Family Labor Supply and the Timing of Cash Transfers: Evidence from the Earned Income Tax Credit

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Abstract

This paper provides new evidence on how families adjust their labor supply in response to the receipt of an anticipated cash transfer. In particular, I exploit the unique disbursement timing and benefit rules of the Earned Income Tax Credit (EITC) to assess the effect of the receipt of a cash transfer on the timing of family labor supply. My results show that income seasonality caused by EITC receipt leads to changes in the intra-year labor supply patterns of married women. On average, receiving a $1,000 EITC payment significantly reduces the proportion of married women who work, by 1.6 percentage points, in the month in which the EITC is received. The income elasticity of labor supply for married women based on this estimate is around -0.06. In contrast, the receipt of the EITC does not affect the timing of the labor supply of married men and single women. The subgroup analysis suggests families might reduce the labor supply of secondary earners in response to receiving an anticipated EITC payment. In addition, My results suggest that the presence of liquidity constraints and myopia could be important reasons for my findings.

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1 Introduction

Do households adjust their behavior in response to receiving expected income payments? This question is crucial to understanding households' behavior and analyzing aspects of government policies. For example, the answer to this question has important implications for the design of welfare programs, especially for determining the payment frequency of welfare benefits. If the benefit recipient's behavior is sensitive to the receipt of income, then more frequent payments could improve policy by helping recipients to smooth out their consumption. On the other hand, the effectiveness of short-run fiscal policies, such as temporary rebates during a recession, largely depends on how people adjust their behavior after receiving payments. The central implication of the life cycle model with a perfect credit market is that consumption behavior should not respond to predictable changes in income. A growing empirical literature tests this claim by examining whether the timing of the receipt of income is associated with the timing of household spending. Most prior studies find that families increase their spending right after they receive expected income payments, such as a public pension (Stephens and Unayama, 2011; Stephens, 2003), temporary rebate (Parker, 2014; Johnson et al., 2013, 2006) or income tax refund (Souleles, 1999). These findings generally offer evidence against the theory.[1]

This paper deviates from the previous studies by considering an economically important but seldom addressed question — Do families change their labor supply in response to the receipt of an anticipated cash transfer?[2] Empirically investigating the labor supply response has important implications for both economic theory and public policy. On the theoretical side, such investigation examines one central prediction of the life cycle model of labor supply: Any anticipated income changes should not affect labor supply behavior.

[1] Johnson et al. (2013) exploit the random timing of the receipt of tax rebates (i.e. US economic stimulus payments) to examine the spending response to the receipt of income. They find that households spend 60% of the tax rebate within three months of receiving it. Stephens and Unayama (2011) use the Japanese public pension which is distributed every three months; they find that household spending closely follows the disbursement patterns of the public pension benefit. Stephens (2003) finds that households spend more on weekly nondurable consumption upon receiving the monthly US Social Security check. Souleles (1999) provides evidence that households in the US spend around 30% to 60% of an income tax refund within one quarter of receiving it. However, not all tests of the life cycle model that examine the spending response to the receipt of income find evidence contradicting consumption-smoothing behavior. Hsieh (2003) utilizes Alaska's annual oil revenue dividend payment, which is equal to two-thirds of the monthly pre-tax household income. He finds that Alaskan households do not change their spending when they receive this payment. Paxson (1993) finds that Thai households can smooth out their spending over a striking degree of variation in seasonal income. Jappelli and Pistaferri (2010) provide an excellent review of this strand of the literature.

[2] Previous studies examining the validity of the life cycle model usually abstract from the labor supply decision and implicitly assume that saving and borrowing are the only ways to smooth out household spending.

When families are informed of a future income change, they can adjust their labor supply (i.e. leisure consumption) in advance through borrowing and saving. Thus, there should be no change in labor supply at the time when the income change is experienced. Several recent studies (e.g. Saez, 2003; Looney and Singhal, 2006) use this prediction to assume away income effects associated with anticipated changes in tax rates when estimating the intertemporal substitution elasticity of labor supply. However, its validity is questionable given the vast evidence on the household spending response to predictable changes in income. Regarding policy, such investigation helps us better understand how the timing of welfare benefit payments affects household behavior. Past policy debates have mainly focused on the impact of the timing on household spending. My results will show that the timing of cash transfers also matters for the family labor supply decision.

I investigate the above issue by assessing the immediate labor supply response to the receipt of the Earned Income Tax Credit (EITC), a refundable tax credit that subsidizes the earnings of the working poor.[3] The EITC is the largest cash transfer program for low-income families in the US.[4] There are two features of the EITC that make it an interesting case to study the issue I want to address. First, it is widely known and highly anticipated by the recipients. Previous studies suggest that most EITC recipients know what their EITC refund will be before filing their taxes (Romich and Weisner, 2000; Chetty and Saez, 2013).

Second, the EITC could be the single largest cash transfer that many of the working poor will receive during the year. The payment is fairly large relative to the recipients' family income.[5] The average amount of EITC for eligible families is around $2,000 and can account for one month of family income.[6] For some families, it can comprise as much as 45% of their annual income. In addition, most EITC recipients receive their credit in the form of a one-time lump-sum payment within a narrow time frame.[7] Figure 3 shows that

[3]The EITC is fully refundable. That is, any excess credit beyond a family's income tax liability will be paid in the form of a tax refund. Over 90% of the value of the EITC is delivered in the form of tax refunds, as opposed to serving to reduce tax liabilities (McGranahan and Schanzenbach, 2014).

[4]The structure of the US welfare system has undergone a substantial change in the past three decades. The federal income tax system has become a major policy tool for providing cash assistance to low-income families with children (Eissa and Hoynes, 2011). The expansion of the EITC accounts for most of this dramatic transformation. In 2011, the federal government spent $61 billion on the EITC, substantially more than the $27.1 billion spent on Temporary Assistance for Needy Families (TANF), the flagship cash transfer program in the US, while the two programs were of a similar size in 1994 (see Figure 1).

[5]The amount of the EITC largely depends on the family's income, the number of children, and the marital status of the taxpayer in the previous year. I will discuss the EITC benefit rules in detail in Section 2.

[6]This number is based on the EITC payment schedule during my sample period (1997–2012).

[7]Recipients formerly had the option of receiving installments of their expected credit on a monthly basis in the calendar year prior to tax filing (Advance EITC). This advance payment option has been unavailable since 2011 due to a very low take-up rate. I will discuss this issue in Section 2.

over half of EITCs are paid in the month of February.[8] This concentrated delivery of cash transfers induces a large variation in families' disposable income across 12 months.[9] I use it to examine how family labor supply reacts to the receipt of anticipated cash transfers by providing the first evidence on how the EITC payment timing affects the timing of the family labor supply.[10]

Since most EITC recipients are low-income families with children, the primary concern over relying on variation in payment timing is that my estimates may simply reveal the intra-year labor supply patterns of specific demographic groups, such as those with low incomes or those who have children, rather than reflecting the impact of receiving the EITC payment. I deal with this concern in two ways.

First, I conduct triple differences estimations by using a comparison group of individuals, such as those with children but with incomes just above the EITC range or those without children but incomes within the EITC range, who are similar to those in the treatment group in many ways but receive much smaller EITC payments to control any confounding effects unrelated to the receipt of the EITC. Note that membership in the treatment group is based on family characteristics in the previous year. It is predetermined and cannot change during the year. My results show that the receipt of EITC causes the labor supply of married women to show a sharp drop in February and a substantial decline in January, March and April. This pattern is largely coincident with the payment timing of the EITC. In contrast, the receipt of the EITC has little impact on the timing of labor supply for married men and single women.

Second, I restrict my sample to those receiving EITC payments and utilize the variation in the amount they receive in a given month, which is predetermined by the time the labor supply decision is made, so as to quantify the impact of the EITC receipt on recipients' monthly labor supply. My estimates indicate that receiving a $1,000 EITC payment signif-

[8]This is because recipients need to file their taxes first and will then obtain their refund a few weeks later. The US government usually opens the tax window in the middle of January and low-income taxpayers tend to file their taxes early, meaning that most tax refunds for low-income families are issued in February.

[9]Previous studies find strong evidence that the timing of the household spending of EITC recipients is closely related to the timing of the EITC arrival. EITC recipients tend to increase their household spending, especially on durable goods (Barrow and McGranahan, 2001; Adams et al., 2009), consume more healthy food (McGranahan and Schanzenbach, 2014) and use more healthcare services (Hoynes et al., 2014; Niedzwiecki, 2013) in the February when they receive the credit.

[10]One recent paper finds that the tax refund provides liquidity for EITC-eligible job losers at the beginning of their unemployment spell (LaLumia, 2013). The author exploits the timing of the EITC refund to examine whether the unemployment duration (i.e. job search intensity) of EITC recipients is sensitive to the provision of a lump-sum transfer at the beginning of their unemployment spell and then estimates the liquidity effect of unemployment insurance. She finds that EITC recipients who become unemployed in February have longer unemployment duration than those entering unemployment in other months of the year.

icantly reduces a married woman's likelihood of working, by 1.6 percentage points, in the month of the EITC arrival, from a base of 47%.[11] The income elasticity of labor supply for married women based on this estimate is around −0.06, which lies between the estimates in the previous studies (Blau and Kahn, 2007; Heim, 2007). In line with the results from the triple differences estimation, I do not find any statistically detectable effect of receiving a $1,000 EITC payment on the probability of working for either married men or single women.

I conduct several subgroup analyses to explore possible causes of my results. First, I investigate why there are very different labor supply responses to the receipt of EITC across married women, married men and single women. The subgroup analysis reveals such patterns to be due to the fact that the majority of married women are secondary earners in their families and not to gender differences in labor supply patterns among EITC recipients.[12] I find that married women who are secondary earners significantly reduce their labor supply in response to the receipt of EITC but those who are primary earners do not. Interestingly, a similar pattern also emerges in the sample of married men. These results suggest that families might adjust the labor supply of secondary earners in response to receiving an anticipated EITC payment. This result is consistent with findings in previous studies (Cullen and Gruber, 2000; Kohara, 2010) suggesting that the labor force participation of secondary earners is sensitive to changes in family resources.[13]

Next, I analyze why the family labor supply changes at the time of receipt of the anticipated EITC payment. My results suggest that it could be due to the presence of liquidity constraints and myopia among EITC-eligible families. The presence of liquidity constraints forces families to keep their labor supply high so as to maintain liquidity until receiving the EITC payment. Following previous studies, I conduct subgroup analysis by splitting the sample into those who are liquidity constrained and those who are less constrained. I find that married women from constrained families, such as families with low liquid assets or high mortgage-to-income ratios, exhibit a significantly negative labor supply response to the receipt of the EITC but those from less constrained families do not. However, liquidity constraints cannot fully explain why the receipt of the EITC causes married women to reduce their labor supply temporarily in February rather than smoothing out their labor supply in

[11] I use the likelihood of working in October, a month in which little of the EITC is disbursed, to represent the baseline mean for the treatment group.

[12] The definition of a secondary earner is an individual who earned less income than her spouse in the previous year. Single women are primary earners.

[13] These phenomena have been addressed in field work. A respondent in Smeeding et al. (2000) vividly described her working status before receiving the EITC refund. As the authors explain: "She can pay off all her [back] bills, be caught up with all her bills and not feel stressed..... All she has to do is keep working until December. Then in January she can turn in her tax form so she can get that money."

the months following the receipt of the cash. The observed pattern reveals that recipients could be somewhat myopic in planning for their future consumption.

Finally, I exploit month-to-month labor force transitions so as to understand the main cause of married women's decreased likelihood of working in February (relative to other months). Although the estimates are not precise, my results provide suggestive evidence that married women could temporarily leave their jobs without pay upon receiving the EITC refund in February.

This paper contributes to the existing literature in two ways. First, it examines the labor supply response to the receipt of an anticipated cash transfer, which is largely unexplored in prior studies. Only two recent studies have studied the response of labor supply to an anticipated income change induced by cash transfers, both in developing countries where people have difficulty accessing credit. Edmonds (2006) finds that the timing of the anticipated public pension in South Africa is associated with the timing of child employment. Receipt of the pension reduces child labor supply and increases children's enrolment in school. Fernandez and Saldarriaga (2014) utilize exogenous variation in the time between the payment date of the conditional transfer program and the interview date of the household survey to find evidence of women's working hours in Peru declining upon receipt of a cash transfer. Due to data limitations, neither paper is able to conduct rigorous empirical investigations into the possible causes of their results. I use detailed asset and debt information in my data to investigate the mechanisms behind my findings. In addition, the present paper provides the first evidence on the causal effect of the receipt of a cash transfer on the timing of family labor supply in the context of a developed country.

Second, this paper represents the first attempt to analyze the short-run (i.e. intra-year) effects of the EITC on the labor supply. Since the EITC is a tax credit that subsidizes the earnings of low-income families, previous studies mainly focus on how a change in the level of the EITC payment affects the level of family labor supply.[14] They exploit various expansions of the EITC, which boosted the level of the EITC payment for eligible families between the mid-1980s and the mid-1990s, to evaluate the labor supply effect of the EITC. They find that EITC expansion resulted in an increase in the employment rate of single women(Meyer, 2010; Meyer and Rosenbaum, 2001; Eissa and Liebman, 1996) and a decline in the employment rate of married women (Eissa and Hoynes, 2004).[15] The present paper

[14]Theoretically, it should have both a substitution effect and an income effect on labor supply. The substitution effect comes about as a result of the EITC altering the family's labor supply decision by changing the marginal tax rate on earnings. The income effect results from the tax credit increasing the family's resources and leading individuals to decrease their labor supply (consume more leisure).

[15]Hotz and Scholz (2003) offer a literature review on behavioral responses to the EITC. Eissa and Hoynes (2006) provide a review focused particularly on the EITC's impact on labor supply.

does not examine a change in the level of the annual EITC payment or labor supply. Rather, it focuses on whether the timing of EITC receipt affects the timing of family labor supply within any given year, keeping the annual EITC amount constant. My results clearly show that the timing of the disbursement of the EITC matters for the labor supply decision of married women.

The paper proceeds as follows. Section 2 briefly describes relevant features of the EITC. Section 3 discusses the data and sample selection process. Section 4 proposes the identification strategies. Section 5 presents my main results and robustness checks, and discusses possible mechanisms behind my findings. Section 6 concludes.

2 Background on The Earned Income Tax Credit

The EITC is a refundable tax credit for low-income working people, particularly those with children, in the US. In 1975, the EITC began as a small program but it has since grown into one of the largest anti-poverty programs in the US. In 2012, the US federal government spent $61 billion on the EITC, supporting more than 28 million families.

A taxpayer's eligibility for the EITC relies largely on her family's earned income (or adjusted gross income), number of qualifying children, and filing status during the tax year (i.e. previous year).[16] First, as the EITC is a policy tool aimed at encouraging the poor to work, a taxpayer must have positive earned income, defined as the sum of wage income and self-employment income. The final EITC payment depends on the minimum amount of credits based on either earned income or adjusted gross income (AGI).[17] Second, as with other means-tested transfer programs, a taxpayer's AGI and earned income have to be below a particular income cutoff, which depends on the number of qualifying children and filing status. Third, a taxpayer with one or more qualifying child is eligible for a much larger amount of credit. Qualifying children must be under the age of 19 years, or 24 years if studying full-time, and must live with the taxpayer for at least half of the year. A small amount of credit is provided to childless taxpayers.

Figure 2 displays the EITC schedule for taxpayers with and without children.[18] The

[16] According to the Internal Revenue Service, "A tax year is an annual accounting period for keeping records and reporting income and expenses." Thus, a tax year usually refers to the previous year. From here on, I will use tax year and previous year interchangeably. There are three filing statuses: joint filing, single, and head of household. The first is for a married couple and the last two are for unmarried people.

