Unintended Consequences? More Marriage, More Children, and the EITC

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Abstract

There has long been a concern that public assistance programs in the U.S. discourage marriage among lower-income couples. The Earned Income Tax Credit (EITC) provides a marriage bonus to some couples but a marriage penalty to others, and encourages some households to have more children but others to have less. The average effect of the EITC is therefore theoretically ambiguous and existing empirical evidence has been mixed. Using over 30 years of household panel data and controlling for current fertility and marital status, I find that federal and state EITC expansions led to increases in both fertility and marriage, and decreases in non-marital cohabitation. Marriage effects are largest for currently unmarried adults and give pause to concerns about the negative effects of the EITC on marriage. Subgroup responses show that effects are concentrated among EITC-eligible households and younger households more likely to be making childbearing decisions. These results also imply that some estimates in the EITC literature may be biased, since endogenous switching from the control to the treatment group (defined by marital status or number of children) would violate the stable-group-composition condition required by difference in differences.

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1. Introduction

Understanding whether public-assistance programs discourage marriage among low-income households is an important policy question since marriage is associated with positive health and economic outcomes for both adults (Waite, 1995; Sawhill, 2014) and their children (McLanahan and Sandefur, 1994; Chetty et al., 2014). The overall effect of the Earned Income Tax Credit (EITC) is theoretically ambiguous since it provides a financial incentive for some couples to marry and a disincentive for others to do so. Similarly, the average effect of the EITC on fertility is theoretically ambiguous: on one hand, the EITC is only available to working parents and may encourage fertility up to a point; on the other hand, since households must work to benefit from the EITC, this increase in labor supply may discourage fertility (Killingsworth and Heckman, 1986; Angrist and Evans, 1998). This paper uses individual-level panel data to explore the effect of state and federal EITC expansions on both marriage and fertility.

Before welfare reform in the 1990s, there was growing concern that Aid to Families with Dependent Children (AFDC) was discouraging marriage. Although evidence remains somewhat mixed, a number of studies found that welfare led to small decreases in marriage (Murray, 1993; Moffitt, 1998; Grogger and Bronars, 2001).[1] After welfare reform, the EITC replaced AFDC as one of the most important parts of the U.S. social safety net for lower-income families. Unlike AFDC, EITC benefits were only available to working adults and led to large increases in working mothers (Meyer and Rosenbaum, 2001) and decreases in poverty (Hoynes and Patel, 2015). By 2013, the EITC was over four times as large as AFDC, redistributing $66 billion to over 28 million low-income households and lifting 9.4 million individuals out of poverty (CBPP, 2014).

[1]Before welfare reform in the 1990s, AFDC was largely conditional on being a single parent. AFDC-UP was available to two-parent households but only if one parent was unemployed with a significant work history and household income and assets were below a low state-specific threshold. Among studies finding negative effects of AFDC on marriage, magnitudes vary substantially: one survey (Moffitt, 1998, p.74) shows that a 25 percent reduction in welfare benefits would have reduced nonmarital births by as much as 30 percent or by as little as 4 percent. On the other hand, other studies have found that AFDC did not affect marriage rates (Hoyne, 1997; Schoeni and Blank, 2000) or even increased marriage (Bitler et al., 2004).

The EITC is likely to affect fertility and marriage decisions since they help determine EITC eligibility (Figure 1). As of 2013, state and federal EITC benefits available to households with 0, 1, 2, or 3+ children was worth up to $680, $4550, $7520, or $8460 *annually*. Households may increase fertility (up to a point) to maximize EITC benefits, or may instead decrease higher-order fertility in order to work and receive EITC benefits. In a simple framework, I illustrate how the EITC encourages fertility for some households and discourages fertility for others. Regarding marriage, the EITC also provides heterogeneous incentives: a "marriage penalty" to some couples and a "marriage bonus" to others (Figure 5).

Existing evidence on how the EITC affects fertility is mixed and largely based on aggregate birth-records or cross-sectional data in the 1990s. Baughman and Dickert-Conlin (2003) finds an increase in the rate of first births for nonwhite women; Baughman and Dickert-Conlin (2009) finds a decrease in higher-order births for white women; and Duchovny (2001) finds an increase in second children for white-married and nonwhite-unmarried women. Regarding marriage, most evidence shows that the EITC has had no effect (Ellwood, 2000) or small negative effects (Dickert-Conlin and Houser, 2002; Herbst, 2011b; Michelmore, 2016). Heterogeneous responses to the EITC – and changes to the EITC over time[2] – may help explain why existing evidence has been mixed.

This paper expands on previous work: controlling for current marital status and number of children, I use over 30 years of individual-level panel data and state-by-year variation in the EITC to identify the effect of EITC expansions on marriage and fertility in subsequent years. Multiple observations of each household and rich variation in EITC generosity enable relatively precise estimation of the EITCs impact on fertility and marriage.

Regarding fertility, a 10-percentage-point increase in state EITC rates led to a 2.3-percentage-point (or 13 percent) increase in the likelihood of having an additional child within two years. Results are robust to various sets of controls and do not simply reflect a shift in birth timing, since event-study results show that a 7 percent increase in fertility is

[2]For example, the EITC "marriage penalty" was decreased in 2003, so studies before and after this may find different overall effects of the EITC on marriage.

still statistically significant seven years later. Heterogeneous analysis shows that the largest responses came from the lowest-educated individuals (most likely to be EITC-eligible), households eligible for additional EITC benefits if they had another child, and younger adults still in their childbearing years. I find null responses among placebo households not eligible for additional EITC benefits and older households less likely to respond on this margin.

Regarding marriage, a 10-percentage-point increase in state EITC rates led to a 1.5-percentage-point (or 2.9 percent) increase in the probability of being married the following year. Event-study results show that these positive effects are still evident (but noisy) several years later. Marriage results are robust to various sets of controls, are largest for previously unmarried adults, and may also be positive for currently married adults. On average, the EITC encourages new marriages and may help married couples stay married. Corroborating this effect, I also find that a 10-percentage-point increase in state EITC rates led to a 1.5-percentage-point (or 11-percent) decline in nonmarital cohabitation. These results give pause to concerns that the EITC discourages marriage and arguments against additional expansions of the EITC because of potential marriage disincentives (Rachidi, 2015).

Since state EITCs are generally a fixed fraction of the federal EITC, it is also important to account for the federal EITC. Using the maximum possible federal plus state EITC benefits (used by Bastian and Michelmore (2018)), I find even stronger evidence that the EITC increased fertility and marriage. These results are robust to various controls and an event-study approach shows that these effects remain positive several years later.

In addition to tax incentives, the EITC may encourage marriage among unmarried lower-income adults by strengthening their financial situation and allowing them to "afford to get married" (Gibson-Davis et al., 2005; Smock et al., 2005). I find evidence that the EITC increases household resources and reduces stress and financial insecurity, likely strengthening existing marriages (Mendenhall et al., 2012; Jones and Michelmore, 2016).

Finally, these results may also have implications for other EITC research that uses difference in differences (DD) or population samples based on marital status or number of

children. If marriage and fertility are endogenous with EITC expansions, then the stable-group-composition condition required for DD may not be met. If individuals are endogenously switching from the control to the treatment group, this could bias DD estimates. Furthermore, many studies restrict the sample to unmarried women, and if the EITC is affecting the composition of married women, this could also lead to biased results.

