dollars. Controls include the federal and state minimum wage, an indicator for a TANF waiver, and linear trends by the number of qualifying children during the first survey wave. Individual and year fixed effects are included. Regressions weighted using population weights provided by the CPS. Standard errors are clustered at the state level. *** p<.01, ** p<.05, * p<.1.

Table 3: Sensitivity Check: Response by Reported Household Income in Previous Year

	Ever Employed (1)	Share Months Employed (2)	Ever Exit Employment (3)	Multiple Exits (4)
Panel A.	Previously Employed Single Women with High School or Less in EITC Range			
Max Credit$_{t-1}$ ($100s)	0.014***	0.014**	-0.003	-0.002***
(Credit Eligible to Receive)	(0.006)	(0.006)	(0.006)	(0.001)
Max Credit$_t$ ($100s)	0.000	-0.004	-0.005	0.000
(Credit Eligible to Earn)	(0.004)	(0.003)	(0.006)	(0.001)
Second Wave Dependent Mean	0.88	0.82	0.08	0.002
Observations	10,890	10,890	10,890	10,890
	Panel B. Previously Employed Single Women with High School or Less above EITC Range			
Max Credit$_{t-1}$ ($100s)	0.006	0.006	0.005	-0.0004
(Credit Eligible to Receive)	(0.006)	(0.006)	(0.009)	(0.001)
Max Credit$_t$ ($100s)	-0.0001	-0.001	0.001	-0.001
(Credit Eligible to Earn)	(0.005)	(0.005)	(0.004)	(0.001)
Second Wave Dependent Mean	0.95	0.91	0.06	0.001
Observations	9,548	9,548	9,548	9,548

Notes: Data from the linked 1989-1995 monthly CPS. Sample includes two observations for all single women with a high school degree or less between the ages of 19 and 44, and for whom survey waves 1-4 were contained within a single year. The maximum credit is converted to real 2010 dollars using the personal consumption index and measured in hundreds of 2010 dollars. Households are sorted into regions on the EITC schedule using household income and EITC parameters from the initial survey year. Household income is reported in bins, so they are assigned (imperfectly) based on where the midpoint of the bin falls on the EITC schedule. Controls include the federal and state minimum wage, an indicator for a TANF waiver, and linear trends by the number of qualifying children during the first survey wave. Individual and year fixed effects are included. Regressions weighted using population weights provided by the CPS. Standard errors are clustered at the state level. *** p<.01, ** p<.05, * p<.1.

Table 4: Sensitivity Check: Response of Previously Employed Single Women with a College Degree

	Ever Employed (1)	Share Months Employed (2)	Ever Exit Employment (3)	Multiple Exits (4)
	Previously Employed Single Women with College Degree			
Max Credit$_{t-1}$ ($100s)	0.003	0.002	0.003	0.000
(Credit Eligible to Receive)	(0.003)	(0.005)	(0.008)	(0.001)
Max Credit$_t$ ($100s)	-0.002	-0.001	-0.002	-0.00002
(Credit Eligible to Earn)	(0.003)	(0.004)	(0.006)	(0.0004)
Second Wave Dependent Mean	0.97	0.95	0.04	0.001
Observations	12,708	12,708	12,708	12,708

Notes: Data from the linked 1989-1995 monthly CPS. Sample includes two observations for single women with a college degree between the ages of 19 and 44, and for whom survey waves 1-4 were contained within a single year, and reported any employment during the initial 4 monthly surveys. The maximum credit is converted to real 2010 dollars using the personal consumption index and measured in hundreds of 2010 dollars. Controls include the federal and state minimum wage, an indicator for a TANF waiver, and linear trends by the number of qualifying children during the first survey wave. Individual and year fixed effects are included. Regressions weighted using population weights provided by the CPS. Standard errors are clustered at the state level. *** p<.01, ** p<.05, * p<.1.

Table 5: Within Individual Annual Labor Supply Response to EITC Increases

	Weeks Worked (1)	Weeks Worked ≥ 10 (2)	Weeks Worked ≥ 20 (3)	Weeks Worked ≥ 30 (4)	Weeks Worked ≥ 40 (5)	Weeks Worked ≥ 50 (6)
Panel A.	Reported Positive Weeks Worked During Initial Survey Year					
Max Credit$_{t-1}$ ($100s)	0.832***	0.015**	0.009	0.021**	0.021***	0.015
(Credit Eligible to Receive)	(0.264)	(0.007)	(0.008)	(0.008)	(0.006)	(0.010)
Max Credit$_t$ ($100s)	-0.138	-0.004	-0.001	-0.010*	-0.003	0.003
(Credit Eligible to Earn)	(0.199)	(0.004)	(0.004)	(0.005)	(0.005)	(0.007)
Second Wave Dependent Mean	42.6	0.89	0.86	0.81	0.77	0.69
Panel B.	Reported No Weeks Worked During Initial Survey Year					
Max Credit$_{t-1}$ ($100s)	0.027	-0.0001	0.001	0.001	-0.0001	-0.006
(Credit Eligible to Receive)	(0.647)	(0.017)	(0.016)	(0.009)	(0.009)	(0.011)
Max Credit$_t$ ($100s)	0.025	0.002	-0.002	0.002	-0.002	0.003
(Credit Eligible to Earn)	(0.150)	(0.004)	(0.003)	(0.003)	(0.004)	(0.006)
Second Wave Dependent Mean	6.5	0.18	0.14	0.10	0.09	0.07

Notes: Data from the linked 1989-1994 ASEC March CPS supplement. Sample includes one observation for all single women with a high school degree or less between the ages of 19 and 44, who were interviewed for two ASEC supplements. There are 10,052 observations (5,026 women) included in Panel A (any work during initial survey year), and 3,786 observations (1,893 women) included in Panel B (no work during initial survey year). This sample is smaller than the monthly sample (Table 2) because not every woman is surveyed in March. Changes in the maximum credit do not occur every year and the within sample correlation coefficient between the change in the credit currently earning and the credit received this year is 0.27. The maximum credit is converted to real 2010 dollars using the personal consumption index and measured in hundreds of 2010 dollars. Controls include the change in the federal and state minimum wages,an indicator for a TANF waiver, linear trends by the number of qualifying children during the first survey wave. Individual and year fixed effects are included. Regressions weighted using household population weights provided by the CPS ASEC. Standard errors are clustered at the state level. *** p<.01, ** p<.05, * p<.1.