[17] AGI is a taxpayer's total income from all sources, excluding non-taxable income such as welfare benefits, minus any adjustments to income. The adjustments could be moving expenses, alimony paid, health savings account deductions, and so on.

[18] This is the EITC payment schedule for year 2007.

payment level is quite stable during my sample period of 1997 to 2012.[19] The EITC schedule consists of three regions: the phase-in region, where the tax credit increases at a given rate as earned income (or AGI) rises, the plateau region, where the tax credit stays constant at the maximum amount, and the phase-out region, where the tax credit declines at a specific rate for each extra dollar of income. The phase-in and phase-out rates depend on the number of qualifying children. For example, the phase-in rate for a taxpayer with one child is 0.34, so that one extra dollar of income would raise the EITC refund by 34 cents. The credit stops rising when it reaches the maximum amount and then stays unchanged until income hits the phase-out threshold. The credit will then start to phase out at the rate of 16 cents per dollar until it disappears entirely. Since 2002, married couples (i.e. married and filing jointly) have had a larger income threshold under which the maximum amount of credit can be given, which means that more tax credit is offered to married couples than to singles. In sum, there is a lot of heterogeneity in the amounts of credit paid to EITC recipients. For a taxpayer with two or more children, the maximum credit can account for 40% of family annual income. However, the maximum credit for a childless taxpayer only accounts for 5% of family annual income.

EITC payments usually arrive in the first quarter of the calendar year, mostly in February. This is because the EITC is part of the annual tax refund; EITC recipients receive their refunds in the first few weeks after filing their taxes, and the Internal Revenue Service (IRS) usually opens the filing window in mid-January.[20] This disbursement pattern is very different from those of other transfer programs and overpayment refunds, which tend to be distributed evenly over the calendar year.[21] Table 1 documents the share of total EITC disbursements that occur in each month, averaged across the years 1997 to 2012, based on various issues of Monthly Treasury Statements (MTS).[22] In each year, over 80% of EITC payments are disbursed between January and March. On average, the share of payments made in February is 56% and that in March is 22%.

[19] In each year, the EITC payment is adjusted for inflation. The program was still being expanded somewhat during this period. For example, during from 2010 to 2013, as part of the American Recovery and Reinvestment Act, the EITC was temporarily expanded for families with three or more children. Therefore, the phase-in rate for families with three or more children became 45% of income (up from 40%). This change effectively raised the maximum credit for these families by around $600. The act also increased the income threshold at which credit begins to phase out for married couples to $5,000.

[20] In 2011, the window opened on January 14th.

[21] Other transfer programmes, such as Supplemental Security Income, Food Stamps, and Temporary Assistance to Needy Families, send the benefits out monthly. Individual income tax refunds are distributed evenly over March to May (Barrow and McGranahan, 2001).

[22] These are published by the Treasury Department's Financial Management Service. The information is available at http://www.fms.treas.gov/mts/backissues.html. As the IRS did not provide disbursement information in 1997, I used the 1998 distribution of disbursements to impute it.

Recipients could, during my sample period, obtain their payments even earlier than the MTS data show by using Refund Anticipation Loan (RALs), for which users were charged a very high fee (i.e. implicit interest rate) for the expedition of the receipt of their benefits. The service allowed a taxpayer to receive their refund immediately upon filing their tax return. Wu (2012) shows that around 18% of EITC recipients receive their tax refunds early via RALs. Moreover, according to McGranahan and Schanzenbach (2014), around 10% of EITC benefits were used to reduce the recipient's tax liability, and presumably such credits are received when the tax was paid. Taken together, these aspects imply that a substantial number of EITC recipients may have obtained their credits in January.

It was not necessary for a recipient to receive the EITC in the form of a one-time lump-sum payment during most of my sample period. Prior to 2011, a recipient had the option of using "Advance EITC" to get back a portion of their expected credit each month over the calendar year prior to filing their taxes. However, this option was not the default and involved submitting paperwork to one's employer.[23] According to previous estimates (GAO, 1992), the take-up rate of Advance EITC was between just 0.5% and 3%. Given the evidence on liquidity constraints among EITC recipients, the extremely low participation in Advance EITC seems to have been a puzzle. Jones (2010) finds that the low take-up of Advance EITC did not result from a lack of information, administrative costs or stigma, and suggests that making Advance EITC the default option could have substantially increased its participation rate.[24] However, due to the very low usage rate, it has not been available since 2011.

3 Data and Sample

3.1 Data

The data I use come from the 1996, 2001, 2004, and 2008 panels of the Survey of Income and Program Participation (SIPP). The SIPP is a national representative survey of welfare program participation, employment and income dynamics, health insurance coverage, assets, liabilities, and related topics. The initial sample size for each panel is about 35,000 households and 100,000 individuals. Each panel is a longitudinal survey that follows the initially

[23] The maximum amount of advance credit that could be received was 60% of the maximum credit for a taxpayer with one child. The remaining credit was received after taxes were filed at the beginning of the next year. In 2009, a potential EITC recipient could obtain at most $1,826 through the Advance EITC.

[24] Based on my SIPP sample, I find that over 70% of EITC-eligible families hold at least one full-time jobs through out a year and 80% of them stay in the same jobs.

selected household members for at least three years and interviews them every four months.[25] In each interview, the respondent reports her or his labor participation and income sources for each of the preceding four months. Most of the information is reported at a monthly or quarterly frequency. One exception is the variable indicating labor force status, which the SIPP provides weekly for each respondent. I use this information to construct my outcome variables.[26]

The SIPP data have two features making them especially suitable for this paper. First, the SIPP data have a longitudinal structure. This feature not only allows me to determine the treatment status for each person and precisely calculate the EITC payments by utilizing information on each family's income and number of qualifying children during the previous year, but also enables me to control for the unobservable time-invariant heterogeneity by including individual fixed effects in the regression.

Second, the SIPP also surveys household wealth and asset information once per year in its Assets, Liabilities, and Eligibility topical module.[27] The module provides the latest measurements of household assets, wealth, and debts as at the interview date, such as the value of deposits in bank accounts, stock and mutual fund holdings, home equity, vehicle equity, business equity, secured and unsecured debt, and mortgages. This information is particularly useful when I conduct subgroup analysis to explore possible explanations for my empirical findings by splitting the sample based on a family's tendency to be trapped by liquidity constraints. I use asset and wealth data from the topical module of the previous year to construct my measures of the family's liquid assets and mortgage-to-income ratio. This predetermined wealth information is used to form proxies indicating a family's liquidity situation in the current year.

3.2 Imputed EITC Payment

The SIPP does not provide valid information about the amount of EITC that each eligible family would have received.[28] I predict the amount of the EITC using information on family (earned) income, number of qualifying children, and filing (marital) status in the previous

[25] Some panels, such as the 1996 panel, follow their sample for up to four years. In earlier years, the SIPP also had a short panel that followed selected household members for less than two years (e.g. the 1989 panel).

[26] I will discuss my outcome variable in detail in Section 4.

[27] The waves of topical modules used in this paper are wave 3, wave 6, and wave 9 in the 1996, wave 3 and wave 6 in the 2001 and 2004 panels, and wave 4, wave 7 and wave 10 in the 2008 panel.

[28] SIPP indeed asks a question about the amount of EITC that a respondent receives in its tax topical module. However, the response rate of this question is fairly low, only 24%. In addition, some of answers to income questions in the tax module are inconsistent with those in the core SIPP files (Sisson and Short, 2001).

year. As mentioned before, the final amount of the EITC depends on the minimum amount of credits, based on either earned income or AGI. Since the SIPP has information about family earned income, I use this variable directly. However, the SIPP does not provide valid information about AGI. I use family income, the sum of earned income and unearned income, excluding non-taxable income, such as means-tested cash transfers,[29] to approximate AGI.[30]

Qualifying children must be under the age of 19 years, or 24 years if studying full-time, and must live with the taxpayer for at least half of the year. I use detailed information about the age of each family member, parent (father and mother) identifiers, school enrollment status, and number of months living with parents to calculate each family's number of qualifying children. According to EITC rules, married couples have to file their taxes jointly. Single individuals can choose either single or head of household filing status. Both filing statuses lead to the same EITC amount.[31] Thus, I use marital status to infer taxpayer's filing status when computing the EITC payment.

3.3 Sample

To improve the measurement of my outcome variable and the EITC payments for my estimation, I select my sample as follows. Table 2 displays the summary statistics of selected variables after each sample selection criterion has been applied. First, I require a respondent to have been followed in SIPP for at least two years. This criterion allows me to use the previous year's information on family income and number of qualifying children to assign treatment status to an individual and infer the EITC amount that her family is likely to receive in the current year. For example, I use a respondent's 1996 information on family income and number of qualifying children to calculate the size of payment her family would have been likely to receive in 1997, and examine the impact of receiving the EITC payment on her intra-year labor supply pattern in 1997. Since I focus on low-income families, the estimated sample is restricted to those with positive earned income and family incomes below $40,000 in the previous year, which serves as the income cutoff for the comparison group (Column 1).[32] Following the previous EITC literature (Eissa and Hoynes, 2004; Eissa and

[29] The SIPP classifies family income sources into four categories: (1) earned income, (2) property income, (3) means-tested cash transfers, and (4) other income. The last three are unearned income but means-tested cash transfers are generally non-taxable income. Therefore, I define family income as the sum of earned income and unearned income, excluding means-tested cash transfers and use that to approximate AGI.

[30] Again, the SIPP has a question about the amount of AGI but the data quality is not good (i.e. low response rate and inaccurate numbers).

[31] However, filing as a head of household can provide more generous tax brackets and larger standard deductions than filing as a single.

[32] I discuss the treatment and comparison groups in detail in Section 4.

Liebman, 1996), I conduct estimations separately for three subgroups that have been the populations of interest in previous studies: married women, married men, and single women (Column 2). Therefore, I only include those who are the reference person of their household or the spouse of the reference person. Note that a married couple filing their taxes together are from the same family and thus have the same predicted EITC amounts.

The basic unit interviewed in the SIPP is the household, and each household might have several families residing in it. In order to avoid the impact of the EITCs of other subfamilies within the same household, any individual living in a household with more than one family is dropped from the sample (Column 3). Furthermore, I restrict the sample to those aged from 20 to 55 so as to reduce the impact of retirement on my estimated labor supply responses (Column 4).[33]

Since my main focus is the intra-year change in labor supply, I require the sample to be observed for all 12 months in the years that I use for labor supply estimation (i.e. except in the first year of each panel) so as to mitigate concern about the impact of a change in sample composition on my estimates. This selection criterion ensures that my estimates identify changes in individuals' behavior instead of shifts in the composition of the sample (Column 5). Finally, for the first year of each panel, which is used only for determining the EITC amount and the treatment status in the following year, the sample can be observed for less than 12 months because a new SIPP panel might start after January. To obtain precise estimates of the EITC payments, I restrict the sample in these years to those with at least six months of observations (Column 6).[34]

The years I use for my estimations are 1997–1999, 2002–2003, 2005–2006, and 2009–2012. Note that I also use the first year of each panel (i.e. 1996, 2001, 2004, and 2008) to infer the treatment status and predicted EITC amount in the following years.[35] The final sample size comprises 25,564 individuals and 484,104 individual-month observations. From Table 2, one can see that the sample characteristics are fairly similar after each sample selection criterion is applied. The age restriction (Column 4) causes the biggest changes in the sample characteristics, causing the sample to have higher average earned income, a higher average number of children, a higher predicted EITC amount, a higher portion of EITC recipients, lower average wealth, and lower average liquid assets. According to statistics from the IRS,

[33]For married couples, this criterion is based on the wife's age. About 93% of the husbands are also within this age range. In Section 5, I report a robustness check using a sample in which both husband and wife are in the required age range (20 to 55).

[34]For those without twelve months of observations, I scale their incomes up to create an annual income. For example, for those with seven months of income information. I use the seven-month income multiplied by 12/7 to obtain an estimate of the annual income.

[35]These years are 1997, 2002, 2005, and 2009.

during my sample period, the average amount of the EITC payment was about $1,974, which is quite close to the average value of the imputed credit amount, at $2,130.[36]

4 Identification Strategy

In this section, I describe the empirical specifications used to examine the impact of the EITC receipt on the labor supply of low-income families. My identification strategy relies on the intra-year variation in the timing of EITC disbursement. EITC recipients receive their payments during the tax filing season, mostly in the month of February. I utilize this plausibly exogenous timing of payments and the benefit rules of the EITC based on the previous year's information to estimate the causal effect of EITC receipt on low-income families' intra-year labor supply.

4.1 Triple Differences Estimation

I begin with triple differences analysis. This method compares the difference in labor supply for a treatment group, between February and the other months, to that for a comparison group, which is presumed to remove any shocks in February, other than the receipt of EITC payments, that might affect the labor supply decision of a treatment group. Following the prior literature (McGranahan and Schanzenbach, 2014; Niedzwiecki, 2013; LaLumia, 2013; Barrow and McGranahan, 2001), I define my treatment and comparison groups using pre-determined information based on EITC benefit rules: (1) the family income in the previous year, and; (2) the number of qualifying children in the previous year. I estimate the following regression:

$$\begin{aligned} L_{imt} = \alpha + \beta_l LowInc_{it-1} + \beta_c Child_{it-1} + \beta_e EITC_{it} + \beta^{DDD} EITC_{it} \times Feb + \\ M + (LowInc_{it-1} \times M)\beta_{lm} + (Child_{it-1} \times M)\beta_{cm} + \delta_t + \nu_i + X_{imt}\psi + \varepsilon_{imt} \end{aligned} \quad (1)$$

where L_{imt} is my outcome of interest, the share of weeks worked by individual i in month m of year t. Since SIPP provides weekly labor force status,[37] I use the number of

[36] All dollar amounts are in 2007 dollars.

[37] The SIPP questionnaire gives a respondent five choices for weekly labor force status: (1) with job or business, working; (2) with job or business, absent without pay; (3) with job or business, on layoff; (4) no job or business, looking for job or on layoff; (5) no job or business, neither looking for job nor on layoff. I use the first option to indicate that a respondent is working in a given week and the other four to indicate that she or he is not working.

working weeks divided by number of weeks in a month to construct this variable: $L_{imt} = 1$ if individual i works for the full month; $L_{imt} = 0$ if individual i does not work at all during the month; $0 < L_{imt} < 1$ denotes cases in between.[38] The advantage of the above definition is that it can also capture changes in labor force status within a month. Later I report a robustness check of my estimates in which I used a different definition of the outcome variable.[39] The variable $LowInc_{it-1}$ refers to whether individual i's family income in year $t-1$ is greater than zero and less than the EITC income limit ($LowInc_{it-1} = 1$) or is greater than than EITC income limit and less than \$40,000 ($LowInc_{it-1} = 0$).[40] The income limit roughly corresponds to the maximum EITC-eligible income for the families with one child during my sample period. For a married couple, the income limit is \$36,000 and for single women it is \$33,000. The variable $Child_{it-1}$ refers to whether individual i has one or more qualifying children in year $t-1$ ($Child_{it-1} = 1$) or has no qualifying children in year $t-1$ ($Child_{it-1} = 0$).

The treatment group dummy $EITC_{it}$ can be expressed as an interaction term between $LowInc_{it-1}$ and $Child_{it-1}$. Therefore, $EITC_{it} = 1$ indicates that individual i belongs to the treatment group that is expected to receive high EITC payments in the year t, namely, those whose family income is below the EITC income limit and who have one or more children in year $t-1$. $EITC_{it} = 0$ denotes that individual i is in the comparison group that is expected to receive low EITC in year t due to either having too great an income or being childless in year $t-1$.[41] Note that the group assignment is based on the previous year's information, which is predetermined by the time an individual makes her labor supply decision. In other words, an individual's current labor supply cannot affect her treatment status.