2. History and Effects of the Federal and State EITC

As of 2013, the EITC was worth up to $8,462 *annually* per household, redistributed a total of $66 billion to over 28 million low-income households, and was one of the most important programs in the U.S. safety net (CBPP, 2014).[3] The EITC is an earnings subsidy with a phase-in region, a plateau region, and a phase-out region (Figure 1). The EITC began in 1975 as a 10 percent earnings subsidy for low-income working parents. Since 1975, the EITC has been expanded numerous times, including a phase-in rate increase in 1986, additional benefits for families with at least two children in 1991, large phase-in rate increases between 1993 and 1996, extending the plateau region for married couples in 2003 to decrease the "marriage penalty", and additional benefits for families with at least three children in 2009.

Beginning with Rhode Island in 1986, states began implementing their own EITCs – generally a fixed percentage of federal EITC benefits (between 3.5 and 40 percent in 2013) – and by 2013 half of all states had one in place. States with an EITC can be found all over the country and cannot be stereotyped as liberal or conservative. For example, Washington, Pennsylvania, and Alabama do not have an EITC, while Oregon, New York, and Louisiana do (as of 2016). Figure 2 shows the year that each state EITC was implemented and the 2013 rate. There is substantial cross-state variation in when these state policies were enacted and how generous they were. Additionally, there is considerable within-state variation in EITC generosity, reflecting two sources: One source comes from changes in state EITC rates

[3]The EITC is also administratively efficient. About 0.3 percent of the EITC budget goes to state and federal overhead administrative costs, less than Medicaid (4.6 percent), SNAP (5.4 percent), public housing (9.1 percent), SSI (7.2 percent), and subsidized school lunch (2.5 percent) (Greenstein and Staff, 2012).

(usually increases but occasionally decreases). Figure 3 shows a histogram of the number of times that each state changed their EITC rate through 2013.[4] A second source of variation comes from federal EITC expansions, since state EITCs that are a fixed fraction of the federal EITC automatically become more generous when the federal EITC is expanded.

The EITC has transformed the U.S. by raising maternal employment (Eissa and Liebman, 1996; Meyer and Rosenbaum, 2001; Bastian, 2017),[5] earnings (Dahl et al., 2009), and health (Evans and Garthwaite, 2014), as well as decreasing poverty (Hoynes and Patel, 2015) and reducing the social stigma against working women (Bastian, 2017). The EITC has also helped children of EITC recipients by improving health (Hoynes et al., 2015; Averett and Wang, 2015), test scores (Chetty et al., 2011; Dahl and Lochner, 2012), and longer-run outcomes such as educational attainment (Bastian and Michelmore, 2018; Manoli and Turner, 2018) and employment and earnings when these children grow up (Bastian and Michelmore, 2018). The EITC may also have led to lower pre-tax wages of low-skill workers (Leigh, 2010; Rothstein, 2010). See Nichols and Rothstein (2016) or Hoynes and Rothstein (2016) for recent a review of the EITC literature.

Since EITC benefits depend on household number of children and marital status, the EITC also likely affects fertility and marriage decisions. Regarding fertility, evidence has been mixed: Baughman and Dickert-Conlin (2003) finds an increase in the rate of first births for nonwhite women; Baughman and Dickert-Conlin (2009) finds a decrease in higher-order births for white women; and Duchovny (2001) finds an increase in second children for white-married and nonwhite-unmarried women. These studies use aggregate birth-records data or cross-sectional observations and are limited to the context of the 1990s.

The average effect of the EITC on marriage is theoretically ambiguous. The EITC's marriage incentives are couple-specific and depend on the intra-couple distribution of earnings and how children are claimed on their taxes (Maag and Acs, 2015). Some studies show

[4]The zeros in this figure represent the states that never had an EITC. After enacting an EITC, five states never adjusted their rates, but nine states adjusted their rates between three and eight more times.

[5]Households may also have an incentive to decrease (or increase) labor supply on the intensive margin, but such results are small and hard to detect empirically (Meyer, 2002; Saez, 2002; Eissa and Hoynes, 2006).

that, on average, the EITC provides a marriage penalty (Alm et al., 1999; Eissa and Hoynes, 2000b; Holtzblatt and Rebelein, 2000; Ellwood, 2000; Lin and Tong, 2012), while others show that it provides a marriage bonus (Maag and Acs, 2015). These marriage incentives have changed over time, especially after 2002 when the "marriage penalty" was reduced in the tax code. However, marriage penalties do not always lead to lower marriage rates (Ellwood, 2000), perhaps because in addition to the direct financial incentive, the EITC may strengthen marriages by increasing household resources and reducing financial insecurity (Mendenhall et al., 2012; Jones and Michelmore, 2016). Still, with few exceptions,[6] there is a growing concern that the EITC may lead to small decreases in marriage (Dickert-Conlin and Houser, 2002; Acs, 2005; Chade and Ventura, 2005; Fisher, 2011; Herbst, 2011a; Michelmore, 2016).[7]

3. Theoretical Framework

3.1. How the EITC May Affect Fertility

The EITC is available to working parents and is based on total household earnings, providing a financial incentive for some families to adjust fertility and marriage decisions. Fertility responses may occur at the extensive or intensive margin (Aaronson et al., 2014). Between 1975 and 1990, the EITC did not provide additional benefits for having more than one child. In this scenario, the EITC subsidized childbearing on the extensive margin but not the intensive margin. In 1991 and 2009 the EITC was expanded so that families with at least two and three children could receive additional EITC benefits. After 1991, the EITC subsidized childbearing on the extensive margin and (to a point) the intensive margin. However, the EITC may also discourage higher-order births since working costs increase with children.

The following discrete-choice framework illustrates how the EITC encourages some households to increase fertility, but encourages others to decrease planned fertility. For simplicity,

[6] Eissa and Hoynes (2003) find that the EITC increases marriage rates for some low-income tax filers.

[7] Popular press example: `http://www.usnews.com/opinion/economic-intelligence/2015/11/12/we-penalize-marriage-for-low-income-couples-and-it-might-be-getting-worse`.

households consist of one adult, working is a binary decision, and fertility equals 0, 1, or 2.

$$V_i(l,k) = max_{l,k}[\alpha log(w_i 1_{l=1} + n_i - k\gamma_i 1_{l=1} + E_1 1_{k=1,l=1} + E_2 1_{k=2,l=1}) + k\beta_i] \tag{1}$$

Each household i maximizes her utility by choosing whether to work ($l = 1$) or not ($l = 0$) and how many kids to have ($k \in 0, 1, 2$). She receives non-labor income n_i. If she works she earns w_i and pays a per-child cost (e.g. childcare) of γ_i. β_i represents the per-child utility derived from each child. E_1 are EITC benefits earned if the household works and has exactly one child. E_2 are EITC benefits earned if the household works and has two children.[8]

The following illustrates how EITC increases could lead some household types to increase fertility and others to decrease fertility. Assume an EITC expansion where $E_1^{new} > E_1^{old}$ and $E_2^{new} > E_2^{old}$. One type of household that would *decrease* their fertility in response to this EITC expansion would satisfy the following two conditions.

$$\begin{aligned} V_i(l=1,k=1|E_1^{old},E_2^{old}) &< V_i(l=0,k=2|E_1^{old},E_2^{old}) \\ V_i(l=1,k=1|E_1^{new},E_2^{new}) &> V_i(l=0,k=2|E_1^{new},E_2^{new}) \end{aligned} \tag{2}$$

Such households would choose to not work and have two children under the old EITC and choose to work and have one child under the new expanded EITC. Normalizing $\alpha = 1$, the two inequalities in equation (2) imply the following:

$$\begin{aligned} log(w_i + n_i - \gamma_i + E_1^{old}) &< log(n_i) + \beta_i \\ log(w_i + n_i - \gamma_i + E_1^{new}) &> log(n_i) + \beta_i \end{aligned} \tag{3}$$

which implies that:

$$E_1^{old} < n_i(e^{\beta_i} - 1) + \gamma_i - w_i < E_1^{new}. \tag{4}$$

Households satisfying equation (4) would *decrease* fertility after such an EITC expansion.