Table 6: Effect of EITC Increases on Annual Labor Market Transitions

	Outcome: Any Employment				
		Any Work During Initial Survey Year			No Work During
	All	Any	< 52 weeks	52 weeks	Initial Survey Year
	(1)	(2)	(3)	(4)	(5)
Max Credit$_{t-1}$ ($100s)	0.011	0.025***	0.047**	0.007	0.001
(Credit Eligible to Receive)	(0.008)	(0.009)	(0.020)	(0.006)	(0.022)
Max Credit$_t$ ($100s)	0.002	0.002	0.008	-0.002	0.005
(Credit Eligible to Earn)	(0.003)	(0.003)	(0.009)	(0.003)	(0.005)
Second Wave Dependent Mean	0.73	0.91	0.81	0.97	0.23
Observations	13,838	10,052	3,474	6,578	3,786

Notes: Data from the linked 1989-1994 ASEC March CPS supplement. Sample includes one observation for all single women with a high school degree or less between the ages of 19 and 44, who were interviewed for two ASEC supplements. This sample is smaller than the monthly sample (Table 2) because not every woman is surveyed in March. Changes in the maximum credit do not occur every year and the within sample correlation coefficient between the credit currently earnings and the credit received this year is 0.27. The year-to-year change in annual employment captures annual level exit in column (2) and annual level exit in column (3). The maximum credit is converted to real 2010 dollars using the personal consumption index and measured in hundreds of 2010 dollars. Controls include the race indicators, age, age2, an indicator for any children under 5, the change in the federal and state minimum wages, and an indicator for the introduction of a TANF waiver. Fixed effects for the year, state, and number of qualifying children are included. Regressions weighted using household population weights provided by the CPS ASEC. Standard errors are clustered at the state level. *** p<.01, ** p<.05, * p<.1.

Table 7: Information vs. Liquidity: Differential Impacts for Previously Employed Women Surveyed During Tax Season

	Ever Employed (1)	Share Months Employed (2)	Ever Exit Employment (3)	Multiple Exits (4)
Max Credit$_{t-1}$ ($100s)	0.011**	0.012**	-0.0004	-0.0014*
(Credit Eligible to Receive)	(0.005)	(0.005)	(0.006)	(0.001)
*Max Credit$_t$ **	-0.001	-0.003	-0.001	0.001
Share of Surveys Feb-May	(0.002)	(0.003)	(0.003)	(0.001)
Second Wave Dependent Mean	0.91	0.86	0.07	0.001
Observations	20,438	20,438	20,438	20,438

Notes: Data from the linked 1989-1995 monthly CPS. Sample includes two observations for all single women with a high school degree or less between the ages of 19 and 44, and for whom survey waves 1-4 were contained within a single year, and reported any employment during the initial 4 monthly surveys. The maximum credit is converted to real 2010 dollars using the personal consumption index and measured in hundreds of 2010 dollars. Controls include the federal and state minimum wage, an indicator for a TANF waiver, and linear trends by the number of qualifying children during the first survey wave. Individual and year fixed effects are included. Regressions weighted using population weights provided by the CPS. Standard errors are clustered at the state level. *** p<.01, ** p<.05, * p<.1.