Figure 4 compares the distribution of EITC payments between the treatment and comparison groups for married couples and single women. One may notice that most individuals in the comparison group have predicted EITC payments of zero. On average, the predicted amount of EITC for married couples in the treatment group is about \$2,450. However, those from the comparison groups only receive \$140 on average. For single women, individuals from

[38] That is, an individual works for part of the month. For example, February has four weeks. If an individual only works for two weeks, I would assign $L_{imt} = 0.5$ to this observation.

[39] $L_{imt} = 1$ if individual i is working in any week during a month and $L_{imt} = 0$ otherwise.

[40] The income cut-off for the comparison group is chosen to narrow down the income difference between the two groups of families while retaining a sufficiently high sample size in the comparison group.

[41] I consider three comparison groups of individuals who are similar to those in the treatment group in many ways but receive very low EITC payments. The first consists of those individuals with a similar income level to those in the treatment group (i.e. individuals whose family income is below the EITC income limit) but no qualifying children. The second comprises those individuals with one or more qualifying child but whose family income in the previous year is just above the income limit and below \$40,000. The third comparison group includes childless individuals whose family income during the previous year is above the income limit but below \$40,000.

the treatment group are predicted to receive about $2,370 and those from the comparison groups just $70. Table 3 displays summary statistics of selected variables for the treatment group and comparison groups. As expected, the treatment group has larger family (earned) incomes, more children, and greater predicted EITC amounts than the comparison groups. In addition, the treatment group consists of more young, less wealthy, and less educated individuals than the comparison groups. However, except for the EITC-related variables, the differences in the covariates between the treatment and comparison groups are not statistically significant after controlling for individual fixed effects. Furthermore, I control for these covariates and individual fixed effects in all specifications, which substantially reduces the impact of these group differences on my estimates.

The variable Feb is a dummy for the month of February, when most EITC recipients receive their tax refunds. The key variable used for identification is $EITC_{it} \times Feb$, which indicates the February observation of individual i who is expected to receive a high EITC payment. Since the timing of the EITC payments is highly concentrated in February, the treatment group will experience a large cash influx in February due to the receipt of the EITC, which is assumed to be the only difference between the treatment and comparison groups during the year. Hence, I can attribute any February effect found in the treatment group to the impact of receiving the EITC. The coefficient of interest β^{DDD} represents the causal effect of the EITC receipt on the labor supply of individuals receiving high EITC payments in February.

Two assumptions are essential to ensure that β^{DDD} has a causal interpretation. First, in absence of EITC payments, the difference in labor supply between the treatment and comparison groups should be similar across all twelve months. In a later section, I conduct an event study analysis to investigate whether the differences in labor supply between treatment and comparison groups are similar across the months when very few EITC payments are disbursed. Second, the composition of the two groups cannot change across months. Since the membership of the groups is based on the previous year's information, there is no change in group composition within the current year. Moreover, the estimated sample is a fixed panel that follows the same individuals over twelve months.

I include a set of month dummies M so as to control for the monthly patterns in labor supply that is common to both treatment and comparison groups in all years, such as holiday-season jobs. The advantage of the triple differences regression is that it allows me to include more fixed effects that are related to the group-level seasonality in the labor supply. Since my treatment group consists of low-income individuals with children, the primary concern with my estimates is that the results could simply reveal monthly patterns in labor supply

for specific groups, namely low-income individuals or individuals with children, regardless of the impact of receiving the EITC payment. Hence, I interact month dummies M with the low-income dummy $LowInc_{it-1}$ to further control for any monthly seasonality in labor supply that is specific to low-income individuals. Note that I use October as the baseline month since less than 1% of the total EITC disbursement is paid in this month. Similarly, to control for any monthly employment patterns for individuals with children, I also include group-specific month fixed effects for those who have qualifying children: $Child_{it-1} \times M$.[42] To control for common macroeconomic effects during my sample period, I include a series of year dummies δ_t. In addition, the panel structure of the data allows me to include individual fixed effects ν_i to control for any unobservable time-invariant differences in labor supply preferences between various individuals. Finally, to improve the precision of the estimates, I include a number of covariates X_{imt} that could affect an individual's labor supply: educational attainment, age, number of children below 18, family wealth, monthly state unemployment rate, state fixed effect, state-specific time trend, industry fixed effect, industry-specific time trend, a dummy denoting the interview month, a dummy indicating that the individual worked part-time in the previous year, and month fixed effect specific to part-time workers.[43]

The variable ε_{imt} represents an error term. Since I follow the same individuals over time, to account for possible serial correlation that might affect the estimation of the standard error, the standard errors in all regressions are clustered at the person level. All regressions are weighted using person-level weights provided by SIPP.[44]

4.2 Event Study Analysis

One possible concern in the above specifications is that I treat all months other than February as part of the comparison groups, i.e. as unaffected by the receipt of the EITC refund. However, nontrivial EITC payments are disbursed in other months, particularly January, March and April. Hence, the results from equation (1) might bias the estimates downward (in absolute value). To address this issue, I conduct an event study by replacing $EITC_{it} \times Feb$

[42] Again, I use October as the omitted month.

[43] The categories of an individual's educational attainment are high school drop-out, high school degree, and post-secondary education. Information about family wealth (2007 dollars) is taken from the Assets, Liabilities, and Eligibility topical module for the previous year. I use the information on a respondent's industry in the previous year and a quadratic time trend to construct an industry-specific time trend variable. I categorize individuals into five groups: agriculture, manufacturing, service, self-employed, and not working. The definition of a part-time worker is that the average weekly hours worked by the individual in the previous year were greater than zero but less than 20.

[44] In Section 5, I conduct robustness checks of my estimates by computing the standard error at different cluster levels and using unweighted regressions.

with a full set of month effects M interacted with the treatment group dummy $EITC_{it}$ in regression (1).[45] The estimation is based on the following regression.

$$L_{imt} = \alpha + \beta_l LowInc_{it-1} + \beta_c Child_{it-1} + \beta_e EITC_{it} + (EITC_{it} \times M)\beta_{em} + M + (LowInc_{it-1} \times M)\beta_{lm} + (Child_{it-1} \times M)\beta_{cm} + \delta_t + \nu_i + X_{imt}\psi + \varepsilon_{imt} \quad (2)$$

In practice, I plot the coefficients on the interactions between M and $EITC_{it}$ (October is the omitted month) to examine whether the monthly patterns of group differences in the labor supply are coincident with the timing of the EITC refund.

4.3 Individual Variation in Predicted EITC Payments

The triple differences approach has the virtue of having a source of identification that is quite transparent as it compares group-level outcomes. The drawback of this approach is that it compares differential treatment of relatively broad groups (i.e. high EITC versus low EITC) and assumes that treatment intensity (i.e. EITC payment amount) is the same within a group. However, there is substantial within-group variation in the amount of the expected EITC payment across individuals.

In this section, I utilize the EITC refund that the recipients are expected to receive in a given month to quantify the impact of the receipt of a $1,000 EITC refund on the recipient's labor supply during the month in which the refund is disbursed. To alleviate the concern over the comparability of labor supply behavior between EITC-eligible and EITC-ineligible individuals, I limit the sample to EITC recipients. The estimation is based on the following regression:

$$L_{imt} = \alpha + \beta^{IND} Refund_{it} \times Share_{mt} + \kappa_1 Refund_{it} + \kappa_2 Share_{mt} + M + X_{imt}\psi + \delta_t + \nu_i + \varepsilon_{imt} \quad (3)$$

In the spirit of Souleles (1999) and McGranahan and Schanzenbach (2014), I construct a variable indicating the EITC payment that each recipient is predicted to receive in a given month in the following ways. First, the variable $Refund_{it}$ represents the EITC payment (in thousands of dollars) that individual i is predicted to receive in year t. Note that $Refund_{it}$ is predetermined as regards the dependent variable L_{imt} since the amount of the EITC

[45] Again, October is the omitted month.

payment is based on information from the previous year (i.e. year $t-1$). In other words, the current labor supply decision has no impact on the amount of EITC received. Second, since SIPP does not have information about when respondents receive their EITC payments, I use the aggregate-level measure of the share of annual EITC disbursement paid out in a given month m of year t, $Share_{mt}$, to approximate the date on which the recipient receives their EITC refund.[46] For example, $Share$ is set to 0.6 in February 2010 since 60% of the 2010 EITC refunds were disbursed in February. Using group-level refund timing instead of the exact dates on which individuals receive their EITC refunds could substantially reduce the endogeneity problem since the exact timing of the refund will largely depend on when an individual files her tax statement, which might be correlated with unobservable determinants of the individual's labor supply.

The key variable in this regression is the interaction term between $Refund_{it}$ and $Share_{mt}$, which represents the expected EITC payment in a given month for individual i. The coefficient of interest, β^{IND}, directly measures the effect of receiving a \$1,000 EITC payment on individual i's labor supply in the month in which the EITC payment arrives. This estimate is useful later, when I compute the income elasticity of labor supply based on this short-run change in labor supply induced by the EITC refund. Consistent with the triple differences analysis, I also control for month fixed effect M, year fixed effect δ_t, the individual fixed effect ν_i and the same set of covariates X_{imt} as before.

It has to be pointed out that most but not all of the tax refunds received by low-income families come from the EITC. Several previous studies (LaLumia, 2013; Romich and Weisner, 2000) show that the EITC could account for 70% to 80% of the tax refund for EITC-eligible families. Furthermore, the amount of the non-EITC refund, which comes from elements such as the child tax credit, may be positively correlated with the amount of the EITC. Therefore, it may be reasonable to assume that a larger EITC payment will be associated with a larger tax refund. The predicted amount of the EITC payment should provide a good approximation of the tax refund that low-income families will receive.

5 Results

5.1 Triple Differences Estimates

I start by presenting the estimates from the triple differences estimations. Table 4 reports the estimated coefficient on the key variable $EITC \times Feb$ in the triple differences estimation

[46] The share data come from various issues of MTS.

(equation (1)). Panels A to C present the results for married women, married men and single women, respectively. I begin by presenting the estimate from the basic triple differences regression controlling for the low-income group, the group with children, and month fixed effects as well as all possible two-way interactions between those three dimensions. Then, I gradually include the individual fixed effect, year fixed effect, state effect, and other individual characteristics that could determine the monthly labor supply,[47] so as to gain an understanding of the impact of adding other covariates to my estimates. The fact that the estimates do not change much across specifications with different sets of covariates is comforting, given the causal interpretation of the estimates.

In general, I find that the income seasonality induced by the receipt of the EITC refund leads to changes in the intra-year labor supply patterns of married women. My preferred specification (Column 5 in Panel A) indicates that, compared to married women who receive low amounts of credit, those who receive high EITC payments are, significantly, 2.9 percentage points less likely to work in the month of February than in other months. In sharp contrast, married men and single women who receive high EITC payments do not exhibit distinct likelihoods of working in February compared to the other months. The point estimates in Column 5, Panels B and C, suggest that the likelihood of working declines, in February (relative to other months), for married men and single women, by only 0.3 percentage points and 0.2 percentage points, respectively. Both estimates lack statistical significance.

5.2 Event Study Analysis

Next, I extend the triple difference estimation by replacing $EITC_{it} \times Feb$ with a full set of month effects M interacted with the treatment group dummy $EITC_{it}$ so as to examine whether the monthly pattern of group difference in labor supply largely follow the disbursement timing of the EITC. Figure 5 displays the coefficients on $EITC_{it} \times M$ and the corresponding 95% confidence intervals based on the sample of married women. One can see that the event study coefficients largely mirror the timing of the EITC disbursement. Compared to marred women who receive low EITC payment, the labor supply of those receiving high EITC payments drops much more in February and also shows a substantial decline in January, March and April (relative to October). Outside of these months, the difference in labor supply between the treatment and comparison groups is quite close to the baseline level in October. Figures 6 and 7 present the estimates for married men and single women, respectively. Consistent with the results from the triple differences estimation, no

[47] For a detailed list of the covariates in each specification, please see the note under Table 4.

such pattern emerges for the married men and single women. Instead, the group differences in the outcome variable are quite similar over the twelve months.

5.3 Results from Individual Variation in EITC Payments

Finally, I report the results based on variation in the predicted size of the EITC payment for each recipient in a given month. This approach has the advantage of allowing variation in treatment intensity among EITC recipients. If the intra-year labor supply pattern of married women found in the previous section is driven by the receipt of the EITC, I should also find a more negative effect on the labor supply among those receiving larger EITC payments.

Table 5 reports the estimated coefficients on $Refund \times Share$ from equation (3). Again, I gradually include different sets of covariates so as to determine the impact of these covariates on my estimates. The estimates across the specifications are fairly independent of the introduction of different covariates. My preferred estimates (Column 5) suggest that the receipt of a $1,000 EITC payment reduces the proportion of married women working by 1.6 percentage points in the month in which the EITC is received. Since the baseline mean of the outcome variable is 47%, the estimated decrease represents a 3.4% decline in the mean.[48] In line with my triple differences results, receiving a $1,000 EITC payment does not have a statistically detectable impact on the share of weeks worked by either married men or single women in the month when the EITC is paid out.

5.4 Robustness Checks

In this section, I examine the sensitivity of my result to a variety of alternative sample selection criteria and empirical specifications. Table 6 displays several of the resulting estimates. The first row presents the estimates based on triple differences regression and the second row the estimates that utilize individual variation in predicted EITC payments. Column 1 presents the results for a sample with a lower age cut-off of 50. This sample selection further alleviates concerns over the impact of retirement on labor supply. In both specifications, the results suggest that this change has little impact on the estimates.

Next, I address the fact that the baseline sample is restricted to married women aged 20 to 55 while their spouses might not be between the ages of 20 and 55. In fact, 7% of the

[48] Using hours of work and rates of pay, I can provide some insights into the extent of labor income offset by the EITC payments. The average hours of work for married women is $105 hours per month and the average rate of pay is $12. Therefore, my estimates in Column 5 of Table 5 implies $1000 EITC payment can offset monthly earned income by $20. The income replacement rate based on this calculation is around 2%.

married women in the baseline sample had spouses aged above 55. Column 2 presents results based on a sample excluding married women whose spouses are outside of the specified age range. The estimates are quite similar to my baseline cases. Column 3 shows that the estimated coefficients from an unweighted regression are smaller than my main estimates (in terms of absolute value), although the point estimates are statistically indistinguishable from my main estimates. In Column 4, I redefine my outcome variable as follows: $L_{imt} = 1$ for an individual who works in any week during the given month and $L_{imt} = 0$ otherwise. This definition is more comparable to the outcome variable of labor supply in previous studies that use annual data but it ignores within-month variation in labor supply. Again, this change has little impact on my estimates.

Column 5 of Table 6 presents statistical inferences based on a different clustering level of standard errors. Since the policy variation I use is at the group-month level,[49] I present the standard errors clustered on the group-month cells to account for any dependence of the unobservable error within the group-month level.

There is a potential concern that my estimates could be confounded with fluctuations in labor demand due to holiday season jobs. Workers in these jobs are usually hired in the fourth quarter of the calender year and might quit their jobs in the first quarter of the following year. To alleviate this concern, Column 6 of Table 6 presents estimates based on a sample that excludes those who worked in the retail industry at the end of the previous year. This restriction reduces my sample by around 8% but has little impact on my estimates.

Some states have supplemental state EITCs. The size of state EITCs vary across states and time, which generates an additional source of variation in EITC payments. The last column of Table 6 presents the estimate based on regression 3 incorporating this state-level variation. I find that this estimate is quite similar to my baseline estimate.

5.5 Discussion: Magnitude of the Estimates

In this section, I begin by discussing the estimates obtained from the two empirical approaches and then compare their magnitudes to estimates from the prior literature. Specification (3) suggests that, on average, the receipt of a $1,000 EITC payment leads to a reduction in the likelihood of married women working by 1.6 percentage points during the month in which the EITC is received. The magnitude based on this specification indeed provides a similar qualitative conclusion to my triple-differences estimation. I present a simple calculation to confirm their similarity. First, the triple-differences estimation (specification

[49] I have four groups. One is the treatment group and the other three are comparison groups. Therefore, the total number of group-month cells is 48 (4 groups x 12 months).