[8]Without specifying the distribution of $(w_i, n_i, \beta_i, \gamma_i)$, I assume that combinations of w_i,n_i,β_i,γ_i exist such that each of the six combinations of l and k are chosen by at least some types of households.

On the other hand, one type of household that would *increase* their fertility in response to the same EITC expansion would satisfy the following two conditions.

$$\begin{aligned} V_i(l=1,k=2|E_1^{old},E_2^{old}) < V_i(l=1,k=1|E_1^{old},E_2^{old}) \\ V_i(l=1,k=2|E_1^{new},E_2^{new}) > V_i(l=1,k=1|E_1^{new},E_2^{new}) \end{aligned} \tag{5}$$

Such households would choose to work and have one child under the old EITC and to work and have two children under the new EITC. Normalizing $\alpha = 1$, these inequalities imply:

$$\frac{w_i + n_i + E_2^{old} - 2\gamma_i}{w_i + n_i + E_1^{old} - \gamma_i} < e^{\beta_i} < \frac{w_i + n_i + E_2^{new} - 2\gamma_i}{w_i + n_i + E_1^{new} - \gamma_i}. \tag{6}$$

Households satisfying equation (6) would increase fertility in response to the EITC expansion.

The framework above shows how EITC expansions could lead some households to increase fertility and others to decrease fertility, which reflects the tradeoff between having more children to maximize EITC benefits and the higher costs associated with working with more children.[9] Because of these heterogeneous responses, the overall effect of EITC expansions on fertility depends on the number of each household-type in the population.[10]

3.2. How the EITC May Affect Marriage

The EITC will also encourage marriage for some families and discourage it for others, depending on the intra-household distribution of earnings and children. Since EITC benefits are only available for working adults with children, (1) a non-working adult with children would have a financial incentive to marry a working partner and file joint taxes, and (2) a working adult without children would benefit from marrying a non-working (or low-income) partner with children, but (3) two working adults with children may have an incentive to not marry (and file taxes separately) if their combined earnings would put them beyond the EITC income limit (Figure 1). Figure 5 shows how marriage is financially rewarded or penal-

[9] Similar results could be shown for other types of EITC expansions.

[10] To make matters even more complicated, this population composition could also change over time.

ized conditional on household earnings and number of children. As with fertility, the overall effect of the EITC on marriage depends on the population composition of household-types, which could vary by state and change over time.

The EITC may also affect marriages in less direct ways. By encouraging mothers to work, the EITC may delay and reduce marriage (Shenhav, 2016). On the other hand, the EITC may lead to more stable marriages by reducing financial insecurity and stress (Mendenhall et al., 2012; Jones and Michelmore, 2016) and by improving childrens outcomes and reducing parental stress (Chetty et al., 2011; Dahl and Lochner, 2012; Hoynes et al., 2015; Manoli and Turner, 2018; Averett and Wang, 2015; Bastian and Michelmore, 2018). The overall effect of the EITC is theoretically ambiguous and is likely quite heterogeneous.

4. Fertility and Marriage Trends, Empirical Strategy

Fertility has steadily declined in recent decades, except for a slight uptick in the mid-1980s to the mid-1990s (Figure 6.A). The fraction of married adults has also been declining while the fraction of never-married adults has been increasing (Figure 6.B). In this context of declining fertility and marriage, I look at the impact of EITC expansions on marriage and fertility.

Data from the 1980 to 2013 Panel Survey of Income Dynamics (PSID) is used and observations are at the household-head-by-year level. The sample contains 76,259 observations reflecting 13,533 unique household heads between 21 and 39 years old. Table 1 shows summary statistics for this sample using PSID weights. On average, these household heads have 1.04 kids, 13.9 years of education, annual earnings of $39,520 (2013 dollars), and total household earnings of $50,520. 58 percent are married, 86 percent work, 26 percent are female, and 16 percent are Black. Appendix Table A2 shows a transition matrix of annual changes in number of household children and marital status. As expected, most households do not change marital status (94 percent) or have additional children (88 percent) in adjacent years.

This paper uses two main measures of the EITC: state EITC rates – generally a fraction of federal EITC benefits – and the maximum possible federal plus state EITC benefits in 2013 dollars ($MaxEITC$) available for each household (used by Bastian and Michelmore (2018)). The average state EITC rate for this sample is 2.4 percent (though this rises to about 6 percent for years after 2000 and is 19.7 percent conditional on having a state EITC) and Figures 2 and 3 (discussed in section 2) show variation in state EITC rates over time, both within and across states. Average $MaxEITC$ is \$1,575 and the distribution is shown in Figure 4. Each EITC measure has substantial variation, enabling relatively precise estimation of how the EITC affects marriage and fertility.

I first look at how changes in state EITC rates affect household number of children and marital status in the following year,[11] conditional on current number of children and marital status.[12] This household-panel approach differentiates this paper from many previous studies that have looked at how the EITC affects the decision to have children or get married.

I use OLS to estimate the following equation.

$$y_{ist+1} = \beta_1 \Delta StateEITC_{(t)-(t-1)} + \beta_2 y_{ist} + \beta_3 X_{ist} + \delta_t + \gamma_s + \epsilon_{ist} \tag{7}$$

i, t, and s denote individual household heads, years, and states. y_{ist+1} is the binary outcome of interest (having an additional child or being married in the following year), $\Delta StateEITC$ is the annual change in the state EITC rate – as a fraction of the federal EITC – measured in 10-percentage-point units. β_1 is the coefficient of interest and measures (in percentage points) the increased likelihood of having an additional child or being married in the year after a 10-percentage-point state EITC increase.[13] y_{ist} is current number of children and current marital status (all regressions controls for each of these). X_{ist} is a set of household-head level controls associated with fertility and marriage rates including fixed effects for birth-

[11] Fertility decisions tend to take a year or so to materialize. The PSID surveys households annually before 1997 and biannually after 1997, so I measure fertility with a two year lag to be consistent.

[12] $\Delta StateEITC$ could also reflect moving across state lines, however, I find no evidence that moving is related to state EITC rates and results are identical if I omit the 5 percent of observations that change states.

[13] Using $StateEITC_t$ and $StateEITC_{t-1}$, or just using $StateEITC_t$, yields similar results.

year, race, and state-by-race, and an age cubic and years of education. X_{ist} also contains state-by-year economic conditions and policies discussed below. δ_t and γ_s are year and state fixed effects; ϵ_{ist} is an idiosyncratic error term. State and year fixed effects account for state institutions and social norms, and annual events (e.g. recessions or welfare reform) affecting the whole country. PSID weights are used throughout to help correct for the oversampling of poor and minority households (PSID 2013). Standard errors are robust to heteroskedasticity and clustered at the individual level unless otherwise stated.

One potential threat to identification would be if state EITCs were created or expanded in response to economic conditions or changes in other polices that also affect fertility and marriage behavior. For example, if state EITCs are expanded during economic expansions and if people are more likely to have children or marry during such periods, then estimates of the effect of state EITC expansions on fertility and marriage would be biased upward. On the other hand, if state EITCs are a substitute for other public assistance programs that encourage fertility and are expanded when other programs are cut, then estimates of the effect of state EITC expansions on fertility and marriage could be biased downward.