Figures

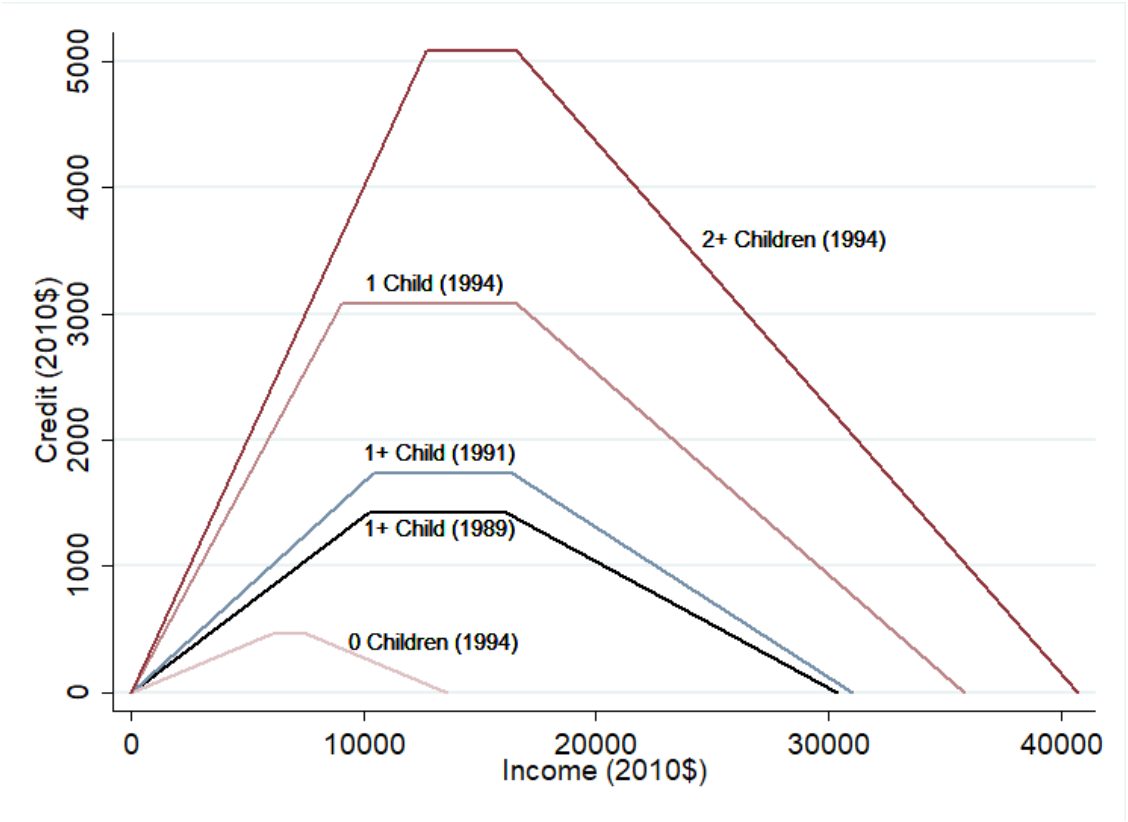

Figure 1: EITC Schedule Parameters over Time for Various Family Sizes

Source: Author's calculations using EITC parameters for 1989, 1991, and 1994 provided by Tax Policy Center.

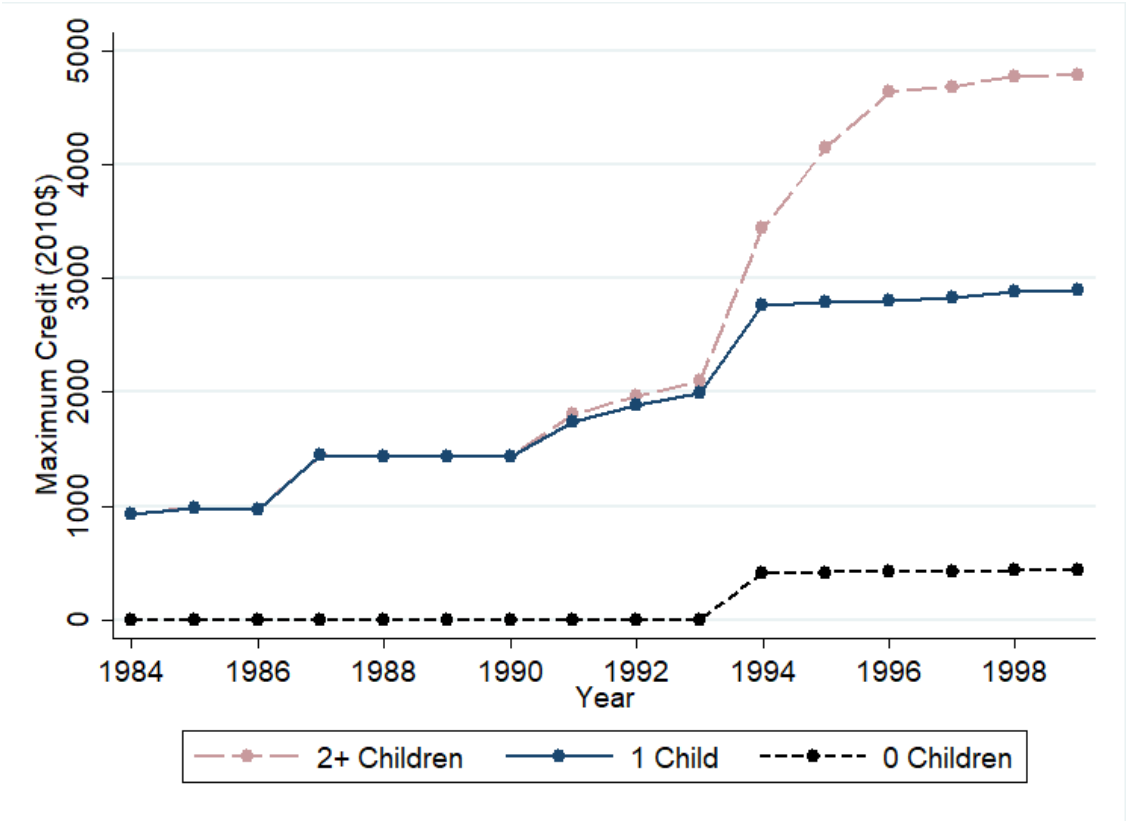

Figure 2: Maximum EITC Credit by Year and Family Size

Source: Author's Calculations using EITC program parameters as provided by the Tax Policy Center.