(1)) suggests that the receipt of the EITC refund leads married women from the treatment group to be 2.9 percentage points less likely to work in February than in other months. Additionally, the average gap in EITC payments between the treatment and comparison groups in the triple differences estimation is around $2,310. Note that around 56% of the EITC is paid out in February. Therefore, the estimate based on triple differences regression implies that receiving a $1,000 EITC refund could reduce the proportion of married women working by 2.2 percentage points.[50] The estimates based on these two approaches are fairly close.

One way to think about the magnitude of my estimates is to calculate the income elasticity of labor supply and then compare it to the estimates reported in previous studies. The unearned income of married women is computed using the secondary earner assumption. That is, it is equal to the husband's monthly earned income plus the family's monthly unearned income. Since the receipt of the EITC has little impact on married men's labor supply, it could be reasonable to assume that the average size of monthly unearned income is unrelated to the EITC refund. The mean value of monthly unearned income for married women is around $1,847. My estimate suggests that receiving a $1,000 EITC refund could significantly reduce the proportion of married women working in the month in which the refund is received, by 1.6 percentage points from the base of 47%. In other words, a 54% increase in unearned income could lead to a 3.4% decline in the likelihood of working in the month of payment arrival. This implies that the income elasticity of labor supply for married women is around -0.06.

My estimated income elasticity is largely consistent with the findings in previous studies. McClelland and Mok (2012) provide an up-to-date review of labor supply elasticities. They point out that the previously estimated income elasticities of employment among married men and single women tend to be quite small, namely, close to zero. However, the responsiveness of the employment of married women to income changes is substantially larger than that for married men and single women. Heim (2007) finds the income elasticity of employment for married women to be between -0.13 and -0.05. Blau and Kahn (2007) estimate the income elasticity for married women to be about -0.1. Both studies rely on cross-sectional variation in unearned income. A few recent studies use more exogenous variation in income from randomized experiments, such as lotteries, to get more credible estimates of the income elasticity. Jacob and Ludwig (2012) use a randomized lottery for housing vouchers and estimate the income elasticity among lower-income individuals who apply for housing assistance to be -0.09.

One caveat should be noted when comparing my results to those in the previous literature.

[50] This is derived from a simple calculation: $\frac{0.029}{2.31 \times 0.56} = 0.022$.

My estimated elasticity relies on a higher-frequency change in income and labor supply than previous studies have done. I exploit the *monthly* change in income induced by the tax refund and study the impact of this short-run income change on an individual's *monthly* working decision. However, most prior studies have utilized *annual* changes in income and labor supply to estimate income elasticity, meaning that their estimates could represent the relatively long-run relationship between income and labor supply. With this caveat in mind, my estimates are generally similar in magnitude to the previously estimated income elasticities of labor supply.

5.6 Mechanisms behind the Findings

5.6.1 Secondary Earner

I examine why married women's labor supply responds to the receipt of an EITC refund but married men's and single women's do not. One possible explanation is most married women are the secondary worker in a family. Prior studies find that labor supply of a secondary earner is quite sensitive to changes in family resources (Cullen and Gruber, 2000). The "added worker effect" hypothesis holds that, under an imperfect credit market, the secondary earners, typically married women, in families could provide transitory earning sources to smooth out household spending whenever families face temporary shortages of liquidity (e.g. if the family has a mortgage commitment). Secondary earners may then exit the labor market once the family's need for liquidity is met (Goux and Petrongolo, 2014; Kohara, 2010; Lundberg, 1980; Heckman and MaCurdy, 1980; Mincer, 1962).[51] Hence, one should expect a secondary earner to exhibit a more negative labor supply response to the receipt of the EITC than a primary earner. Another potential explanation for my findings is that female EITC recipients have specific intra-year patterns in labor supply that are coincident with the timing of the EITC disbursement.

I use information on individual earnings in the previous year to define the primary and secondary earners within each family. An individual who had lower annual earnings than her or his spouse during the previous year is classified as the secondary earner. I begin by focusing on married couples and estimate specification (3) for the following four subgroups: married women who are primary earners, married women who are secondary earners, married men who are primary earners, and married men who are secondary earners.

The first four columns in Table 8 display the coefficients on $Refund \times Share$ for the above

[51] For example, Cullen and Gruber (2000) find that more generous unemployment insurance would "crowd out" the labor supply of married women who face a temporary reduction in household resources due to the unemployment of their husbands.

four subgroups. The estimates in Columns 1 and 2 suggest that the negative labor supply response to EITC receipt for married women found in the previous section is exclusively driven by those who are secondary earners in their families. On average, upon receiving a $1,000 EITC payment, married women who are secondary earners are significantly less likely to work, by 1.7 percentage points in the month in which the EITC refund is received. In contrast, those who are primary earners only show an insignificant decreased likelihood of working, of 0.7 percentage points. Interestingly, a similar pattern arises in the sample of married men. A married man who is his family's secondary earner exhibits a reduction of 1.6 percentage points in his working likelihood in the month in which he receives a $1,000 EITC refund. The magnitude of this estimate is fairly close to the estimate for married women but is not statistically significant due to the small sample size for this group. The above results imply that the negative labor supply response to the receipt of the EITC for married women could result from the different gender roles due to the division of labor within families, rather than gender differences in intra-year labor supply patterns among EITC recipients.

To further compare the two possible channels that could underlie my results, I pool the whole sample together (including single women)[52]and "horse race" the "secondary earner" channel against the "gender difference" channel by interacting the intercept, a set of month dummies, and the predicted monthly EITC amount with an indicator for being female ($Female$) and a dummy indicating that a person is a secondary earner ($Second$), respectively, in specification (3). The first row in the last column of Table 8 suggests that receiving a $1,000 EITC payment leads the baseline group's likelihood of working in the month when the EITC is received to decline by 0.3 percentage points, insignificantly.[53] The "secondary earner" channel coefficient (in the second row) reveals that those who are secondary earners in their families will be an additional 1.4 percentage points less likely to work in a month in which they receive a $1,000 EITC refund. The point estimate is significant, with a p-value of 0.03. However, the "gender difference" channel coefficient (in the third row) suggests that there is no statistically detectable additional impact of being female on the probability of working in the month in which the refund arrives, after controlling for the effect of being a "secondary earner."

5.6.2 Liquidity Constraints

Next, I analyze why families reduce labor supply upon receipt of an anticipated EITC payment. The leading explanation for the observed behavior is the presence of liquidity con-

[52]By definition, all single women are the primary earners in their families.
[53]The baseline group consists of married men who are primary earners.

straints preventing families from borrowing future income to finance current spending. In this situation, families may keep their level of labor supply high to improve their liquidity until their tight budget is loosened by the receipt of the EITC refund. If liquidity constraints do play an important role in determining the family labor supply, one would expect the negative labor supply response of married women to the receipt of the EITC to be driven by those women from "more constrained" families.

I use two proxy variables to indicate the family's tendency to be liquidity constrained: liquid assets (i.e. the value of bank deposits in the previous year) and the mortgage-to-income ratio (i.e. the amount of the mortgage divided by total family income in the previous year). Both variables are computed at the family level for the calendar year before EITC receipt. Following the standard methodology in the prior literature (Parker, 2014; Johnson et al., 2013; Johnson et al., 2006; Souleles, 1999; Zeldes, 1989), for each variable, I divide the sample into two sets of individuals: those likely to be liquidity-constrained and those likely not to be. I use *Constrained* to denote membership of the liquidity-constrained group and interact it with the intercept and the expected EITC amount in a given month in specification (3). Hence, the additional labor supply response to the receipt of a $1,000 EITC payment for liquidity-constrained individuals would be identified by the interaction between the indicator for the constrained group and the predicted monthly EITC payment.

Individuals with low liquid assets could be unable to draw down their wealth to smooth out their spending. In order to improve their family's liquidity, they are likely to adjust their labor supply, which could result in a greater negative response of labor supply to the receipt of the EITC payment. In the spirit of Parker (2014), I label those with liquid assets below the one-month average family income (i.e.$2,000) as constrained families and the rest as unconstrained.[54] Column (1) of Table 7 shows how the labor supply response to an EITC payment varies according to the liquid assets held. The first row indicates that the receipt of a $1,000 EITC payment reduces the likelihood of working for married women with high liquid assets by 0.3 percentage points in the month in which the EITC received and this estimate is not statistically significant. In sharp contrast, receiving a $1,000 EITC refund significantly lowers the proportion of married women with low liquid assets working by 1.7 percentage points (Row 3). This labor supply response is almost five times as large as that of married women from families whose liquid assets are above the average monthly family income (in absolute value). The point estimate of the group difference is statistically significant, with a p-value of 0.07 (Row 2).

Prior studies (Del Boca and Lusardi, 2003; Fortin, 1995) show that mortgage commit-

[54]This value also divides the top 20% in the distribution of liquid assets from the rest.

ment is an important factor determining the labor force participation of married women. Furthermore, those who have large mortgages might also have limited borrowing ability since housing collateral is often used for borrowing (Mian et al., 2014; Mian and Sufi, 2011). I use the mortgage-to-income ratio to approximate the likelihood of families being bound by liquidity constraints. Families with high mortgage-to-income ratios may be under greater pressure to meet their mortgage commitment and have limited credit lines for borrowing additional money. Under these circumstances, married women with high mortgage-to-income ratios might enter the labor market temporarily to increase family liquidity, and their working decision may be sensitive to the change in family liquidity induced by the EITC refund. To investigate this hypothesis, the estimated sample is restricted to those who are house owners.[55] I classify families with a mortgage-to-income ratio of 1.5 or above as constrained and the remainder as less constrained. A mortgage-to-income ratio of 1.5 is around the median of the distribution of mortgage-to-income ratios. Column 2 of Table 7 shows how the labor supply response to an EITC payment varies according to the mortgage-to-income ratio. For married women with low mortgage-to-income ratios, the receipt of a $1,000 EITC refund results in a decrease of 1 percentage point in the likelihood of working in the month in which the EITC is received (Row 1). However, the point estimate is not statistically significant. In contrast, the receipt of a $1,000 EITC refund significantly lowers the proportion of married women with a high mortgage-to-income ratio who work, by 2.7 percentage points (Row 3). The point estimate of the group difference is sizeable and statistically significant, with a p-value of 0.014 (Row 2).

5.6.3 Myopia

The above subgroup analysis suggests that the presence of liquidity constraints may be an important reason why married women reduce their labor supply when receiving anticipated EITC payments. However, the presence of liquidity constraints cannot fully explain why the receipt of the EITC causes labor supply of married women to have a temporary drop in February, and then revert back quickly to the normal level of labor supply. Assumed a household's utility function is concave so marginal utility of leisure is diminishing. Therefore, to maximize intertemproal utility, a household wants to keep marginal utility equal across time periods. In other words, if families are forward-looking but liquidity constrained, they should smooth out their labor supply (or leisure consumption) after receiving the cash (i.e. when they are no longer liquidity constrained). Thus, we should observe a small and persistent decrease rather than a large and temporary drop in labor supply following receipt of

[55] Around 56% of the EITC recipients in my sample are house owners.

the EITC. This patterns reveals that the recipients could be somewhat present-biased and prefer consuming leisure at the time when receiving cash transfer rather than use this money for their future consumption.[56]

5.6.4 Month-to-Month Labor Force Transitions

Finally, I use detailed information about labor force status from the SIPP to investigate how the receipt of an EITC refund affects the recipient's month-to-month labor force transitions. This analysis will help us understand the main cause of the decreased likelihood of working for married women in February (relative to other months). In general, my results could be driven by the fact that the receipt of the EITC increases the likelihood of working-to-nonworking transitions or decreases the likelihood of nonworking-to-working transitions (e.g. those who work in January and then stop working in February or those who do not work in January and then keep not working in February due to the receipt of the EITC).

As mentioned before, SIPP classifies labor force status into five categories: (1) working, (2) temporary leave without pay, (3) temporary layoff without pay, (4) unemployment, and (5) out of the labor force. The last four categories are defined as nonworking. In addition, Figure 8 displays the total amount of income tax refunds paid out in each week from January to April, based on the Daily Treasury Statement, and clearly shows that a large amount of the income tax refund is disbursed in the 6th week and the 7th week, which corresponds to the second and third weeks of February. Since most EITC recipients obtain their refund in February, this weekly refund disbursement pattern is likely to reflect the timing of the receipt of the EITC refund. Therefore, it is quite possible that EITC recipients receive their credit in the third week of February.

Given the above information, I define the two outcome variables as follows and estimate specification (1): The first dependent variable, $P(W_{im} = 0|W_{im-1} = 1)$, is an indicator of whether individual i works in the third week of month $m-1$ (i.e. $W_{im-1} = 1$) and stops working in the third week in month m (i.e. $W_{im} = 0$), which measures the working-to-

[56]There are several theories explaining such present-biased behavior. One possibility is that poor people could have hyperbolic discount rate (**?**), which results in time-inconsistent preferences. That is, current selves of EITC recipients want to enjoy leisure right after receiving payments but future selves of EITC recipients would like to keep their labor supply to finance future spending. Another explanation is that the presence of temptation goods causes people prefer to consume more today rather than save for tomorrow (**?**). In contrast to normal goods, temptation goods, such as alcohol or cigarettes, generate utility only at the point of consumption and people do not value spending on tomorrow's temptation goods. For example, you may get pleasure from drinking alcohol today but you may think that it will be bad for your future selves to drink alcohol. Under the assumption that the proportion of temptation goods is decreasing as income increases, low-income people would prefer to consume today rather than tomorrow since a higher share of their future spending on temptation goods makes them unwilling to save for tomorrow consumption.

nonworking transition. Similarly, I measure the nonworking-to-working transition using the dependent variable, $P(W_{im} = 1|W_{im-1} = 0)$, an indicator of whether individual i does not work in the third week of month $m-1$ (i.e. $W_{im-1} = 0$) but does work in the third week of month m (i.e. $W_{im} = 1$).

The first two columns in Table 9 report the estimated coefficients on $EITC \times Feb$ for the above two outcome variables. The estimated coefficient implies that the receipt of an EITC refund would increase the likelihood of a working-to-nonworking transition for married women by 1.24 percentage points in February compared to other months. On the other hand, the receipt of an EITC refund decreases the likelihood of a nonworking-to-working transition by 0.2 in February compared to other months. Most changes in labor force status are concentrated in the working-to-nonworking transitions, which is around six times as large as the nonworking-to-working transitions, although neither estimate is statistically significant. I further decompose the working-to-nonworking transition into more detailed changes in labor force status by estimating specification (1) with the following outcome variables, respectively: working to unpaid leave, working to temporary layoff, working to unemployment, and working to out of the labor force. When I do this, I find that most increases in working-to-nonworking transitions in February indeed come from working to unpaid leave transitions. The receipt of the EITC significantly increases the likelihood of working to unpaid leave transition for married women by 1.08 percentage points in February (relative to other months). In contrast, the likelihoods of other labor force transitions do not show significant differences between February and other months. Figures 9a to 9f, which plot the estimated coefficients on $EITC_{it} \times M$ from specification (2) (i.e. event study analysis) for each outcome variable, confirm my regression results. Although the estimates are not precise, my results provide suggestive evidence that married women could temporarily leave their jobs without pay upon receiving the EITC refund in February.