I formally test whether state EITC rates are correlated with state policies or economic conditions in Appendix Table A1. I regress state EITC rates on various state-by-year characteristics such as GDP, minimum wage, unemployment, welfare generosity, marginal income-tax rates, higher-education spending, total tax revenue, and lags of each of these variables along with state and year fixed effects. Columns 1 to 3 run this state-by-year-level regression with three different weights (including unweighted) and the only covariate significant at the 10 percent level is lagged state unemployment. This negative estimate may suggest that state EITCs are lower the year after high unemployment. However, with 14 covariates, one is likely to be significant by chance. Joint F-tests in each column (excluding state and year fixed effects) yield p-values between 0.14 and 0.35 and I cannot reject the null hypothesis that none of these variables are correlated with state EITC rates. Still, these factors may be correlated with marriage and fertility and I control for them to isolate the impact of the

EITC (although they have almost no impact on the estimates (Tables 2 and 4).

5. Fertility Results

5.1. Average Effects in Year t+2

I first look at the average effect of state EITCs on fertility and examine how stable these estimates are across various sets of controls. Columns in Table 2 Panel A progressively add controls and show the effect of a 10-percentage-point increase in the state EITC rate in year t on household number of children in year $t + 2$. Column 1 only controls for current number of children. Column 2 adds controls for the household heads gender, marital status, and race. Column 3 adds controls for the household head's age (cubic) and fixed effects for year and birth year to account for declining birth rates across cohorts and the age-varying probability of having children. Column 4 controls for state and state-by-race fixed effects and column 5 controls for education. Column 6 adds state-by-year economic policies and conditions (discussed in section 4). Column 7 controls for state-specific time trends and is the full set of controls that is used for all subsequent analysis. Column 8 tests whether results are robust to family fixed effects.[14]

Estimates in Table 2 Panel A are positive and stable across sets of controls, ranging from 2.1 to 3.1 percentage points, with the full set of controls indicating that a 10-percentage-point increase in state EITC benefits leads to a 2.3-percentage-point (or 13-percent) increase in the average likelihood of having an additional child within two years.[15] I compare these magnitudes with previous studies in section 5.5. Probit, logit, and less parametric, locally weighted approaches yield similar estimates (Appendix Figure A1).[16]

[14]The purpose of progressively adding controls is to show that the relationship between the treatment and dependent variables is not sensitive to observable controls and thus unlikely to be sensitive to unobservable controls, not to attribute variation to certain covariates (Gelbach, 2016).

[15]Results are similar when the two-thirds of observations that do not have a state EITC are dropped.

[16]Appendix Figure A1 shows results from a locally weighted, double-residual regression (Cleveland, 1979), where two sets of residuals are created: one, from the regression of y_{t+1} on the full set of controls except $\Delta StateEITC$; two, from the regression of $\Delta StateEITC$ on the full set of controls. Regressing the first set of

To be clear, results may not only reflect newly born children, but also older children moving in a household for various reasons. In Appendix Table A3 I restrict new children to be at most two (or other cutoffs) years old and results fall slightly from 0.023 to 0.017 (representing a 10 percent increase) and remain statistically significant.

5.2. Event Study Approach

In addition to affecting fertility in year $t+2$, the EITC may also affect fertility in other ways. For example, the effect may grow over time as households learn about state EITC expansions. On the other hand, these positive effects may simply reflect changes in birth timing (Grogger and Bronars, 2001; LaLumia et al., 2015; Meckel, 2015) and not changes in completed fertility. I test for these possibilities in an event-study framework where I estimate equation (8) with various sets of controls from Table 2 column 7.

$$y_{ist+j} = \beta_1 \Delta StateEITC_{(t)-(t-1)} + \beta_2 y_{ist} + \beta_3 X_{ist} + \delta_t + \gamma_s + \epsilon_{ist} \tag{8}$$

Instead of just using y_{t+1} as the dependent variable, I use y_{t+j} where $j \in \{-5, -4, ... -1, 1, 2, ...7\}$. Since y_t is still used as a control, $j = 0$ is not used and each estimate can be interpreted as the probability of having an additional child relative to the year of the state EITC expansion.[17] If the estimates in Table 2 reflect simply a timing response and not a permanent fertility increase, then the estimates should shrink and approach zero over time. However, if the estimates in Table 2 reflect a permanent fertility change, then the estimates should remain positive and perhaps even grow over time. An event-study approach also provides a number of placebo tests, since EITC expansions should not affect past fertility.

Event-study results in Figure 7 nest the results in Table 2 by showing a positive fertility effect in year $t+2$ across various sets of controls. The effect of the EITC on fertility is positive in year $t+1$ and grows larger in year $t+2$, perhaps suggesting that it takes households a year

residuals on the second set mechanically reproduces the main OLS estimate in Table 2 column 7. Although the boundary estimates are noisy, the locally weighted slope is positive and quite similar to OLS.

[17] Thus, estimates should not be cumulatively added.

or so to learn about the EITC (EITC payments do not occur until the following year). The effect remains positive and significant through year $t + 7$, indicating an permanent increase in fertility, not just reduced birth spacing. Since about 28 percent of the sample has an additional child within 7 years of an EITC increase, my results imply a 7 percent increase in completed fertility due to state EITC expansions. Figure 7 also shows a statistically insignificant flat pre-trend in the years leading up to state EITC changes, providing evidence that the fertility responses do not simply reflect state-level trends unrelated to the EITC.

5.3. Heterogeneous Responses: Subgroups, Dose Response, Placebo Tests

The EITC likely had different fertility effects on different types of households. Figure 8 and Table 3 use equation (7) but interact $\Delta StateEITC$ with number of children, EITC eligibility, age, education, and race to investigate heterogeneous responses and whether fertility responses only exist among households that should have responded to the EITC.

The framework in section 3.1. illustrated how an EITC expansion could increase children for some households (to increase EITC benefits) but decrease children for other households (since it is less costly to work with less children). I look for evidence of this in Figure 8, where I interact $\Delta StateEITC$ with current number of children. I find that the EITC increases the likelihood of having additional children for households with 0 or 1 children and reduces the likelihood of having additional children for those with more than 3 children.[18] These heterogeneous responses are generally missed by studies focusing on average responses.

In Table 3 column 1, I divide the sample into households that would or would not be eligible to receive additional EITC benefits if they had another child. Before 1990, no additional EITC benefits were available for households with more than one child. In 1991, additional EITC benefits became available to households with at least two children, and in 2009 additional benefits became available to households with at least three children.[19]

[18] As found by (Lovenheim and Mumford, 2013), I find largest effects for households that had one child.

[19] Therefore, the EITC only encouraged having children on the extensive margin before 1990, but encouraged children on the extensive and (to a point) the intensive margin after 1991.

Therefore, households potentially eligible for additional EITC benefits with one more child had zero children before 1991, at most one child between 1991 and 2008, and at most two children after 2008. Interacting $\Delta StateEITC$ with this eligibility variable shows that a 10-percentage-point increase in state EITC rates increased the likelihood that households eligible for additional EITC benefits increased their fertility (2.7 percentage points) but households not eligible for additional EITC benefits did not.

In Table 3 column 2, I broaden the sample to include household heads up to age 60 and then divide the sample into those younger and older than age 40. Any potential effect of the EITC on fertility should be concentrated among younger household heads in their prime childbearing years, and are able to respond to fertility incentives, and near zero for older household heads. I find that a 10-percentage-point increase in state EITC rates had a positive effect on younger adults (2.4 percentage points) and a null effect on older adults.