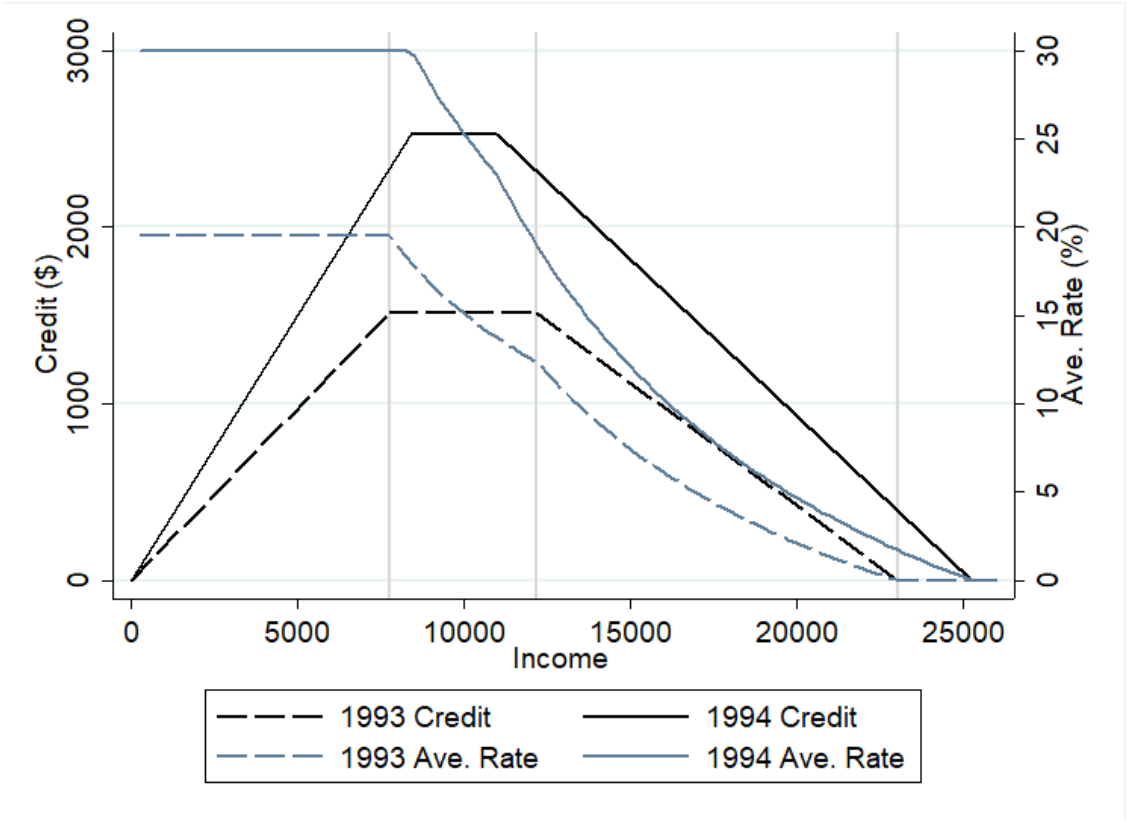

Figure 3: Change in Marginal and Average Subsidy Rates When the EITC Maximum Credit Increases

Notes: The 1994 expansion increased average subsidy rates for households throughout the EITC schedule. The impact on marginal subsidy rates varied across the EITC schedule. For households in the phase-in region the marginal tax rate become more negative, for households in the phase-out region the marginal tax rate became more positive, and for households in the plateau region the marginal tax rates either became larger, smaller or remained constant.

Source: Author's calculations using parameters provided by the Tax Policy Center for a household with two qualifying children from 1993 and 1994.

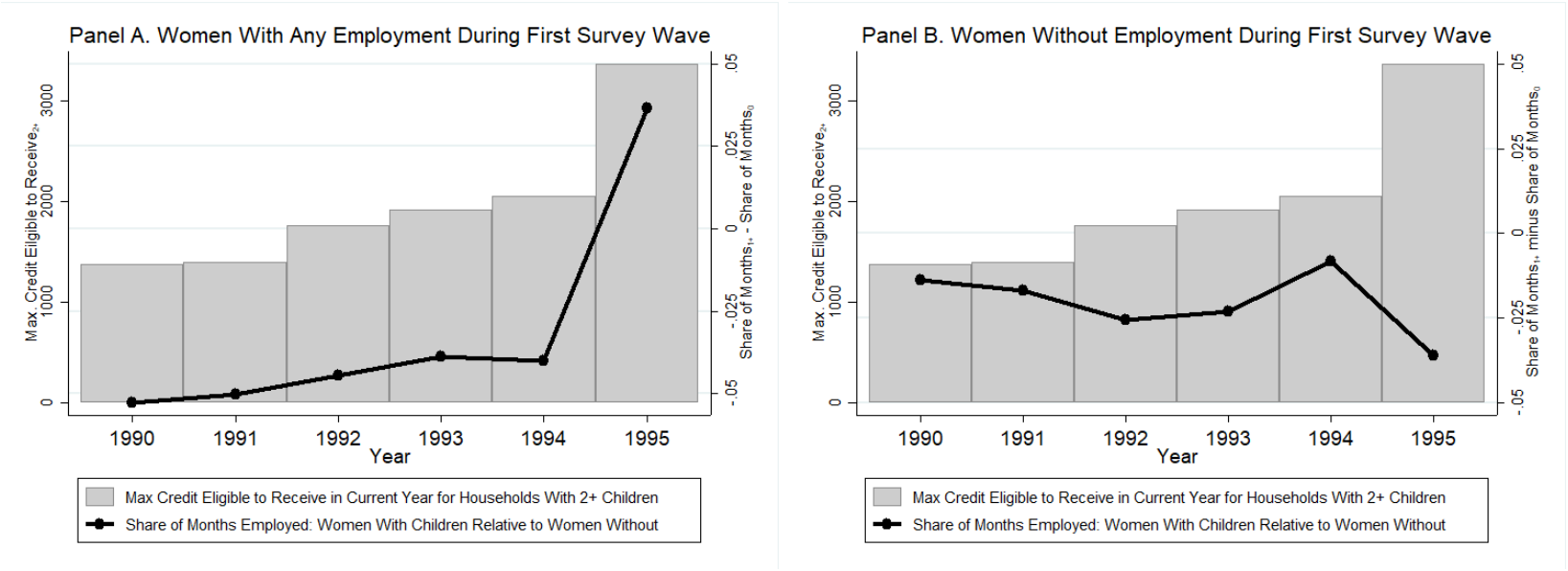

Figure 4: Average Share of Months Employed for Single Women with Children Relative to Single Women without Children

Notes: The solid black line plots the share of months employed for single women with a high school degree or less with children relative to women single women with a high school degree or less without children. Averages are weighted using CPS sampling weights. Averages are weighted using CPS sampling weights. The bar graph depicts the maximum credit eligible to *receive* in the current year (lagged EITC policy) for households with two or more eligible children. The maximum credit for households with one eligible child would look similar in most years, but 600 dollars lower in 1995.