6 Conclusion

This paper utilizes the unique disbursement pattern and benefit rules of the EITC to examine the casual effect of the receipt of a cash transfer on the timing of family labor supply. My results show that income seasonality caused by EITC receipt leads to changes in the intra-year labor supply patterns of married women. On average, receiving a $1,000 EITC payment reduces the proportion of married women who work in the month of credit receipt by 1.6 percentage points from a baseline mean of 47%. The income elasticity of labor supply for married women based on these short-run changes in labor supply and income is around -0.06,

which falls within the range of estimates in the previous literature that were obtained using longer horizons for employment and income changes. The analysis of month-to-month labor force transitions provides suggestive evidence that married women could temporarily leave their jobs without pay upon receiving the EITC refund in February. No such tax refund-induced intra-year labor supply emerges for married men or single women. The subgroup analysis suggests families might reduce the labor supply of secondary earners in response to receiving an anticipated EITC payment. In addition, my results suggest that the presence of both liquidity constraints and myopia among EITC recipients provide possible explanations for my findings.

Several interesting implications arise from my results. First, both this paper and previous studies consistently provide evidence of a liquidity constraint among those claiming the EITC. These results imply that providing more frequent payments prior to the tax filing year, such as through Advance EITC, should be an attractive option for low-income taxpayers and could substantially help liquidity-constrained recipients to smooth their spending and leisure throughout the year. However, the low participation rate in Advance EITC is still a puzzle in the literature, and it has not been an option since 2011. Recent studies (Jones, 2010) have made some progress toward solving this puzzle. In general, they find that the universally low take-up might not have resulted from recipients' lack of information about it, from the application process being too complicated, or from recipients' fear of stigma. Jones (2012) finds strong evidence on the presence of inertia among EITC recipients, suggesting making periodic EITC payments the default option could substantially encourage people to obtain their EITC throughout the year before tax filing. Future research on this issue is needed to aid the redesign of a feasible option for periodic EITC payments.

On the other hand, my results clearly show that married couples have more flexibility in terms of adjusting their labor supply so as to smooth out their spending than singles. One possibility for future research is to examine whether the response of household spending to EITC receipt (or the receipt of other anticipated income) varies by family structure, which would provide a more complete picture of how families smooth their consumption.

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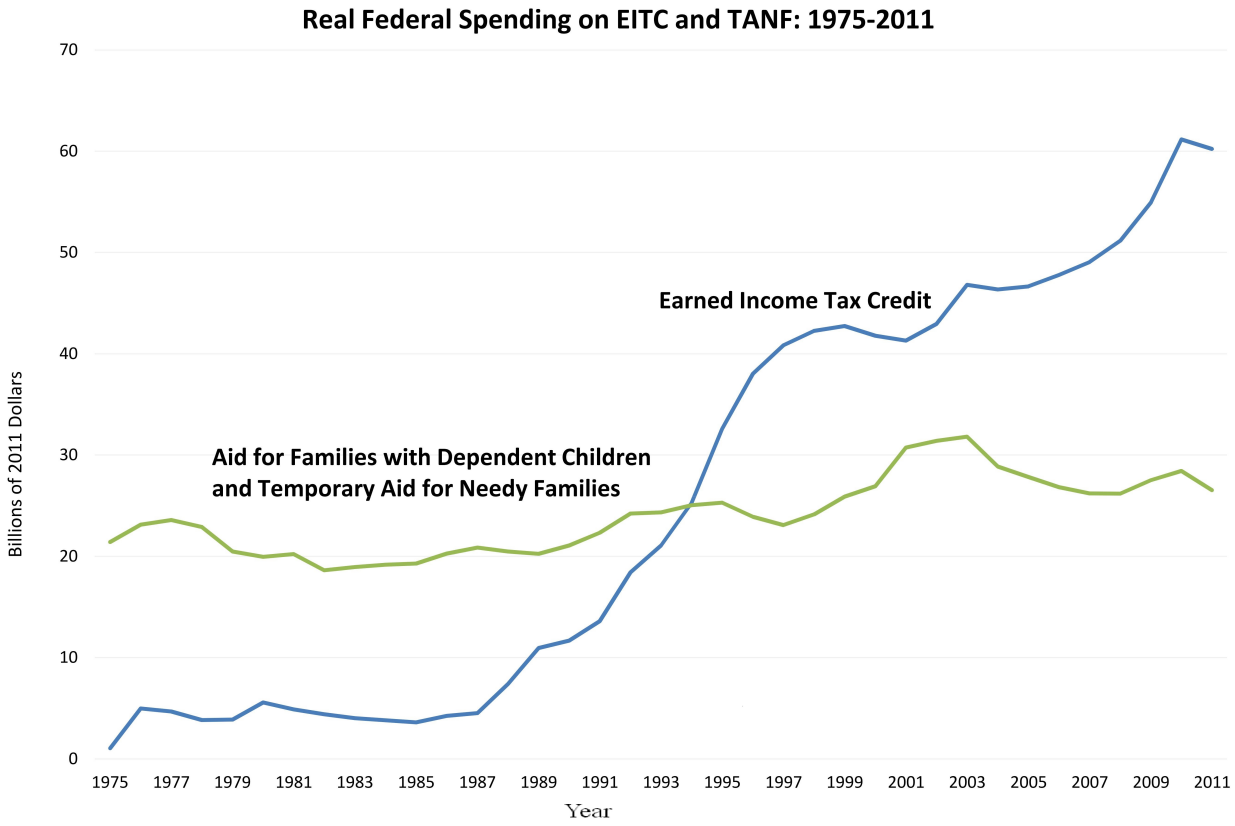
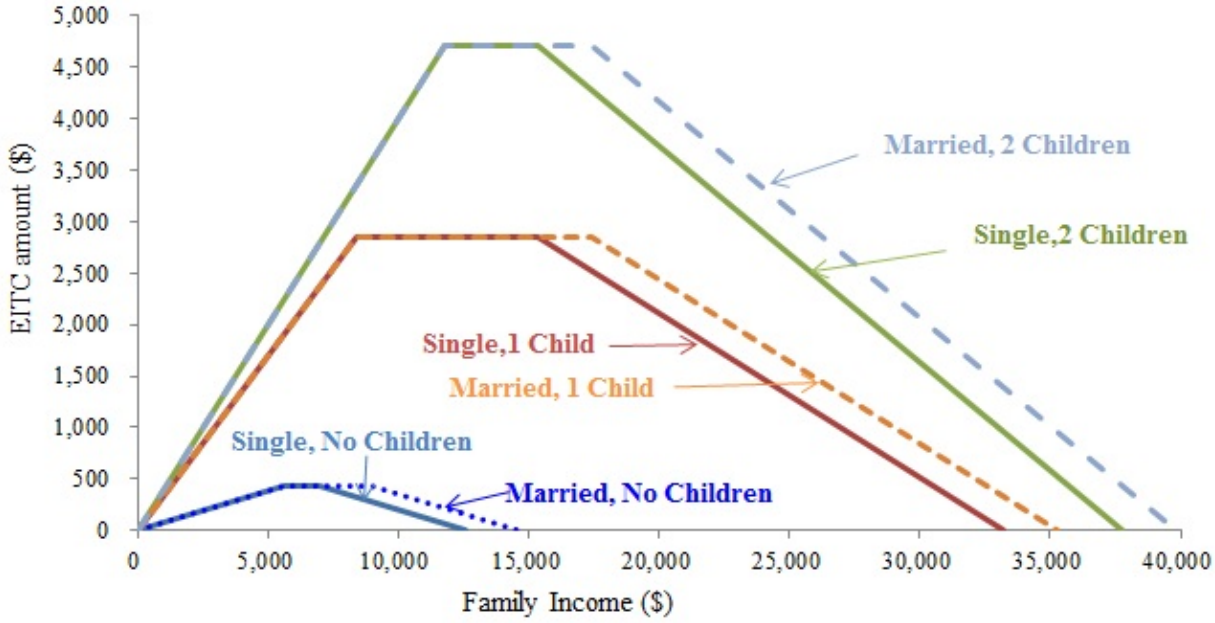
7 Figures

Figure 1: Real Federal Spending on EITC and TANF: 1975–2011



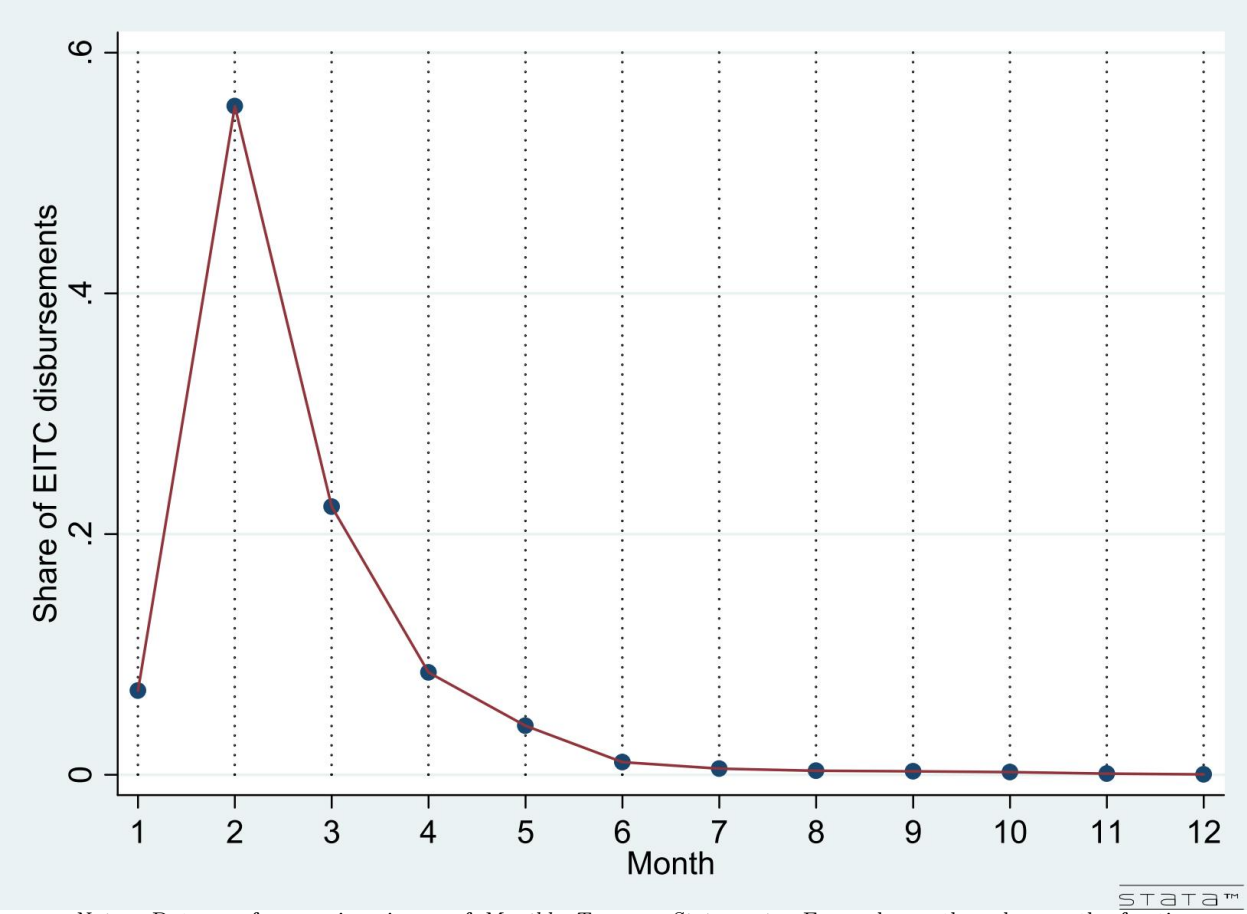
Notes: Data are from Tax Policy Center (2012)

Figure 2: EITC schedule (Tax Year 2007)



Notes: Data are from Tax Policy Center (2012). All dollar values are measured in 2007 dollars.

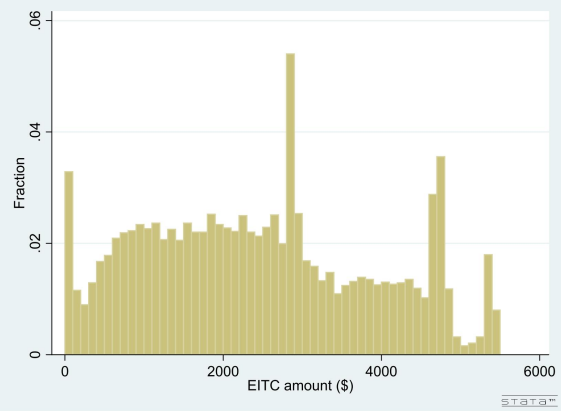
Figure 3: Share of Annual EITC Disbursements by Month



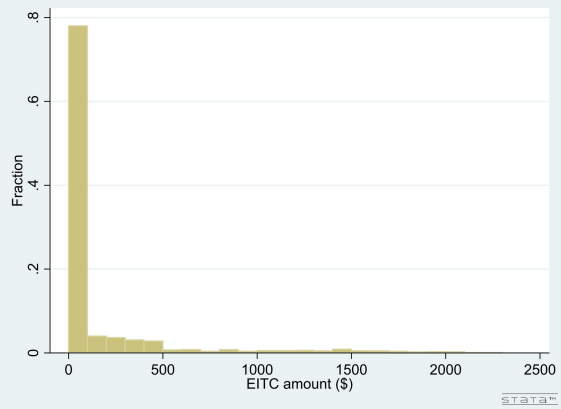
Notes: Data are from various issues of *Monthly Treasury Statements*. For each month and year, the fraction of the year's disbursements was first calculated. These fractions were then averaged by month across the years: 1997–1998, 2002–2003, 2005–2006, and 2009–2012. Because the IRS did not provide disbursement information in 1997, I used the 1998 distribution of disbursements to impute it.