In column 3, I divide the sample into three categories by years of education (less than 12, 12 to 15, and at least 16 years of education). Interacting $\Delta StateEITC$ with these three variables shows that state EITC rates had the strongest effect on the lowest-education group, most likely to be eligible for the EITC (4.5 percentage points), a positive but statistically insignificant effect on the middle-education group, and puzzlingly, an effect on the highest educated group too, although this result is only significant at the 10-percent level.

Finally, in column 4 I divide the sample by race (white and nonwhite), interact the treatment variable with these variables, and find a positive response from both nonwhite and white household heads (3.5 and 2.2 percentage points).

These heterogeneous responses largely nest previous findings: an increase in first and second children by white and nonwhite mothers (Baughman and Dickert-Conlin, 2003; Duchovny, 2001) and a decrease in higher-order births for white women (Baughman and Dickert-Conlin, 2009).

5.4. Accounting for the Federal and State EITC

Although results above show that state EITCs had a positive effect on fertility, state EITCs are generally a fraction of the federal EITC, which itself has increased over time. To account for the overall impact of the federal and state EITC, I construct the variable $maxEITC$, which is the maximum potential federal and state EITC benefits that a family could receive if they had one more child. $maxEITC$ is a function of year, state, number of household children, and is independent of family income ($maxEITC$ is from Bastian and Michelmore (2018)). Equation (9) is identical to equation (7) except it measures the effect of a $1,000 (2013 dollars) increase in $maxEITC$ – instead of $\Delta StateEITC$ – on fertility.

$$y_{ist+1} = \beta_1 maxEITC_t + \beta_2 y_{ist} + \beta_3 X_{ist} + \delta_t + \gamma_s + \epsilon_{ist} \tag{9}$$

Results in Table 2 Panel B use the same progressive build-up of controls as Panel A (see section 5.1) and show that a $1,000 increase in $maxEITC$ increases the likelihood of having another child within two years by 3.2 to 3.7 percentage points. Results are similar whether $maxEITC$ is measured in annual levels or in year-on-year changes: in Table 3 columns 5 and 6, these two measures of $maxEITC$ yield statistically significant estimates of 0.035 and 0.026. And as with $\Delta StateEITC$ in Appendix Figure A1, a locally weighted approach in Appendix Figure A2 yields similar results (see footnote 16 for details).

Next, I use an event-study approach to test whether $maxEITC$ (measured in levels or annual changes) had a permanent effect on fertility. Figures 9 and 10 parallel the event-study in Figure 7, nest the results in Table 3 columns 5 and 6, show a permanent increase in fertility, and show flat pre-trends leading up to EITC expansions.

5.5. Children as "Normal" Goods and Interpreting Magnitudes

It is well known that (1) fertility decreases with family income and (2) children are "normal" goods (Milligan, 2005; Lindo, 2010; Black et al., 2013; Lovenheim and Mumford, 2013). In

my sample, every $1000 (2013 dollars) in family income is associated with 0.05 less children, but also, a $1,000 increase in $maxEITC$ increases average family earnings by about $2800 ((Dahl and Lochner, 2017, Table 3); (Bastian and Michelmore, 2018, Table 4)) and increases the probability of having another child by about 4 percentage points (Figures 9 and 10). These estimates map to an elasticity of about 0.69.[20]

How does this elasticity compare with other elasticity estimates of family income and fertility? The same approach yields elasticities of 0.5 to 0.75 in Black et al. (2013); 0.78 to 0.95 in Whittington (1993); 0.7 to 1.15 in Whittington (1992); 1.6 in Zhang et al. (1994); 2 to 3 in Lovenheim and Mumford (2013); and 4 in Milligan (2005).[21] My elasticity falls in the lower end of these estimates.

Another way to compare my magnitudes with previous findings is to estimate the effect of $1000 (2013 dollars) on fertility. Since $1000 of $maxEITC$ increases average family income by $2800 and fertility by 3.8 percent (0.04/1.05), this paper shows that $1000 of family income is associated with a 1.4 percent increase in fertility (3.8/2.8). This compares with 0.7 to 1.7 percent in Black et al. (2013); 0.2 percent in Whittington (1992) and Whittington (1993); 6 percent in Zhang et al. (1994); 1.7 to 5.6 percent in Lovenheim and Mumford (2013); and 8 percent in Milligan (2005). In the context of AFDC, (Moffitt, 1998, p.74) finds that a $1000 decrease would have reduced non-marital births by 2 to 16 percent.[22]

Although the literature has found implied elasticities all over the map, my estimates are within this range. To the extent that my results are smaller than other studies, this could reflect the fact that many other studies reflect a pure income effect, whereas the EITC likely increases children through an income effect, but decreases children through a substitution

[20]Calculated as (log(50.5+2.8)-log(50.5))/(log(1.05+.04)-log(1.05)). Average income and kids in Table 1.

[21]I calculate these elasticities as the change in log family income divided by the change in log fertility.

[22]Although my elasticity is smaller than those in Moffitt (1998), my results are averaged over the whole population, not just unmarried mothers. The fraction of births to unmarried mothers has risen from below 20 percent in 1980 to about 40 percent in 2010 (`https://www.cdc.gov/nchs/data/databriefs/db162.htm`); scaling my estimates by 2 to 5 yields elasticities similar to those surveyed by Moffitt (1998). Moffitt (1998) actually says that a 25 percent decrease in AFDC would have decreased non-marital births by 4 to 30 percent. Since average household AFDC benefits were worth around $600 (2013 dollars), a 25 percent decrease represents an $1800 annual income decrease (and 30/1.8=16). $600 is an 1980s and early 1990s average, since in 1994, nominal state AFDC benefits ranged from $120 to $923 (Page and Larner, 1997).

effect where mothers spend more time working and less time on household production.

6. Marriage Results

In this section I follow the same multi-step approach as for fertility in section 5.

6.1. Average Effects

I estimate equation (7) where y_{t+1} is a binary variable for whether the household head is married in the year after a 10-percentage-point state EITC expansion, conditional on marital status in year t. Table 4 Panel A progressively adds controls – exactly as in Table 2 – and shows that the estimates of β_1 range from 1.4 to 1.6 percentage points (or 2.7 to 3.1 percent), with the full set of controls indicating that a 10-percentage-point increase in state EITC benefits leads to a 1.5-percentage-point (or 2.9 percent) increase in the average likelihood of being married in the following year.[23] Probit, logit, and Less parametric, locally weighted approaches yield similar results (see Appendix Figure A3 and footnote 16).

6.2. Event Study Approach

In addition to affecting marriage in the following year, the EITC may also affect marriage in other ways. The EITC may affect marriage timing (Sjoquist and Walker, 1995) or could evolve over time as households learn about EITC expansions. On the other hand, the effect could decrease over time as households raise expectations to their new standard of living. I test for these possibilities in an event-study framework where I re-estimate equation (8).

Event-study results in Figure 11 show that the effect on marriage is positive in the first two years after a state EITC expansion (nesting the results in Table 4 Panel A) and then remains positive, but is less statistically significant up to year $t + 6$. There also appears to

[23]Results are unlikely to reflect manipulation of tax-filing status (Edin et al., 2014), since there is no financial incentive to misreport marital status to the PSID. Although see Hurst et al. (2014).

be no response or pre-trend in the years leading up to state EITC changes, suggesting that the positive marriage response does not simply reflect state trends unrelated to the EITC.