Source: Author's calculation using the linked 1989-1995 monthly CPS and EITC program parameters from the Tax Policy Center.

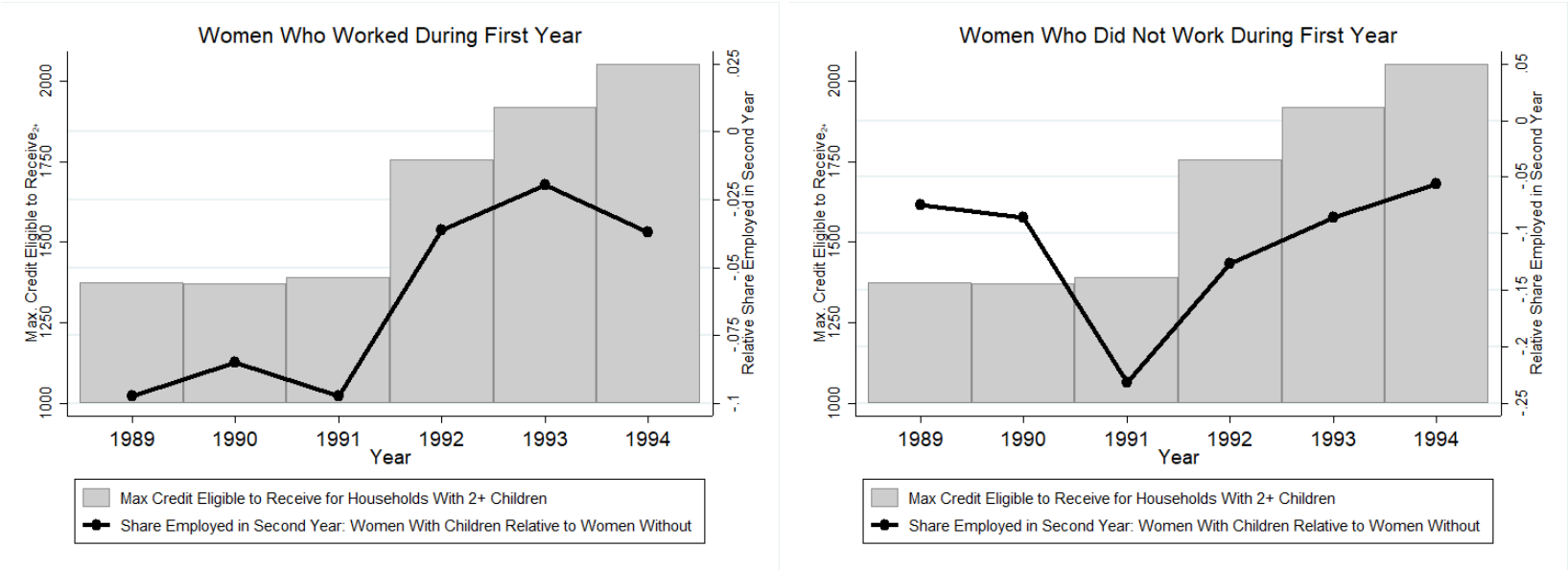

Figure 5: Share Employed During Second Year for Single Women with Children Relative to Single Women without Children

Notes: The solid black line plots the share employed in the second year for single women with a high school degree or less with children relative to women single women with a high school degree or less without children. Averages are weighted using CPS sampling weights. The bar graph depicts the maximum credit eligible to *receive* in the current year (lagged EITC policy) for households with two or more eligible children.

Source: Author's calculation using the linked 1989-1995 ASEC CPS and EITC program parameters from the Tax Policy Center.