Figure 4: EITC Amount by Treatment Status and Family Type

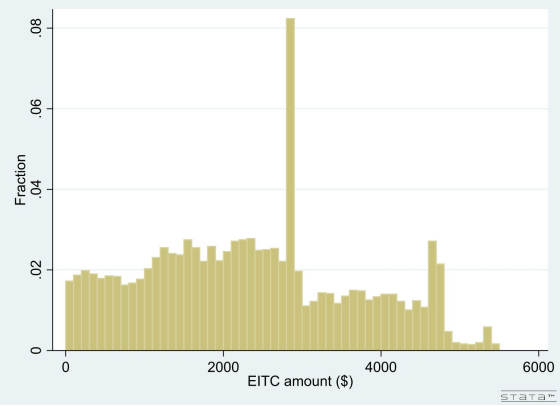
(a) Treatment Group: Married Couples



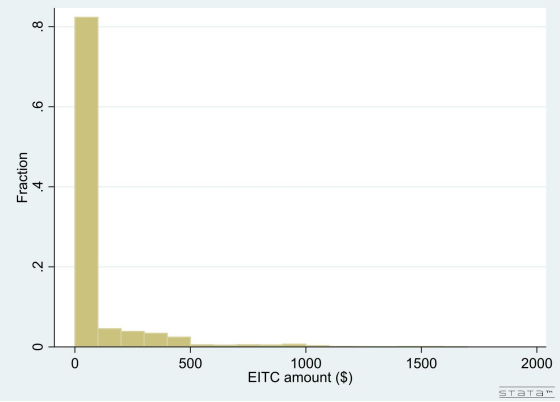
(b) Comparison Group: Married Couples



(c) Treatment Group: Single Women

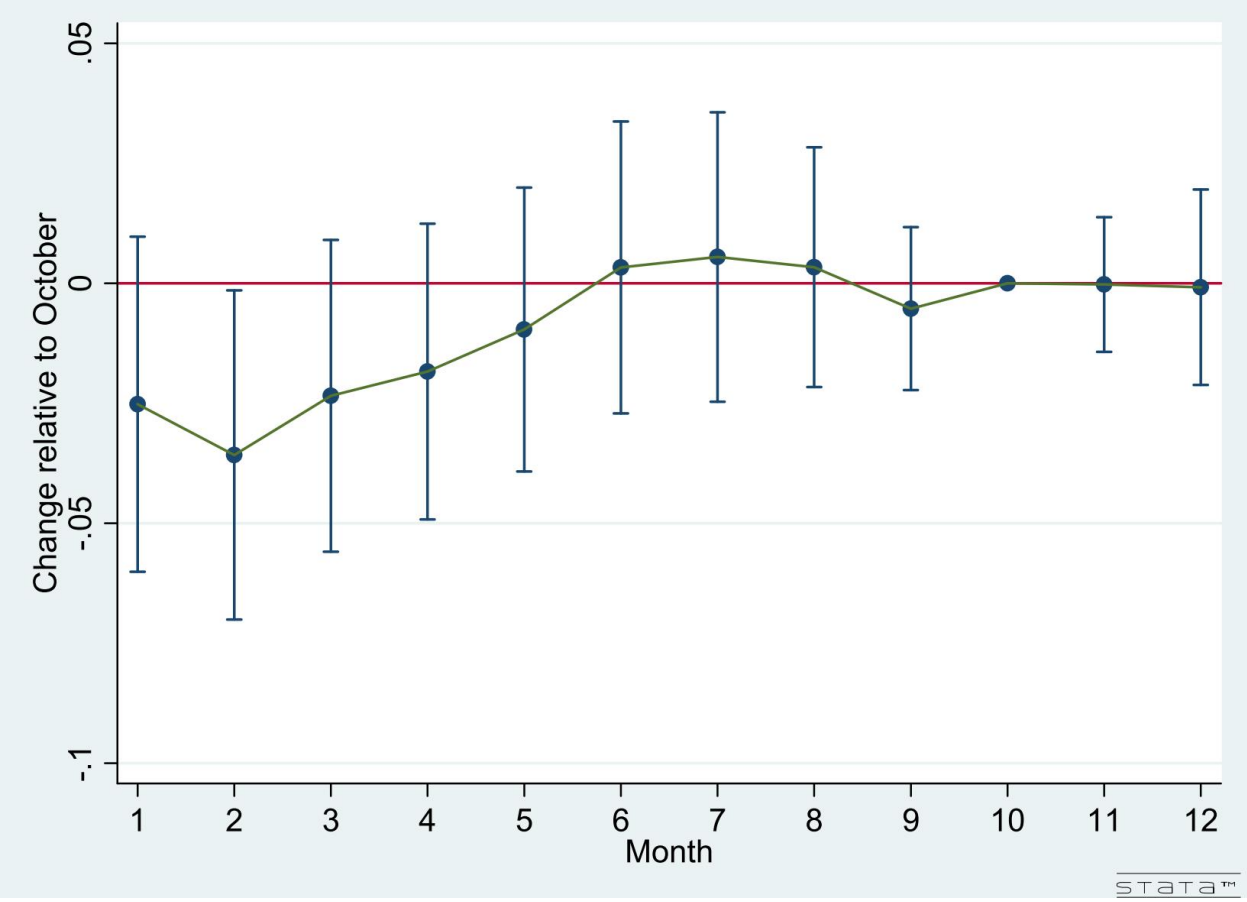


(d) Comparison Group: Single Women



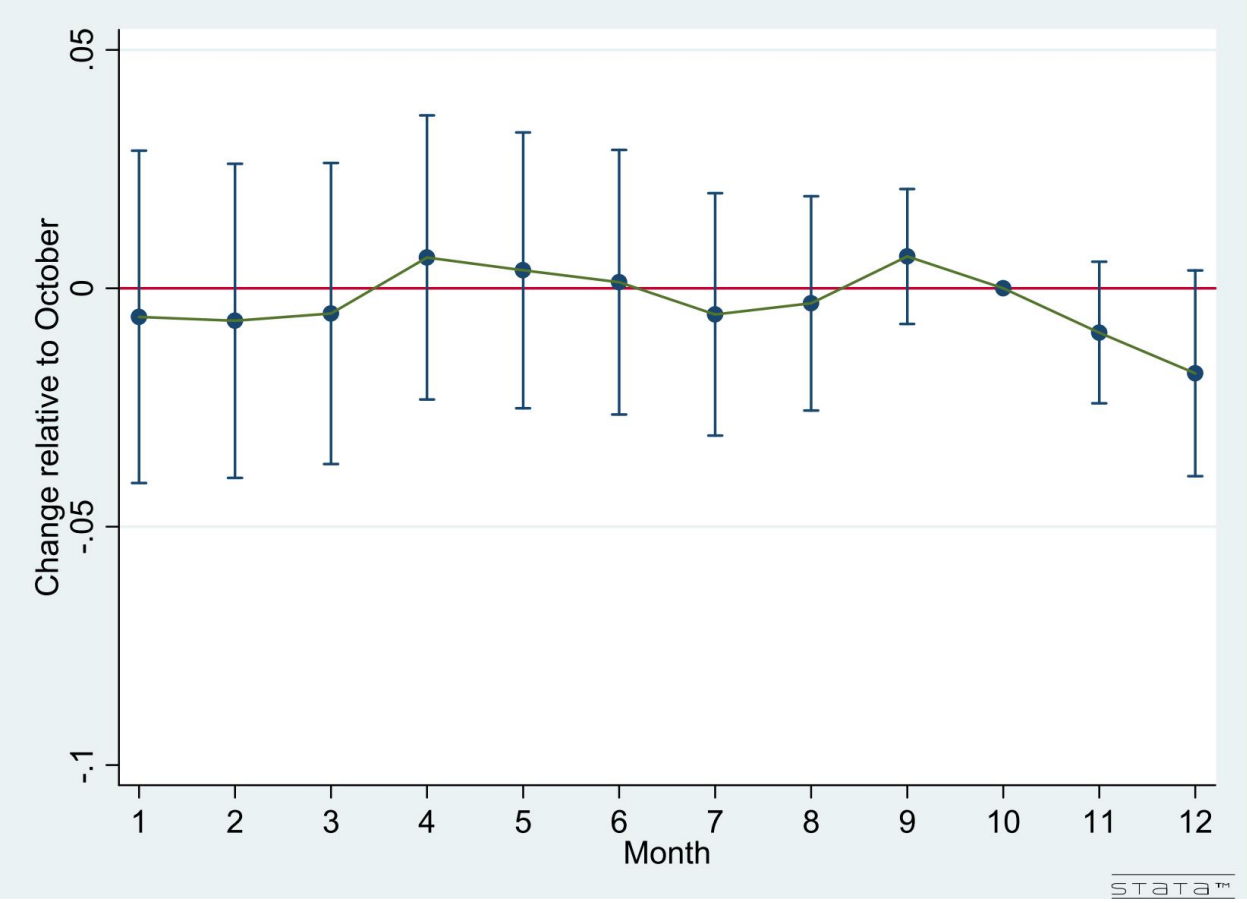
Notes: This table displays the distribution of predicted EITC amount by treatment status and family type. The horizontal axis indicates the predicted amount of the EITC. The vertical axis indicates the fraction of people within a specific income range. The bin width is $100.

Figure 5: The Impact of EITC on Intra-Year Labor Supply Patterns: Married Women



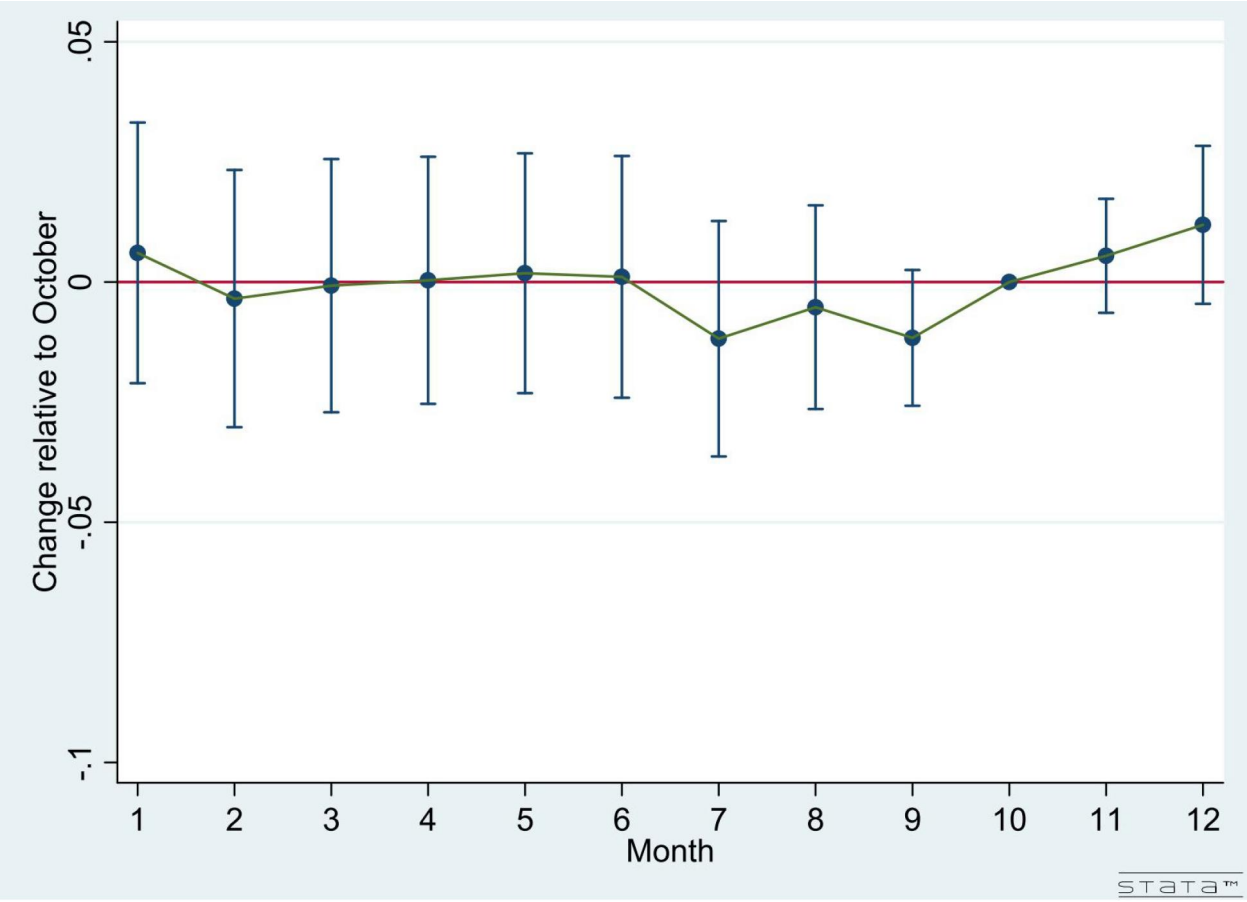
Notes: This figure shows coefficients on $EITC_{it} \times M$ and associated 95% confidence interval from specification 2 where the dependent variable L is the share of weeks worked in a month defined as number of working weeks divided by total number of weeks in a month. Therefore, $L = 1$ if working for the full month, $L = 0$ if not working for the full month, and $0 < L < 1$ if working for partial month. The estimated sample is restricted to married women. The dependent variable is regressed on the interaction terms between indicator for treatment group $EITC$ and 11 month dummies (October is the omitted month) M. The treatment group consists of those individuals that have one or more qualifying children and family income during tax year greater than zero and less than \$36,000. The comparison groups comprise (1) those individuals that have family income during tax year greater than zero and less than \$36,000 but have no qualifying child. (2) those individuals with one or more qualifying children but whose annual income is just above \$36,000 and below \$40,000. (3) childless individuals that have incomes greater than \$36,000 and below \$40,000. All dollar values are measured in 2007 dollars. The regression controls for treatment group dummy, an indicator for individuals with one or more qualifying children, an indicator for individuals with family income greater zero and below \$36,000, month fixed effect for those who have qualifying children, month fixed effect for those who have family income during tax year less than \$36,000, month fixed effect, individual fixed effect, year fixed effect, state fixed effect, monthly state unemployment rate, state specific time trend (quadratic), an indicator for interviewing month, educational attainment, number of children under 18, age, industry fixed effect, industry specific time trend (quadratic), family wealth, a dummy indicating that the individual worked part-time in the previous year, and month fixed effect specific to part-time workers.

Figure 6: The Impact of EITC on Intra-Year Labor Supply Patterns: Married Men



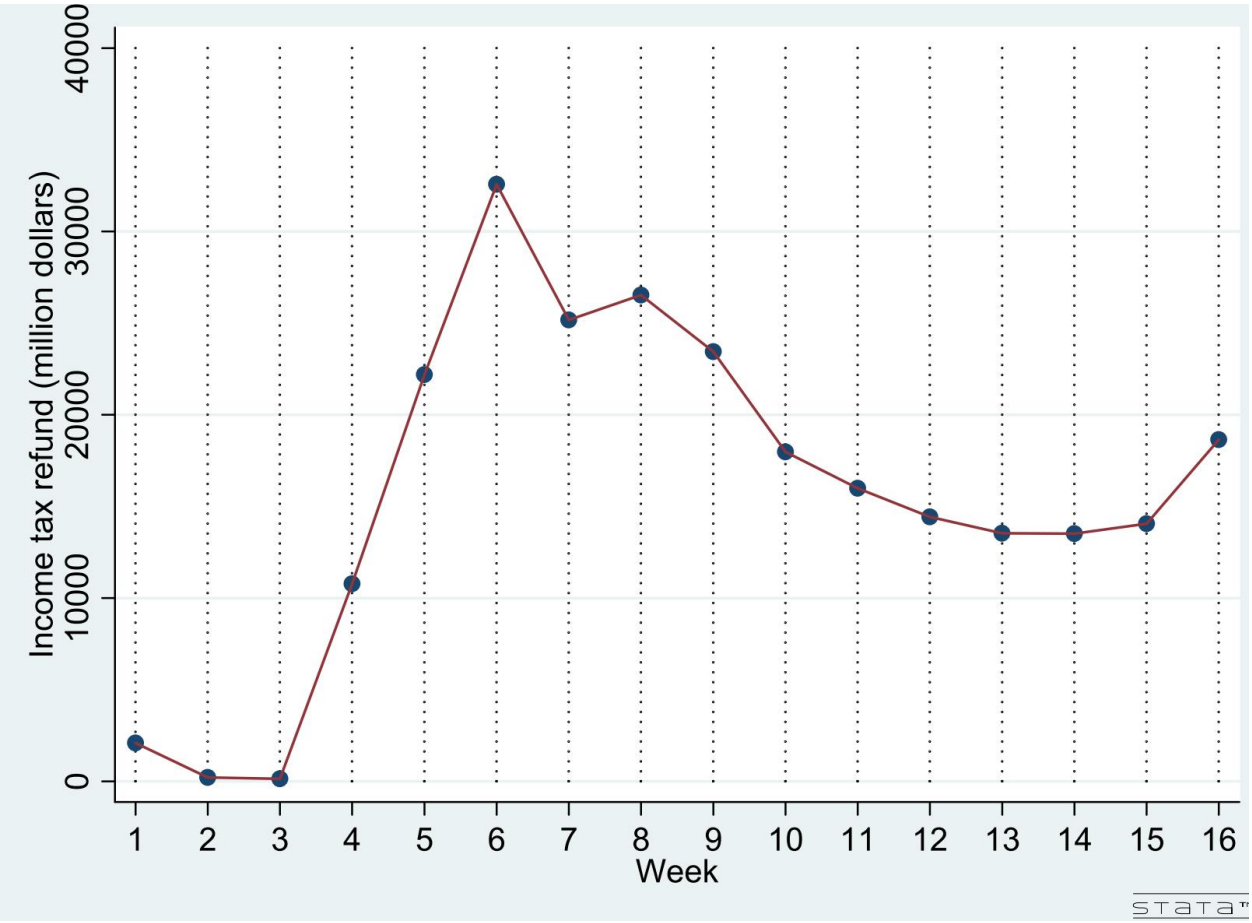
Notes: This figure shows coefficients on $EITC_{it} \times M$ and associated 95% confidence interval from specification 2 where the dependent variable L is the share of weeks worked in a month defined as number of working weeks divided by total number of weeks in a month. Therefore, $L = 1$ if working for the full month, $L = 0$ if not working for the full month, and $0 < L < 1$ if working for partial month. The estimated sample is restricted to married men. The dependent variable is regressed on the interaction terms between indicator for treatment group $EITC$ and 11 month dummies (October is the omitted month) M. The treatment group consists of those individuals that have one or more qualifying children and family income during tax year greater than zero and less than $36,000. The comparison groups comprise (1) those individuals that have family income during tax year greater than zero and less than $36,000 but have no qualifying child. (2) those individuals with one or more qualifying children but whose annual income is just above $36,000 and below $40,000. (3) childless individuals that have incomes greater than $36,000 and below $40,000. All dollar values are measured in 2007 dollars. The regression controls for treatment group dummy, an indicator for individuals with one or more qualifying children, an indicator for individuals with family income greater zero and below $36,000, month fixed effect for those who have qualifying children, month fixed effect for those who have family income during tax year less than $36,000, month fixed effect, individual fixed effect, year fixed effect, state fixed effect, monthly state unemployment rate, state specific time trend (quadratic), an indicator for interviewing month, educational attainment, number of children under 18, age, industry fixed effect, industry specific time trend (quadratic), family wealth, a dummy indicating that the individual worked part-time in the previous year, and month fixed effect specific to part-time workers.