6.3. Heterogeneous Responses: Subgroups, Dose Response, Placebo Tests

Table 5 shows how the effect of state EITCs on marriage varies by current marital status. The estimate in column 1 is identical to Table 3 column 7; the estimates in columns 2 to 4 divide the sample into household heads currently married, never married, and currently divorced. Results show that for these three groups, a 10-percentage-point increase in state EITC benefits is associated with a 0.6-, 2.3-, and 2.8-percentage-point increase in the probability of being married in the following year, although only results for the never married are statistically significant.[24] In column 5, I also estimate the effect of the EITC on these subgroups by using the full sample and interacting the treatment variable $\Delta StateEITC$ with marital status and find results similar to columns 2 to 4.

In Table 6, I investigate how heterogeneous responses varied by EITC eligibility, education, race, and age and test whether marriage responses only exist among households that should have responded to the EITC. To do this I interact $\Delta StateEITC$ from equation (7) with various subgroups, identical to the approach in Table 3 for fertility.

In column 1, I expand the sample to include household heads up to age 60 and interact $\Delta StateEITC$ with being under or over 40. I find that a 10-percentage-point increase in state EITC rates had a positive effect on younger adults (1.5 percentage points) and an insignificant effect on older adults (-0.4 percentage points). This makes sense since, younger adults are less likely to be married and more able to respond on this margin.

In column 2, I divide the sample into three categories by years of education (less than 12, 12 to 15, and at least 16 years of education). Interacting the treatment variable with these three variables shows that a 10-percentage-point increase in state EITC rates had the strongest effect on the middle-education group (2.5 percentage points) and a positive but

[24] One reason that the effect on currently married adults is near zero is that 94 percent of adults married in year t are still married in year $t+1$ (Appendix Table A2), and therefore there is little room for growth.

statistically insignificant effect on the lowest- and highest-education groups. Although the lowest education group was most likely to be EITC-eligible, marriage requires planning and foresight, perhaps more easily accomplished with more education.

In column 3, I divide the sample by race (white and nonwhite), interact the treatment variable with race, and find positive responses from both nonwhite and white household heads (1.1 and 1.6 percentage points), although only the latter is statistically significant.

6.4. Accounting for the Federal EITC and the Total Financial Incentive

As discussed in section 5.4, state EITC expansions are one way to measure the effect of the EITC on marriage. Another approach, that incorporates the federal EITC, is the variable $maxEITC$, which is the maximum potential federal and state EITC benefits that a family could receive given year, state, number of children, and is independent of family income.

Table 6 columns 4 to 6 estimates equation (7) with $maxEITC$ in place of $\Delta StateEITC$, and shows that $maxEITC$ is also associated with increases in marriage. This holds true for the annual level or change in $maxEITC$. Columns 4 and 5 show that $maxEITC$ has a positive effect on households ever eligible for the EITC (based on household earnings and children) and a null effect on the placebo group of households never eligible for the EITC. For the first group, a $1000 increase in $maxEITC$ leads to a 0.7 percentage point increase in the likelihood of being married in the following year (column 4) and for the second group, the same estimate is an insignificant -0.2 percentage points (column 5). Similarly, a $1000 increase in $\Delta maxEITC$ leads to a 0.5 percentage point increase in marriage (column 6).

In Figure 12, I use an event-study approach to test whether increases in $maxEITC$ had a permanent effect on marriage, and whether this effect simply reflects pre-trends. Results nest Table 6 column 6, and show that increases in $maxEITC$ had positive (but diminishing) effects on marriage lasting at least six years. Figure 12 also shows that increases in $maxEITC$ in year t had no apparent effect on marriage in the six placebo years before year t.

7. Mechanisms and Intermediate Outcomes

Results in sections 5 and 6 suggest that the EITC had a positive effect on lower-order fertility and on marriage. These results hold whether I use state EITC expansions or the maximum possible federal and state EITC benefits. In Tables 7 to 9, I explore possible mechanisms and intermediate outcomes that could partially drive these responses.

It is well known that the federal EITC has increased maternal employment over the last 40 years (Eissa and Liebman, 1996; Meyer and Rosenbaum, 2001; Bastian, 2017). In Table 7 columns 1 to 3, I test whether state EITC expansions had a similar effect on employment, annual work weeks, and weekly work hours. Panel A estimates the effect of state EITC increases on the full sample of household heads; Panel B estimates the effect separately for male and female heads. A 10-percentage-point increase in state EITC rates increased average employment (0.4 percentage points), annual weeks worked (0.44), and weekly work hours (0.29). By gender, these three outcomes are statistically insignificant for men (-0.003, 0.23, and 0.10) and larger and statistically significant for women (0.023, 1.04, and 0.89).

Table 7 columns 4 to 6 show the relationship between state EITC expansions and (1) maximum federal and state EITC benefits ($maxEITC$) in 2013 dollars, (2) estimated household EITC benefits, (3) estimated additional household EITC benefits that an additional child would bring. In column 4, a 10-percentage-point increase in state EITC rates increased $maxEITC$ by \$235, and this result is similar by gender. In column 5, estimated EITC benefits increased by about \$71 in response to a 10-percentage-point increase in state EITC rates. This estimate is small but is averaged over the whole sample. Panel B shows that this estimate is larger for female than for male household heads (\$143 versus \$46). In column 6, a 10-percentage-point increase in state EITC rates would result in an additional \$93 of EITC benefits with one more child, and is larger for females than males (\$157 versus \$70).

Table 7 column 7 provides evidence that EITC expansions have also resulted in decreased stress (especially for men). However, this evidence is merely suggestive since it is only available between 2005 and 2013 and is only collected from a fraction of the main sample.

If the EITC did increase marriage, then it should also have decreased nonmarital cohabitation. As with stress, this variable is only available for a fraction of the main sample (see Table 1).[25] Using equation (7) and the same identification strategy used to estimate the effect of state EITCs on fertility and marriage, Table 8 estimates the effect of state EITCs on the likelihood that a young adult is unmarried and cohabitating.[26] Table 8 progressively adds controls (following the approach in Tables 2 and 4) and shows that across various sets of controls, the EITC reduces cohabitation, even with family fixed effects. The full set of controls shows that a 10-percentage-point increase in state EITC rates leads to a 1.5-percentage-point (or 10 percent) reduction in the probability of cohabitating in the following year. Panel A uses contemporaneous cohabitation (partly to increase sample size) and Panel B uses lagged cohabitation. Both approaches yield statistically significant, negative estimates.

Subgroup analysis in Table 9 uses lagged cohabitation and follows the approach in Tables 3 and 6 and interacts state EITC rates with current cohabitation status, marital status, education, and race. These results show that the negative effect holds for both currently cohabitating and currently non-cohabitating adults (column 1), though effects are larger for the former. This reduction in cohabitation is largest for individuals most affected by the EITC – those with the lowest education – and is statistically insignificant for those with the most education. Table 9 column 4 shows decreased cohabitation among both nonwhite and white adults, although only white adults are statistically significant. These subgroup responses are similar to results in Tables 3 and 6 and provide evidence that decreased cohabitation coincided with increased marriage. Reductions in cohabitation provides additional evidence that the EITC encourages couples to get – and stay – married.

[25]Cohabitation is directly measured in the PSIDs Transition to Adulthood sample between 2005 and 2013. This sample includes 2,497 individuals, 6,803 individual-year observations, young adults 18 to 27 years old, and is largely a separate set of individuals than the main sample used so far (see Table 1 for sample statistics; 977 observations are in both samples). Using a different set of individuals and a distinct (but related) outcome provides corroborating evidence that the EITC encourages marriage. I did not include this sample of young adults in the main sample because this paper focuses on household heads and many PSID variables are only available for household heads and wives. Previous results are similar if I add these 5,826 person-year-observations not in the main sample.

[26]With this smaller sample and year range, I observe much less variation in $\Delta StateEITC_{(t)-(t-1)}$ and use the related variable $StateEITC_t$ instead.