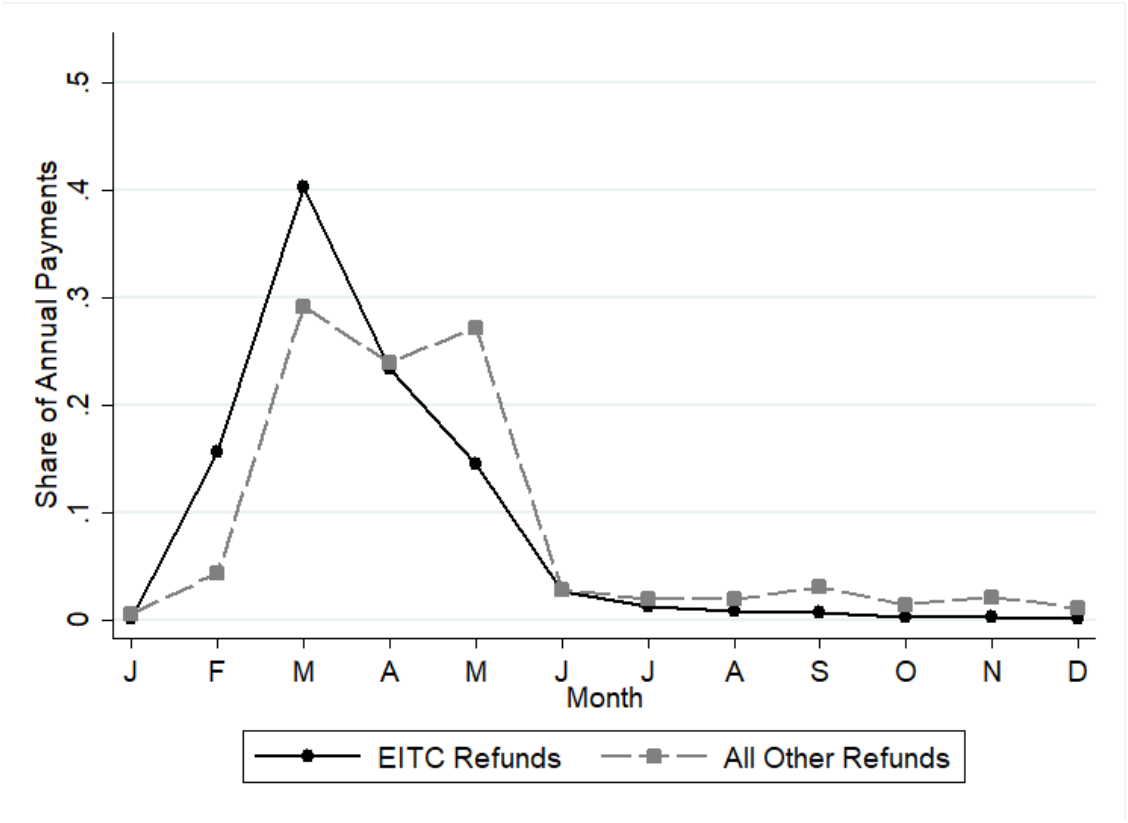

Figure 6: Distribution of Tax Refunds by Calendar Month in 1989

Notes: Plots represent the monthly share of the total tax refund payments made during the year for EITC refunds and all other refunds in 1989.
Source: Author's calculation using Monthly Treasury Statements for January 1989 through December 1989.

VIII Appendix A. Additional Tables and Figures

Table A.1: Re-weighting to Account for Sample Selection in Linked Analysis Sample

	Ever Employed (1)	Share Months Employed (2)	Ever Exit Employment (3)	Multiple Exits (4)
Panel A.	Reported Any Employment During First 4 Monthly Surveys			
Max Credit$_{t-1}$ ($100s)	0.008**	0.008**	0.0003	-0.001**
(Credit Eligible to Receive)	(0.004)	(0.004)	(0.004)	(0.0005)
Max Credit$_t$ ($100s)	0.0004	-0.0001	-0.007**	0.0001
(Credit Eligible to Earn)	(0.002)	(0.002)	(0.003)	(0.0004)
Dependent Mean (in levels)	0.91	0.86	0.07	0.001
Panel B.	Reported No Employment During First 4 Monthly Surveys			
Max Credit$_{t-1}$ ($100s)	0.001	0.001	-0.001	-0.0002
(Credit Eligible to Receive)	(0.006)	(0.004)	(0.003)	(0.0002)
Max Credit$_t$ ($100s)	-0.0001	-0.001	0.002	-0.0002
(Credit Eligible to Earn)	(0.004)	(0.003)	(0.003)	(0.0003)
Second Wave Dependent Mean	0.19	0.13	0.06	0.001

Notes: Data from the linked 1989-1995 monthly CPS. Sample includes two observations for all single women with a high school degree or less between the ages of 19 and 44, and for whom survey waves 1-4 were contained within a single year. The analysis sample is reweighted so that the demographic and employment characteristics in the initial year match those of the full sample in Table 1. Observations given zero weight are excluded from the analysis. The maximum credit is converted to real 2010 dollars using the personal consumption index and measured in hundreds of 2010 dollars. Controls include the federal and state minimum wage, an indicator for a TANF waiver, and linear trends by the number of qualifying children during the first survey wave. Individual and year fixed effects are included. Standard errors are clustered at the state level. *** p<.01, ** p<.05, * p<.1.

Table A.2: Separate Effects of the Credit Currently Earning and the Credit Receiving in the Current Year

	Ever Employed (1)	Share Months Employed (2)	Ever Exit Employment (3)	Multiple Exits (4)
Panel A.	Reported Any Employment During First 4 Monthly Surveys, Credit Currently Receiving			
Max Credit$_{t-1}$ ($100s)	0.010**	0.009**	-0.001	-0.001*
(Credit Eligible to Receive)	(0.004)	(0.004)	(0.005)	(0.0004)
Panel B.	Reported Any Employment During First 4 Monthly Surveys, Credit Currently Earning			
Max Credit$_t$ ($100s)	0.002	-0.0003	-0.006	-0.0002
(Credit Eligible to Earn)	(0.003)	(0.002)	(0.004)	(0.0005)
Panel C.	Reported No Employment During First 4 Monthly Surveys, Credit Currently Receiving			
Max Credit$_{t-1}$ ($100s)	-0.002	-0.001	-0.0002	-0.0002
(Credit Eligible to Receive)	(0.007)	(0.005)	(0.003)	(0.0002)
Panel D.	Reported No Employment During First 4 Monthly Surveys, Credit Currently Earning			
Max Credit$_t$ ($100s)	0.003	0.001	0.003	-0.0002
(Credit Eligible to Earn)	(0.005)	(0.004)	(0.002)	(0.0003)

Notes: Data from the linked 1989-1995 monthly CPS. Sample includes two observations for all single women with a high school degree or less between the ages of 19 and 44, and for whom survey waves 1-4 were contained within a single year. There are 20,438 observations (10,219 women) included in Panel A and B (any employed during first four months), and 8,514 observations (4,257 women) included in Panel C and D (no employed during first four months). Changes in the maximum credit do not occur every year and the within sample correlation coefficient between changes in the credit currently earning and the credit received this year is 0.22. The maximum credit is converted to real 2010 dollars using the personal consumption index and measured in hundreds of 2010 dollars. Controls include the federal and state minimum wages, an indicator for a TANF waiver, and linear trends by the number of qualifying children during the first survey wave. Individual and year fixed effects are included. Regressions weighted using population weights provided by the CPS. Standard errors are clustered at the state level. *** p<.01, ** p<.05, * p<.1.