Figure 7: The Impact of EITC on Intra-Year Labor Supply Patterns: Single Women



Notes: This figure shows coefficients on $EITC_{it} \times M$ and associated 95% confidence interval from specification 2 where the dependent variable L is the share of weeks worked in a month defined as number of working weeks divided by total number of weeks in a month. Therefore, $L = 1$ if working for the full month, $L = 0$ if not working for the full month, and $0 < L < 1$ if working for partial month. The estimated sample is restricted to single women. The dependent variable is regressed on the interaction terms between indicator for treatment group $EITC$ and 11 month dummies (October is the omitted month) M. The treatment group consists of those individuals that have one or more qualifying children and family income during tax year greater than zero and less than $33,000. The comparison groups comprise (1) those individuals that have family income during tax year greater than zero and less than $33,000 but have no qualifying child. (2) those individuals with one or more qualifying children but whose annual income is just above $33,000 and below $40,000. (3) childless individuals that have incomes greater than $33,000 and below $40,000. All dollar values are measured in 2007 dollars. The regression controls for treatment group dummy, an indicator for individuals with one or more qualifying children, an indicator for individuals with family income greater zero and below $33,000, month fixed effect for those who have qualifying children, month fixed effect for those who have family income during tax year less than $33,000, month fixed effect, individual fixed effect, year fixed effect, state fixed effect, monthly state unemployment rate, state specific time trend (quadratic), an indicator for interviewing month, educational attainment, number of children under 18, age, industry fixed effect, industry specific time trend (quadratic), family wealth, a dummy indicating that the individual worked part-time in the previous year, and month fixed effect specific to part-time workers.

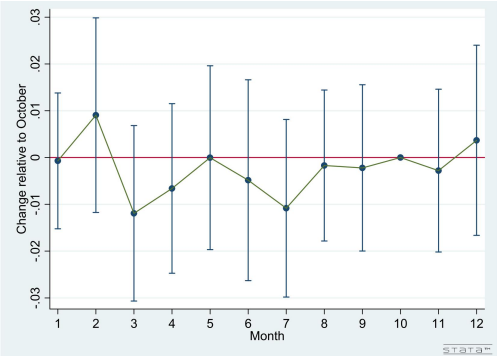
Figure 8: Weekly Disbursement Patterns of Income Tax Refunds



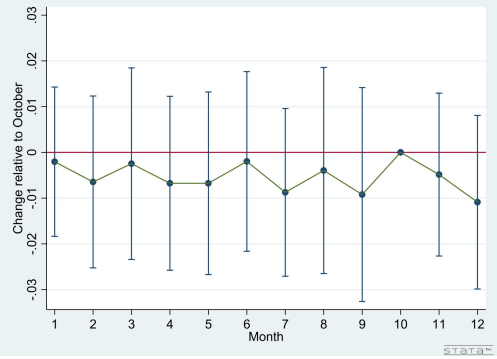
Notes: Data are from various issues of *Daily Treasury Statements*. The graph displays the average disbursement of income tax refunds during the first 16 weeks in a year. These amounts were averaged by week across the years: 1997–1998, 2002–2003, 2005–2006, and 2009–2012. Because the IRS did not provide disbursement information in 1997, I used the 1998 distribution of disbursements to impute it.

Figure 9: Month-to-Month Labor Force Transitions

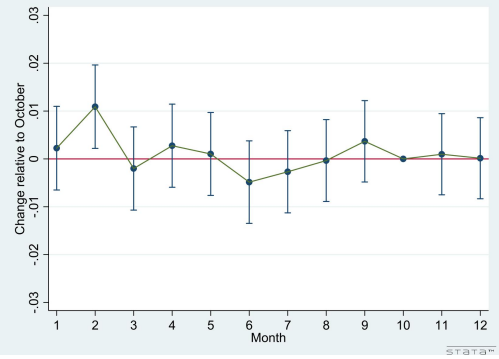
(a) Working to Nonworking



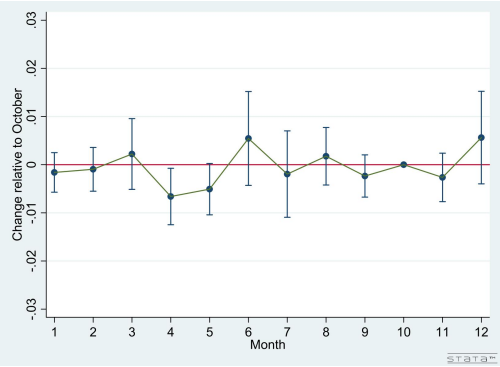
(b) Nonworking to Working



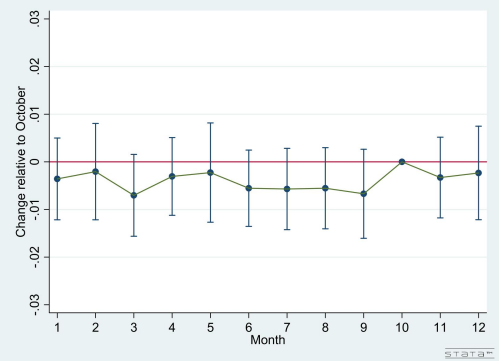
(c) Working to Unpaid Leave



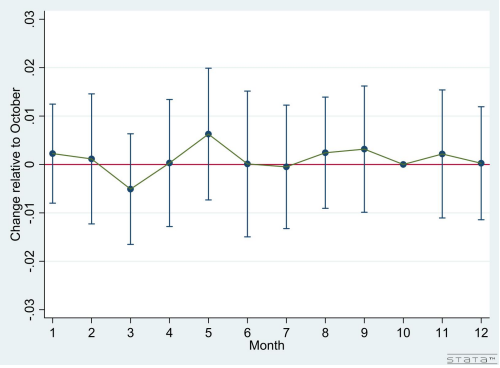
(d) Working to Temporary Layoff



(e) Working to Unemployment



(f) Working to Out of Labor Force



Notes: This figure shows coefficients on $EITC_{it} \times M$ and associated 95% confidence interval from specification 2 where the dependent variables are working to nonworking, nonworking to working, working to unpaid leave, working to temporary layoff, working to unemployment, and working to out of the labor force. The estimated sample is restricted to married women. The dependent variable is regressed on the interaction terms between indicator for treatment group $EITC$ and 11 month dummies (October is the omitted month) M. The treatment group consists of those individuals that have one or more qualifying children and family income during tax year greater than zero and less than $36,000. The comparison groups comprise (1) those individuals that have family income during tax year greater than zero and less than $36,000 but have no qualifying child. (2) those individuals with one or more qualifying children but whose annual income is just above $36,000 and below $40,000. (3) childless individuals that have incomes greater than $36,000 and below $40,000. All dollar values are measured in 2007 dollars. The regression controls for treatment group dummy, an indicator for individuals with one or more qualifying children, an indicator for individuals with family income greater zero and below $33,000, month fixed effect for those who have qualifying children, month fixed effect for those who have family income during tax year less than $33,000, month fixed effect, individual fixed effect, year fixed effect, state fixed effect, monthly state unemployment rate, state specific time trend (quadratic), an indicator for interviewing month, educational attainment, number of children under 18, age, industry fixed effect, industry specific time trend (quadratic), family wealth, a dummy indicating that the individual worked part-time in the previous year, and month fixed effect specific to part-time workers.

8 Tables

Table 1: Share of Annual EITC Disbursements by Month

	Percent of annual disbursements
January	7.0
February	55.5
March	22.3
April	8.5
May	4.1
June	1.1
July	0.5
August	0.3
September	0.3
October	0.2
November	0.1
December	0.0

Note: Data are from various issues of *Monthly Treasury Statements*. For each month and year, the fraction of the year's disbursements in that year was first calculated. These fractions were then averaged by month across the years: 1997–1999, 2002–2003, 2005–2006, and 2009–2012. Because the IRS did not provide disbursement information in 1997, I used the 1998 distribution of disbursements to impute it.

Table 2: Sample Selection: Summary Statistics

	(1) Below $40,000	(2) Reference person or spouse	(3) Only one family	(4) Age 20-55	(5) Observed 12 months	(6) First year information
Family income ($1,000)	24.17	24.53	24.82	24.45	24.90	24.92
	[10.13]	[10.04]	[9.98]	[10.14]	[10.02]	[10.03]
Earned income ($1,000)	19.78	20.07	20.14	22.14	22.50	22.51
	[11.02]	[11.10]	[11.17]	[10.67]	[10.58]	[10.59]
# of qualifying children	0.71	0.82	0.85	1.22	1.35	1.41
	[1.15]	[1.21]	[1.23]	[1.31]	[10.58]	[1.34]
EITC payment (> 0, $1,000)	1.74	1.83	1.86	1.97	2.10	2.12
	[1.49]	[1.49]	[1.50]	[1.48]	[1.48]	[1.48]
Working	0.67	0.68	0.67	0.72	0.71	0.71
	[0.46]	[0.46]	[0.45]	[0.44]	[0.44]	[0.44]
Wealth ($1,000)	93.50	93.81	97.52	66.34	71.31	70.79
	[876.92]	[927.03]	[930.28]	[627.81]	[802.97]	[816.96]
Liquid asset ($1,000)	4.80	4.77	4.97	2.85	2.84	2.81
	[21.54]	[21.16]	[21.93]	[15.36]	[15.19]	[14.89]
Amount of mortgage ($1,000)	25.53	25.10	25.24	27.19	29.91	29.61
	[56.48]	[55.31]	[55.31]	[57.59]	[60.02]	[59.45]
Age	43.16	44.18	45.78	39.00	39.52	39.50
	[15.38]	[14.52]	[14.92]	[9.98]	[9.76]	[9.75]
State Unemployment rate(%)	6.62	6.58	6.58	6.57	6.76	6.58
	[2.39]	[1.24]	[1.38]	[1.38]	[1.39]	[1.39]
EITC recipients	0.43	0.45	0.46	0.57	0.64	0.66
Female	0.56	0.57	0.58	0.56	0.66	0.66
Married	0.39	0.48	0.53	0.53	0.67	0.67
White	0.77	0.77	0.78	0.76	0.77	0.77
High school and below	0.72	0.72	0.72	0.70	0.71	0.71
Part time job	0.14	0.14	0.12	0.12	0.12	0.12
Secondary earner	0.20	0.24	0.25	0.34	0.34	0.34
Agriculture	0.06	0.06	0.07	0.07	0.06	0.06
Manufacturing	0.09	0.10	0.10	0.10	0.09	0.09
Service	0.57	0.56	0.58	0.58	0.57	0.57
Self-emplpoyed	0.10	0.10	0.10	0.10	0.10	0.10
Not working	0.18	0.18	0.15	0.15	0.18	0.18
# of EITC recipients	41,997	35,383	31,609	29,163	17,027	16,908
# of individual	91,607	72,438	64,240	49,580	26,185	25,564
# of individual-months	1,672,584	1,339,029	1,154,992	859,007	502,440	484,104

Note: SIPP data for years 1996–1999, 2001–2003, 2004–2006, and 2008–2012. Family income is the sum of earned income and unearned income, excluding the non-taxable mean-tested cash transfer. Family income, earned income, wealth, liquid asset, amount of mortgage, and EITC payment are in thousands of dollars. Family income, earned income, wealth, liquid asset, amount of mortgage, # of qualifying children, and EITC payment are based on the family level information in the previous year. All dollar amounts are in 2007 USD. Column (1) includes observations that have positive earned income and family income during the previous year below $40,000. In addition, they are followed for at least two years. Column (2) additionally requires sample to be married women, married men and single women. They are either reference person of the household or spouse of reference person. Column (3) additionally requires each sample to live in a household with only one family. Column (4) additionally imposes age restrictions: individuals with age 20 to 55. For a married couple, the age restriction is based on wife's age. Column (5) additionally requires individuals to be observed for all 12 months in the year that I use for estimating labor supply (i.e. except the first year of each panel). Column (6) additionally restricts the sample to those observed at least six months in the first year of each panel. Standard errors are reported in parentheses.

Table 3: Treatment and Comparison Groups: Summary Statistics

	Married Women		Married Men		Single Women	
	High-EITC	Low-EITC	High-EITC	Low-EITC	High-EITC	Low-EITC
Family income ($1,000)	23.97	30.49**	23.97	30.49**	17.55	25.11**
	[8.45]	[9.30]	[8.45]	[9.30]	[8.72]	[5.68]
Earned income ($1,000)	22.14	27.35**	22.14	27.35**	14.61	22.80**
	[8.94]	[10.89]	[8.94]	[10.89]	[8.62]	[10.59]
# of qualifying children	2.20	0.69**	2.20	0.69**	1.88	0.26**
	[1.13]	[1.20]	[1.13]	[1.20]	[1.02]	[10.59]
EITC payment ($1,000)	2.45	0.14**	2.45	0.14**	2.33	0.07**
	[1.44]	[0.37]	[1.44]	[0.37]	[1.32]	[1.59]
Working	0.44	0.58	0.82	0.77	0.77	0.87
	[0.49]	[0.48]	[0.49]	[0.48]	[0.40]	[9.93]
Wealth ($1,000)	70.97	112.92	70.97	112.92	24.17	46.60
	[207.1]	[1551.83]	[207.1]	[1551.83]	[90.68]	[816.96]
Age	36.19	41.02	39.13	44.10	37.11	41.09
	[7.96]	[10.06]	[8.94]	[10.06]	[8.24]	[9.75]
Unemployment rate(%)	6.68	6.61	6.68	6.61	6.39	6.46
	[2.39]	[1.24]	[2.39]	[1.24]	[1.39]	[1.39]
White	0.83	0.84	0.83	0.84	0.56	0.72
High school and below	0.77	0.71	0.77	0.72	0.72	0.55
Part time job	0.19	0.16	0.07	0.08	0.14	0.12
Agriculture	0.02	0.02	0.06	0.06	0.02	0.02
Manufacturing	0.06	0.06	0.26	0.21	0.08	0.08
Service	0.42	0.55	0.43	0.44	0.78	0.81
Self-employed	0.07	0.08	0.16	0.16	0.06	0.06
Not working	0.43	0.29	0.09	0.13	0.06	0.03
# of individual	5,202	4,063	5,202	4,063	3,984	4,770
# of individual-months	97,524	64,944	97,524	64,944	73,836	85,332