Most estimates of the EITC on cohabitation find positive effects (Eissa and Hoynes, 2000a; Ellwood, 2000; Dickert-Conlin and Houser, 2002). One possible reason for this difference is that I use data from 2005 to 2013, after the 2003 reduction of the EITC marriage penalty. Another reason could be the way that individual-level panel data precisely accounts for incentives in a context of declining marriage rates and increasing cohabitation.

8. Implications for Stable-Group Composition

If the EITC affects both fertility and marriage, results in this paper may have implications for other EITC research. Many EITC papers use a difference-in-differences (DD) approach, with one of the differences being determined by number of children.[27] However, if number of children and EITC expansions are endogenous, then the stable-group-composition condition required for DD may not be met, and individuals may be endogenously switching from the control to the treatment group. Furthermore, many EITC papers restrict the sample to unmarried women to focus on the population most affected by the EITC. However, if the EITC is affecting marriage, then comparing single women before and after EITC expansions may be problematic and the stable-group-composition condition may not hold.

If the stable-group-composition condition does not hold, whether this would bias these other estimates up or down depends on whether these endogenous switchers have higher or lower relative responses to treatment than other women in the treatment group. It also depends on whether controls can account for these differences.[28] If the EITC does affect group composition, the McCrary test (McCrary, 2008) may be one way to detect this change.

[27] One approach compares women with one versus two children during the 1993 EITC expansion.

[28] For example, if the outcome is labor supply, and if women endogenously switching into the treatment group are more likely to work (since they are response on the fertility margin, perhaps they are also responsive on other margins) then this could result in an overestimate of the effect of the EITC on labor supply.

9. Discussion and Summary

There has long been a concern that public assistance programs may discourage marriage among low-income households. This is an important policy question since marriage is associated with positive health and economic outcomes for adults (Waite, 1995; Sawhill, 2014) and children (McLanahan and Sandefur, 1994; Chetty et al., 2014). Although the EITC provides incentives for some couples to marry and others to not, and some couples to have more children and others to have less, I find a positive average effect on these outcomes over a 30 year period. These results are robust to measuring EITC expansions by state EITC rates or by the total possible federal plus state EITC benefits available.

Heterogeneous responses to the EITC – and numerous changes to the EITC program over time – could help explain why existing evidence on how the EITC affects fertility and marriage has been mixed. I find evidence consistent with the following previous studies: Baughman and Dickert-Conlin (2003) finds an increase in the rate of first births for nonwhite women; Baughman and Dickert-Conlin (2009) finds a decrease in higher-order births for white women; and Duchovny (2001) finds an increase in second children for white-married and nonwhite-unmarried women. Regarding marriage, small negative effects are found by Dickert-Conlin and Houser (2002); Acs (2005); Fisher (2011); Herbst (2011a); Michelmore (2016). Null effects are found by Ellwood (2000) and small positive effects among low-income households are found by Eissa and Hoynes (2003). However, the marriage penalty has decreased over time and the number of low-income couples that face a marriage bonus may now outnumber those that face a marriage penalty (Maag and Acs, 2015).[29]

This paper uses a novel approach to identify the effect of the EITC on both fertility and marriage. Using 30 years of household-level panel data and state-by-year variation in state EITC rates, I control for lagged fertility and marital status to identify the effects of state EITC expansions on the decisions of households to marry and have children.

[29]Though Lin and Tong (2012) show that among cohabitating couples, 48 percent face a marriage penalty and 38 percent face a marriage bonus.

Estimates suggest that a 10-percentage-point increase in state EITC rates led to 2.3- and 1.5-percentage-point increase in the likelihood of having an additional child and being married in the following year. Incorporating federal EITC expansions, I find that a $1,000 (2013 dollars) increase in maximum potential federal and state EITC benefits (determined by state, year, number of children, and independent of earnings) led to a 3.5 and 5-percentage-point increase in these two outcomes. All of these results are robust to various sets of controls, remain positive and evident several years later, and heterogeneous analysis shows that fertility responses are concentrated among households that would be expected to respond to the incentives of the EITC.

These results give pause to growing concerns that the EITC has a negative effect on marriage and arguments against additional expansions of the EITC because of potential marriage disincentives. Finally, I also find positive effects on the interaction of additional fertility and being married, perhaps suggesting that these two outcomes reinforce each other in this context.

References

D. Aaronson, F. Lange, and B. Mazumder. Fertility transitions along the extensive and intensive margins. *American Economic Review*, 104(11):3701–3724, 2014.

G. Acs. Irreconcilable differences?: The conflict between marriage promotion initiatives for cohabiting couples with children and marriage penalties in tax and transfer programs. *Urban Institute*, 2005.

J. Alm, S. Dickert-Conlin, and L. A. Whittington. Policy watch: The marriage penalty. *Journal of Economic Perspectives*, 13(3):193–204, 1999.

J. D. Angrist and W. N. Evans. Children and their parents labor supply: Evidence from exogenous variation in family size. *American Economic Review*, 88(3):450–477, 1998.

S. Averett and Y. Wang. The effects of the earned income tax credit on childrens health, quality of home environment, and non-cognitive skills. *IZA Working Paper*, 2015.

J. Bastian. The rise of working mothers and the 1975 earned income tax credit. Technical report, Working Paper, 2017.

J. Bastian and K. Michelmore. The long run impact of the earned income tax credit on education and employment outcomes. *Journal of Labor Economics*, 2018.

R. Baughman and S. Dickert-Conlin. Did expanding the eitc promote motherhood? *American Economic Review*, 93(2):247–251, 2003.

R. Baughman and S. Dickert-Conlin. The earned income tax credit and fertility. *Journal of Population Economics*, 22(3):537–563, 2009.

M. P. Bitler, J. B. Gelbach, H. W. Hoynes, and M. Zavodny. The impact of welfare reform on marriage and divorce. *Demography*, 41(2):213–236, 2004.

D. A. Black, N. Kolesnikova, S. G. Sanders, and L. J. Taylor. Are children normal? *Review of Economics and Statistics*, 95(1):21–33, 2013.

CBPP. *Center on Budget and Policy Priorities Analysis of the Census Bureau's March 2013 Current Population Survey*, 2014.

H. Chade and G. Ventura. Income taxation and marital decisions. *Review of Economic Dynamics*, 8(3):565–599, 2005.

R. Chetty, J. N. Friedman, and J. E. Rockoff. New evidence on the long-term impacts of tax credits. *IRS Statistics of Income White Paper*, 2011.

R. Chetty, N. Hendren, P. Kline, E. Saez, and N. Turner. Is the united states still a land of opportunity? recent trends in intergenerational mobility. *American Economic Review*, 104(5): 141–147, 2014.

W. S. Cleveland. Robust locally weighted regression and smoothing scatterplots. *Journal of the American Statistical Association*, 74(368):829–836, 1979.

G. B. Dahl and L. Lochner. The impact of family income on child achievement: Evidence from the earned income tax credit. *American Economic Review*, 102(5):1927–1956, 2012.

G. B. Dahl and L. Lochner. The impact of family income on child achievement: Evidence from the earned income tax credit: Reply. *American Economic Review*, 107(2):629–31, February 2017. doi: 10.1257/aer.20161329. URL `http://www.aeaweb.org/articles?id=10.1257/aer.20161329`.

M. Dahl, T. DeLeire, and J. Schwabish. Stepping stone or dead end? the effect of the eitc on earnings growth. *National Tax Journal*, pages 329–346, 2009.