Table A.3: Within Individual Annual Labor Supply Response to EITC Increases, By Initial Labor Force Attachment

	Weeks Worked (1)	Weeks Worked ≥ 10 (2)	Weeks Worked ≥ 20 (3)	Weeks Worked ≥ 30 (4)	Weeks Worked ≥ 40 (5)	Weeks Worked ≥ 50 (6)
Panel A.	Reported Between 1 and 51 Weeks Worked During Initial Survey Year					
Max Credit$_{t-1}$ ($100s)	2.54**	0.040*	0.025	0.056*	0.069**	0.069**
(Credit Eligible to Receive)	(1.06)	(0.024)	(0.021)	(0.031)	(0.031)	(0.029)
Max Credit$_t$ ($100s)	-0.22	-0.005	-0.003	-0.019**	-0.003	0.007
(Credit Eligible to Earn)	(0.38)	(0.011)	(0.011)	(0.010)	(0.009)	(0.009)
Second Wave Dependent Mean	32.9	0.76	0.70	0.61	0.54	0.43
Observations	3,474	3,474	3,474	3,474	3,474	3,474
Panel B.	Reported 52 Weeks Worked During Initial Survey Year					
Max Credit$_{t-1}$ ($100s)	0.23	0.002	0.003	0.010	0.006	0.003
(Credit Eligible to Receive)	(0.46)	(0.009)	(0.011)	(0.011)	(0.012)	(0.012)
Max Credit$_t$ ($100s)	-0.01	-0.002	0.002	-0.002	-0.001	0.002
(Credit Eligible to Earn)	(0.20)	(0.004)	(0.004)	(0.004)	(0.006)	(0.008)
Second Wave Dependent Mean	47.7	0.96	0.94	0.92	0.89	0.83
Observations	6,578	6,578	6,578	6,578	6,578	6,578

Notes: Data from the linked 1989-1994 ASEC March CPS supplement. Sample includes two observations for all single women with a high school degree or less between the ages of 19 and 44, who were interviewed for two ASEC supplements and reported positive weeks worked in their first ASEC survey. Changes in the maximum credit do not occur every year and the within sample correlation coefficient between the change in the credit currently earning and the credit received this year is 0.27. The maximum credit is converted to real 2010 dollars using the personal consumption index and measured in hundreds of 2010 dollars. Controls include the federal and state minimum wages, an indicator for a TANF waiver, and linear trends by the number of qualifying children during the first survey wave. Individual and year fixed effects are included. Regressions weighted using population weights provided by the CPS. Standard errors are clustered at the state level. *** p<.01, ** p<.05, * p<.1.

Table A.4: Response as Measured in the SIPP, 1990-1993 Cohorts

	Ever Employed (1)	Share Months Employed (2)	Ever Exit Employment (3)	Multiple Exits (4)
Max Credit$_{t-1}$ ($100s)	0.004	0.007***	0.002	-0.0004
(Credit Eligible to Receive)	(0.004)	(0.003)	(0.005)	(0.001)
*Max Credit$_{t-1}$*No Emp. Last Year*	-0.005	-0.005**	-0.003	0.0005
	(0.003)	(0.002)	(0.004)	0.001)
Max Credit$_t$ ($100s)	0.0002	-0.001	-0.002	-0.00002
(Credit Eligible to Earn)	(0.003)	(0.002)	(0.003)	(0.001)
*Max Credit$_t$*No Emp. Last Year*	0.002	0.001	0.002	-0.00002
	(0.003)	(0.001)	(0.004)	(0.001)
Dependent Mean	0.68	0.61	0.11	0.009
Observations	14,579	14,579	14,579	14,579

Notes: Data from the 1990, 1991, 1992, and 1993 cohorts of the SIPP. Sample includes annual observations for all single women with a high school degree or less between the ages of 19 and 44. Changes in the maximum credit do not occur every year and the within sample correlation coefficient between the credit currently earnings and the credit received this year is 0.23. The maximum credit is converted to real 2010 dollars using the personal consumption index and measured in hundreds of 2010 dollars. Controls include an indicator for not being employed last year, the federal and state minimum wages, an indicator for a TANF waiver, and linear trends by the number of qualifying children during the first survey wave. Individual and year fixed effects are included. Regressions weighted using population weights provided by the SIPP. Standard errors are clustered at the state level. *** p<.01, ** p<.05, * p<.1.

Table A.5: Recent Responses to State and Federal EITC Credit Increases, 1999-2016

	Ever Employed (1)	Share Months Employed (2)	Ever Exit Employment (3)	Multiple Exits (4)
Panel A.	Reported Any Employment During First 4 Monthly Surveys			
Max Credit$_{t-1}$ ($100s)	-0.0003	-0.001	-0.001	-0.00004
(Credit Eligible to Receive)	(0.002)	(0.001)	(0.002)	(0.0001)
Max Credit$_t$ ($100s)	0.002***	0.002***	0.001	0.000
(Credit Eligible to Earn)	(0.001)	(0.001)	(0.001)	(0.0001)
Second Wave Dependent Mean	0.94	0.86	0.11	0.003
	Panel B. Reported No Employment During First 4 Monthly Surveys			
Max Credit$_{t-1}$ ($100s)	-0.003	-0.003	-0.001	-0.00002
(Credit Eligible to Receive)	(0.005)	(0.003)	(0.002)	(0.0001)
Max Credit$_t$ ($100s)	-0.00005	-0.001	-0.002***	-0.00004
(Credit Eligible to Earn)	(0.001)	(0.001)	(0.0004)	(0.0001)
Second Wave Dependent Mean	0.12	0.08	0.03	0.001

Notes: Data from the linked 2000-2016 monthly CPS. Sample includes two observations for all single women with a high school degree or less between the ages of 19 and 44, and for whom survey waves 1-4 were contained within a single year. There are 47,312 observations (23,656 women) included in Panel A (Any employed during first four months), and 21,074 observations (10,537 women) included in Panel B (no employed during first four months). Changes in the maximum credit do not occur every year and the within sample correlation coefficient between the credit currently earnings and the credit received this year is -.05. The maximum credit is converted to real 2010 dollars using the personal consumption index and measured in hundreds of 2010 dollars. Controls include the federal and state minimum wages, an indicator for a TANF waiver, and linear trends by the number of qualifying children during the first survey wave. Individual and year fixed effects are included. Regressions weighted using population weights provided by the CPS. Standard errors are clustered at the state level. *** p<.01, ** p<.05, * p<.1.