Note: SIPP data for years 1996–1999, 2001–2003, 2004–2006, and 2008–2012. Family income is the sum of earned income and unearned income, excluding the non-taxable mean-tested cash transfer. Family income, earned income, wealth, and EITC payment are in thousands of dollars. Family income, earned income, wealth, # of qualifying children, and EITC payment are based on the family level information in the previous year. All dollar amounts are in 2007 USD. The high-EITC group (treatment group) consists of those individuals that have one or more qualifying children and family income greater than zero and less than EITC income limit during the previous year. The low-EITC group (comparison group) comprise (1) those individuals that have family income greater than zero and less than EITC income limit during the previous year but have no qualifying child. (2) those individuals with one or more qualifying children but whose family income during the previous year is above EITC income limit and below $40,000. (3) childless individuals that have family income during the previous year is above EITC income limit and below $40,000. The income limit roughly corresponds to the maximum EITC-eligible income for the families with one child during my sample period. For a married couple, the income limit is $36,000 and for single women it is $33,000. Standard errors are reported in parentheses. Star indicates a significant difference across the preceding two columns after controlling individual fixed effects. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

Table 4: Triple Differences Estimates

Dependent Variable:	Working				
	(1)	(2)	(3)	(4)	(5)
Panel A: *Married Women*					
EITC $\times Feb$	-0.0243**	-0.0292**	-0.0293**	-0.0295**	-0.0294**
	[0.0117]	[0.0116]	[0.0116]	[0.0116]	[0.0116]
R^2	0.025	0.786	0.787	0.790	0.793
Baseline mean			0.47		
# of individual			8,625		
# of individual-months			162,468		
Panel B: *Married Men*					
EITC $\times Feb$	-0.0046	-0.0035	-0.0035	-0.0037	-0.0031
	[0.0116]	[0.0117]	[0.0117]	[0.0117]	[0.0116]
R^2	0.018	0.705	0.705	0.708	0.711
Baseline mean			0.83		
# of individual			8,625		
# of individual-months			162,468		
Panel C: *Single Women*					
EITC $\times Feb$	-0.0022	-0.0042	-0.0042	-0.0038	-0.0021
	[0.0092]	[0.0092]	[0.0092]	[0.0091]	[0.0091]
R^2	0.022	0.654	0.654	0.657	0.658
Baseline mean			0.78		
# of individual			8,366		
# of individual-months			159,168		
Basic controls	√	√	√	√	√
Individual fixed effect		√	√	√	√
Year fixed effect			√	√	√
State effect				√	√
Other controls					√

Note: This table reports coefficients from triple differences regressions (equation (1)). The outcome variable L is share of weeks worked in a month defined as number of working weeks in a month divided by total number of weeks in a month. Therefore, $L = 1$ if working for the full month, $L = 0$ if not working for the full month, and $0 < L < 1$ if working for partial month. The outcome variables regressed on the indicator for treatment group, as interacted with dummy for February. The treatment group consists of those individuals that have one or more qualifying children and family income greater than zero and less than EITC income limit during the previous year. The comparison group comprise (1) those individuals that have family income greater than zero and less than EITC income limit during the previous year but have no qualifying child. (2) those individuals with one or more qualifying children but whose family income during the previous year is above EITC income limit and below $40,000. (3) childless individuals that have family income during the previous year is above EITC income limit and below $40,000. The income limit roughly corresponds to the maximum EITC-eligible income for the families with one child during my sample period. For a married couple, the income limit is $36,000 and for single women it is $33,000. All dollar values are measured in 2007 USD. Column 1 control for treament group dummy, an indicator for individuals with one or more qualifying children, an indicator for individuals with family income greater zero and below $36,000, month fixed effect for those who have qualifying children, month fixed effect for those who have family income during tax year greater than zero and less than $36,000, and month fixed effect. Column 2 additionally includes individual fixed effects. Column 3 additionally includes year fixed effects. Column 4 additionally includes state effects: state fixed effect, monthly state unemployment rate, state specific time trend (quadratic). Column 5 additionally includes other controls: educational attainment, age, number of children below 18, family wealth, industry fixed effects, industry-specific time trend, a dummy denoting the interview month, a dummy indicating that the individual worked part-time in the previous year, and month fixed effects specific to part-time workers. Standard errors are clustered at the person level and reported in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

Table 5: Estimates from Individual Variation in EITC Payments

Dependent Variable:	Working				
	(1)	(2)	(3)	(4)	(5)
Panel A: *Married Women*					
Refund $\times Share$	-0.0110**	-0.0144***	-0.0144***	-0.0161***	-0.0159***
	[0.0043]	[0.0043]	[0.0043]	[0.0043]	[0.0042]
R^2	0.021	0.777	0.778	0.782	0.785
Baseline mean			0.47		
# of individual			5,933		
# of individual-months			112,152		
Panel B: *Married Men*					
Refund $\times Share$	-0.0052	-0.0052	-0.0053	-0.0056	-0.0065
	[0.0043]	[0.0043]	[0.0043]	[0.0043]	[0.0042]
R^2	0.002	0.683	0.683	0.687	0.691
Baseline mean			0.83		
# of individual			5,933		
# of individual-months			112,152		
Panel C: *Single Women*					
Refund $\times Share$	0.0042	0.0053	0.0053	0.0056	0.00001
	[0.0054]	[0.0053]	[0.0053]	[0.0053]	[0.0053]
R^2	0.013	0.660	0.661	0.666	0.668
Baseline mean			0.78		
# of individual			5,079		
# of individual-months			92,688		
Basic controls	√	√	√	√	√
Individual fixed effect		√	√	√	√
Year fixed effect			√	√	√
State effect				√	√
Other controls					√

Note: This table reports coefficients from ordinary least squares regressions (equation (3)). The outcome variable L is monthly employment status defined as number of working weeks in a month divided by total number of weeks in a month. Therefore, $L = 1$ if working for the full month, $L = 0$ if not working for the full month, and $0 < L < 1$ if working for partial month. The outcome variable is regressed on the imputed EITC amounts that an individual will receive $Refund$, as interacted with share of annual EITC disbursement paid out in a given month and year $Share$. The sample is restricted to EITC recipients. All dollar values are measured in 2007 USD. Column 1 controls for $Refund$, $Share$, and month fixed effects. Column 2 additionally includes individual fixed effects. Column 3 additionally includes year fixed effects. Column 4 additionally includes state effects: state fixed effects, monthly state unemployment rate, state specific time trend (quadratic). Column 5 additionally includes other controls: educational attainment, age, number of children below 18, family wealth, industry fixed effects, industry-specific time trend, a dummy denoting the interview month, a dummy indicating that the individual worked part-time in the previous year, and month fixed effects specific to part-time workers. Standard errors are clustered at the person level and reported in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

Table 6: Robustness Checks

Dependent Variable:	Working						
	(1) Age 20–50	(2) Husbands' age 20–55	(3) Unweighted regression	(4) Different dependent variable	(5) Stardard error group-month cluster	(6) No retail industry	(7) Add State EITC
Panel A: *Specification*(1)							
EITC $\times Feb$	-0.0279**	-0.0279**	-0.0246**	-0.0317***	-0.0294***	-0.0256**	
	[0.0140]	[0.0129]	[0.0106]	[0.0117]	[0.0021]	[0.0122]	
R^2	0.786	0.789	0.791	0.790	0.792	0.799	
# of individual	7,488	7,753	8,625	8,625	8,625	8,016	
# of individual-months	140,904	145,968	162,468	162,468	162,468	150,048	
Panel B: *Specification*(3)							
Refund $\times Share$	-0.0155***	-0.0163***	-0.0128***	-0.0160***	-0.0159***	-0.0149***	-0.0141***
	[0.0045]	[0.0044]	[0.0039]	[0.0043]	[0.0045]	[0.0043]	[0.0042]
R^2	0.782	0.783	0.783	0.781	0.785	0.783	0.792
# of individual	5,526	5,581	5,933	5,933	5,933	5,566	5,933
# of individual-months	104,340	105,612	112,152	112,152	112,152	104,484	112,152

Note: This table reports coefficients from ordinary least squares regressions (equation (1) and (3)). The outcome variable L is share of weeks worked in a month defined as number of working weeks in a month divided by total number of weeks in a month. Therefore, $L = 1$ if working for a full month, $L = 0$ if not working for a full month, and $0 < L < 1$ if working for a partial month. The outcome variable is regressed on the imputed EITC amounts that an individual will receive $Refund$, as interacted with share of annual EITC disbursement paid out in a given month and year $Share$. The sample is restricted to EITC recipients. Column 1 presents the results for a sample with a lower age cutoff of 50. Column 2 presents results based on a sample excluding married women whose spouses are outside of the age range (20 to 55). Column 3 shows the estimated coefficients from an unweighted regression. Column 4 shows that the estimated coefficients from an regression that uses different definition of outcome variable: $L = 1$ if working in any week during a month, and $L = 0$ otherwise. Column 5 shows the estimates using standard errors clustered on the group-month level (4 groups x 12 months). Column 6 presents results based on a sample excluding married women who worked in the retail industry in the end of previous year. Column 7 presents results that add variation in state EITC. In Panel A, all regressions control for treatment group dummy, an indicator for individuals with one or more qualifying children, an indicator for individuals with family income greater zero and below $36,000, month fixed effects for those who have qualifying children, month fixed effects for those who have family income during the previous year greater than $36,000 and less than $40,000, month fixed effects, individual fixed effects, year fixed effects, state fixed effects, monthly state unemployment rate, state specific time trend (quadratic), an indicator for interviewing month, educational attainment, number of children under 18, age, industry fixed effects, industry specific time trend (quadratic), family wealth, a dummy indicating part time job workers in previous year, and month fixed effects specific to part time job workers. In Panel B, all regressions controls for $Refund$, $Share$, month fixed effects, individual fixed effects, year fixed effects, state fixed effects, monthly state unemployment rate, state specific time trend (quadratic), an indicator for interviewing month, educational attainment, number of children under 18, age, industry fixed effects, industry specific time trend (quadratic), family wealth, a dummy indicating part time job workers in previous year, and month fixed effects specific to part time job workers. Standard errors are clustered at the person level and reported in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

Table 7: Subgroup Analysis Based on Tendency toward Being Liquidity Constrained (Married Women)

Dependent Variable:	Working	
	(1) Liquid Asset	(2) Mortgage to Income
Refund $\times Share$	-0.0034	-0.0109
	[0.0043]	[0.0067]
Refund $\times Share \times Constrained$	-0.0135*	-0.0162**
	[0.0077]	[0.0066]
Row 1 + Row 2	-0.0169***	-0.0271***
	[0.0042]	[0.0066]
R^2	0.785	0.810
Mean of EITC (constrained)	$2,284	$2,140
Mean of EITC (less constrained)	$1,860	$1,981
# of individual	5,933	3,579
# of individual-months	112,152	62,579

Note: This table reports coefficients from ordinary least squares regressions (equation (3)). In addition, I use *Constrained* to denote membership in the liquidity-constrained group and interact it with the intercept and predicted EITC amount $Refund \times Share$. The sample is restricted to EITC recipients (Married Women). The outcome variable L is share of weeks worked in a month defined as number of working weeks in a month divided by total number of weeks in a month. Therefore, $L = 1$ if working for the full month, $L = 0$ if not working for the full month, and $0 < L < 1$ if working for partial month. The outcome variable is regressed on the imputed EITC amounts that an individual will receive $Refund$, as interacted with share of annual EITC disbursement paid out in a given month and year $Share$. All dollar values are measured in 2007 dollars. All regressions control for *Constrained*, $Refund$, $Share$, month fixed effects, individual fixed effects, year fixed effects, state fixed effects, monthly state unemployment rate, state specific time trend (quadratic), an indicator for interviewing month, educational attainment, number of children under 18, age, industry fixed effects, industry specific time trend (quadratic), family wealth, a dummy indicating part time job workers in previous year, and month fixed effects specific to part time job workers. Standard errors are clustered at the person level and reported in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

Table 8: Secondary Earner Channel v.s. Gender Difference Channel

Dependent Variable:	Working				
	Married Women		Married Men		Full Sample
	Primary Earner	Secondary Earner	Primary Earner	Secondary Earner	
Refund $\times Share$	-0.0067	-0.0171***	-0.0046	-0.0158	-0.0028
	[0.0094]	[0.0048]	[0.0046]	[0.0113]	[0.0042]
Refund $\times Share \times Second$					-0.0138**
					[0.0058]
Refund $\times Share \times Female$					0.0028
					[0.0056]
R^2	0.648	0.767	0.576	0.776	0.762
Baseline mean	0.85	0.36	0.90	0.54	0.67
# of individual	1,453	4,766	4,766	1,453	11,012
# of individual-months	23,520	88,632	88,632	23,508	316,980

Note: This table reports coefficients from ordinary least squares regressions (equation (3)). The outcome variable L is share of weeks worked in a month defined as number of working weeks in a month divided by total number of weeks in a month. Therefore, $L = 1$ if working for the full month, $L = 0$ if not working for the full month, and $0 < L < 1$ if working for partial month. The outcome variable is regressed on the imputed EITC amounts that an individual will receive $Refund$, as interacted with share of annual EITC disbursement paid out in a given month and year $Share$. In the last column, based on equation (3), I also interact the intercept, predicted monthly EITC amount, and a set of month dummies with a indicator for female ($Female$) and a dummy indicating secondary earner ($Second$), respectively. The sample is restricted to EITC recipients. All regressions control for $Female$, $Second$, $Refund$, $Share$, month fixed effect, month fixed effect specific to female, month fixed effect specific to secondary earner, individual fixed effect, year fixed effect, state fixed effect, monthly state unemployment rate, state specific time trend (quadratic), an indicator for interviewing month, educational attainment, number of children under 18, age, industry fixed effect, industry specific time trend (quadratic), family wealth, a dummy indicating part time job workers in previous year, and month fixed effect specific to part time job workers. Standard errors are clustered at the person level and reported in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.

Table 9: Month-to-Month Labor Force Transitions (Married Women)

	Month-to-Month Labor Force Transitions					
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	Working to Nonworking	Nonworking to Working	Working to Unpaid Leave	Working to Temporary Layoff	Unemployed	Working to out of Labor Force
EITC $\times Feb$	0.0124	-0.0021	0.0108*	-0.0003	0.002	0.00003
	[0.0086]	[0.0073]	[0.0056]	[0.0038]	[0.0036]	[0.0052]
R^2	0.071	0.069	0.074	0.056	0.065	0.062
Baseline mean	0.016	0.018	0.004	0.002	0.003	0.007
# of individual	8,625	8,625	8,625	8,625	8,625	8,625
# of individual-months	162,468	162,468	162,468	162,468	162,468	162,468

Note: This table reports coefficients from triple differences regressions (equation (1)). The sample is restricted to married women. The outcome variables across the columns are presented as follows: 1) an indicator for whether an individual work in the third week in the last month and stopped working in the third week in the current month; 2) an indicator for whether an individual did not work in the third week in the last month and started working in the third week in the current month; 3) an indicator for whether an individual worked in the third week in the last month and then took leave without pay in the third week in the current month; 4) an indicator for whether an individual worked in the third week in the last month and then had temporary layoff without pay in the third week in the current month; 5) an indicator for whether an individual worked in the third week in the last month and become unemployed in the third week in the current month; 6) an indicator for whether an individual work in the third week in the last month and moved out of the labor force in the third week in the current month; All regressions control for treament group dummy, an indicator for individuals with one or more qualifying children, an indicator for individuals with family income greater zero and below $36,000, month fixed effects for those who have qualifying children, month fixed effects for those who have family income during the previous year greater than $36,000 and less than $40,000, month fixed effects, individual fixed effects, year fixed effects, state fixed effects, monthly state unemployment rate, state specific time trend (quadratic), an indicator for interviewing month, educational attainment, number of children under 18, age, industry fixed effect, industry specific time trend (quadratic), family wealth, a dummy indicating part time job workers in previous year, and month fixed effects specific to part time job workers. Standard errors are clustered at the person level and reported in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, and * significant at the 10 percent level.