IX Appendix B. Model Derivations

Proposition 1.

$$0 < \frac{\partial a_t^w}{\partial w_t} < 1, \;\; \frac{\partial \phi^*}{\partial w_t} = u_t'\big(1 - \frac{\partial a_t^w}{\partial w_t}\big) + \frac{\partial EV(a_t, y_t)}{\partial a_t}\frac{\partial a_t^w}{\partial w_t} > 0 \tag{8}$$

Suppose there is no uncertainty and define the value function at time t of a woman who chooses to work in period t as

$$V_t(a_{t-1}; y_{t-1}) = \max_{a_t} u_t(w_t - c_t + a_{t-1} - a_t + \beta V_{t+1}(a_t; y_t) \tag{9}$$

First Order Condition: $\frac{\partial V_t}{\partial a_t} = -u_t' + \beta\frac{\partial V_{t+1}}{\partial a_t} = 0 \rightarrow u_t' = \beta\frac{\partial V_{t+1}}{\partial a_t}$

Envelope Condition: $\frac{\partial V_t}{\partial a_{t-1}} = u_t'$

Combine the first order condition and envelop condition (iterated one period forward) to derive the Euler Equation

Euler Equation: $u_t' = \beta u_{t+1}'$

Totally differentiate the Euler Equation and rearrange to determine how the optimal choice of a_t responds to changes in w_t

$$u_t'' dw_t - u_t'' da_t = \beta u_{t+1}'' da_t \tag{10}$$

$$\frac{\partial a_t}{\partial w_t} = \frac{u_t''}{u_t'' + \beta u_{t+1}''} \tag{11}$$

By the concavity of u, $u'' < 0$ so $0 < \frac{\partial a_t}{\partial w_t} < 1$. Now consider the working cost threshold

$$\phi^* = u_t(w_t - c_t + a_{t-1} - a_t^w) - u_t(b_t + a_{t-1} - a_t^n) + EV(a_t^w, y_t = 1) - EV(a_t^n, y_t = 0). \tag{12}$$

Differentiating with respect to w_t yields

$$\frac{\partial \phi^*}{\partial w_t} = u_t'\big(1 - \frac{\partial a_t^w}{\partial w_t}\big) + \frac{\partial EV(a_t, y_t)}{\partial a_t}\frac{\partial a_t^w}{\partial w_t} > 0 \tag{13}$$

Differentiating with respect to c_t will yield

$$\frac{\partial a_t}{\partial c_t} = \frac{-u_t''}{u_t'' + \beta u_t''} < 0. \tag{14}$$

If the woman decides not to work, the value function becomes

$$V_t(a_{t-1}; y_{t-1}) = \max_{a_t} u_t(b_t + a_{t-1} - a_t) + \beta V_{t+1}(a_t; y_t) \tag{15}$$

The optimal wealth level will respond to b_t as it responded to w_t and $0 < \frac{\partial a_t}{\partial b_t} < 1$. However, the value of not working enters the cost threshold negatively so an increase in b_t will have a negative effect on ϕ^*.

Proposition 2.

$$-w_t < \frac{\partial a_t^w}{\partial \tau_t} < 0, \;\; \frac{\partial \phi_\tau^*}{\partial \tau_t} = \frac{\partial EV(a_t^w + \tau_t w_t, y_t{=}1)}{\partial a_t}\big(\frac{\partial a_t^w}{\partial \tau_t} + w_t\big) > 0 \tag{16}$$

Suppose a wage subsidy is now available and transferred with a one period lag, the value function for working becomes

$$V_t(a_{t-1}; y_{t-1}) = \max_{a_t} u_t(w_t - c_t + a_{t-1} - a_t) + \beta V_{t+1}(a_t + \tau_t w_t; y_t) \tag{17}$$

and the Euler Equation will be

$$u_t'(w_t - c_t + a_{t-1} - a_t) = \beta u_{t+1}'(a_t + \tau_t w_t). \tag{18}$$

Totally differentiating with respect to τ_t and a_t yields

$$-u_t'' da_t = \beta u_{t+1}'' da_t + \beta u_{t+1}'' w_t d\tau_t \tag{19}$$

$$\frac{\partial a_t}{\partial \tau_t} = -\frac{\beta u_{t+1}''}{\beta u_{t+1}'' + u_t''} w_t \tag{20}$$

Because u is concave, $u'' < 0$ meaning that $\frac{\partial a_t}{\partial \tau_t} < 0$. However, $\frac{\beta u_{t+1}''}{\beta u_{t+1}'' + u_t''} < 1$ so it must be the case that

$$-w_t < \frac{\partial a_t}{\partial \tau_t} < 0. \tag{21}$$

If we substitute this into the equation for ϕ^* and take the partial derivative with respect to τ_t

$$\frac{\partial \phi_\tau^*}{\partial \tau_t} = \frac{\partial EV(a_t^w + \tau_t w_t, y_t{=}1)}{\partial a_t}\big(\frac{\partial a_t^w}{\partial \tau_t} + w_t\big) > 0. \tag{22}$$