S. Dickert-Conlin and S. Houser. Eitc and marriage. *National Tax Journal*, pages 25–40, 2002.

N. J. Duchovny. *The earned income tax credit and fertility.* PhD thesis, University of Maryland, College Park, 2001.

K. Edin, L. Tach, and S. Halpern-Meekin. Tax code knowledge and behavioral responses among eitc recipients: Policy insights from qualitative data. *Journal of Policy Analysis and Management*, 33(2):413–439, 2014.

N. Eissa and H. Hoynes. Tax and transfer policy, and family formation: Marriage and cohabitation. *University of California, Berkeley. Mimeo*, 2000a.

N. Eissa and H. Hoynes. The hours of work response of married couples: taxes and the earned income tax credit. *Tax policy and labor market performance*, pages 187–228, 2006.

N. Eissa and H. W. Hoynes. Explaining the fall and rise in the tax cost of marriage: The effect of tax laws and demographic trends, 1984-97. *National Tax Journal*, pages 683–711, 2000b.

N. Eissa and H. W. Hoynes. Good news for low-income families? tax-transfer schemes and marriage. *University of California, Berkeley. Mimeo*, 2003.

N. Eissa and J. B. Liebman. Labor supply response to the earned income tax credit. *Quarterly Journal of Economics*, 111(2):605–637, 1996.

D. T. Ellwood. The impact of the earned income tax credit and social policy reforms on work, marriage, and living arrangements. *National Tax Journal*, pages 1063–1105, 2000.
W. N. Evans and C. L. Garthwaite. Giving mom a break: The impact of higher eitc payments on maternal health. *American Economic Journal: Economic Policy*, 6(2):258–290, 2014.
H. Fisher. Marriage penalties, marriage, and cohabitation. *Working Paper*, 2011.
J. Gelbach. When do covariates matter? and which ones, and how much? *Journal of Labor Economics*, 34(2):509–543, 2016.
C. Gibson-Davis, K. Edin, and S. McLanahan. High hopes but even higher expectations: The retreat from marriage among low-income couples. *Journal of Marriage and Family*, 67(5):1301–1312, 2005.
R. Greenstein and C. Staff. Romneys charge that most federal low-income spending goes for overhead and bureaucrats is false. *CBPP*, 2012.
J. Grogger and S. Bronars. The effect of welfare payments on the marriage and fertility behavior of unwed mothers: Results from a twins experiment. *Journal of Political Economy*, 109(3):529–545, 2001.
C. M. Herbst. The earned income tax credit and abortion. *Social Science Research*, 40(6):1638–1651, 2011a.
C. M. Herbst. The impact of the earned income tax credit on marriage and divorce: Evidence from flow data. *Population research and Policy review*, 30(1):101–128, 2011b.
J. Holtzblatt and R. Rebelein. Measuring the effect of the eitc on marriage penalties and bonuses. *National Tax Journal*, pages 1107–1133, 2000.
H. W. Hoyne. Does welfare play any role in female headship decisions? *Journal of Public Economics*, 65(2):89–117, 1997.
H. Hoynes and J. Rothstein. Tax policy toward low-income families. Technical report, National Bureau of Economic Research, 2016.
H. Hoynes, D. Miller, and D. Simon. Income, the earned income tax credit, and infant health. *American Economic Journal: Economic Policy*, 7(1):172–211, 2015.
H. W. Hoynes and A. J. Patel. Effective policy for reducing inequality? the earned income tax credit and the distribution of income. Technical report, National Bureau of Economic Research, 2015.
E. Hurst, G. Li, and B. Pugsley. Are household surveys like tax forms? evidence from income underreporting of the self-employed. *Review of Economics and Statistics*, 96(1):19–33, 2014.
L. E. Jones and K. Michelmore. Timing is money: Does lump-sum payment of tax credits induce high-cost borrowing? *Working Paper*, 2016.
M. Killingsworth and J. Heckman. Female labor supply: A survey. handbook of labor economics,(eds) o. ashenfelter and r. layard, 1986.
S. LaLumia, J. Sallee, and N. Turner. New evidence on taxes and the timing of birth. *American Economic Journal: Economic Policy*, 7(2):258–93, 2015.
A. Leigh. Who benefits from the earned income tax credit? incidence among recipients, coworkers and firms. *BE Journal of Economic Analysis & Policy*, 10(1), 2010.
E. Y. Lin and P. K. Tong. Marriage and taxes: what can we learn from tax returns filed by cohabiting couples? *National Tax Journal*, 65(4):807, 2012.
J. M. Lindo. Are children really inferior goods? evidence from displacement-driven income shocks. *Journal of Human Resources*, 45(2):301–327, 2010.
M. F. Lovenheim and K. J. Mumford. Do family wealth shocks affect fertility choices? evidence from the housing market. *Review of Economics and Statistics*, 95(2):464–475, 2013.
E. Maag and G. Acs. The financial consequences of marriage for cohabiting couples with children. *Urban Institute*, 2015.
D. Manoli and N. Turner. Cash-on-hand and college enrollment: Evidence from population tax data and the earned income tax credit. *American Economic Journal: Economic Policy*, 2018.
J. McCrary. Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of Econometrics*, 142(2):698–714, 2008.
S. McLanahan and G. Sandefur. *Growing Up with a Single Parent. What Hurts, What Helps.* ERIC, 1994.
K. Meckel. Does the eitc reduce birth spacing? *Working Paper*, 2015.
R. Mendenhall, K. Edin, S. Crowley, J. Sykes, L. Tach, K. Kriz, and J. R. Kling. The role of earned income tax credit in the budgets of low-income households. *Social Service Review*, 86(3): 367–400, 2012.
B. D. Meyer. Labor supply at the extensive and intensive margins: The eitc, welfare, and hours

worked. *American Economic Review*, 92(2):373–379, 2002.
B. D. Meyer and D. T. Rosenbaum. Welfare, the earned income tax credit, and the labor supply of single mothers. *Quarterly Journal of Economics*, 116(3):1063–1114, 2001.
K. Michelmore. The earned income tax credit and union formation: The impact of expected spouse earnings. *Review of Economics of the Household*, pages 1–30, 2016.
K. Milligan. Subsidizing the stork: New evidence on tax incentives and fertility. *Review of Economics and Statistics*, 87(3):539–555, 2005.
R. A. Moffitt. *The effect of welfare on marriage and fertility*. Washington, DC: National Academy Press, 1998.
C. Murray. Welfare and the family: The us experience. *Journal of Labor Economics*, 11(1, Part 2): S224–S262, 1993.
A. Nichols and J. Rothstein. The earned income tax credit. *Economics of Means-Tested Transfer Programs in the United States*, 1:137, 2016.
S. Page and M. Larner. Introduction to the afdc program. *The Future of Children*, pages 20–27, 1997.
A. Rachidi. The earned income tax credit and marriage penalties: Does a childless worker expansion make them worse? *AEI*, 2015.
J. Rothstein. Is the eitc as good as an nit? conditional cash transfers and tax incidence. *American Economic Journal: Economic Policy*, 2(1):177–208, 2010.
E. Saez. Optimal income transfer programs: intensive versus extensive labor supply responses. *Quarterly Journal of Economics*, 117(3):1039–1073, 2002.
I. V. Sawhill. *Generation unbound: Drifting into sex and parenthood without marriage*. Brookings Institution Press, 2014.
R. F. Schoeni and R. M. Blank. What has welfare reform accomplished? impacts on welfare participation, employment, income, poverty, and family structure. Technical report, National Bureau of Economic Research, 2000.
N. Shenhav. Bribed to wed? family formation and labor market responses to the gender wage gap. Technical report, Working Paper, 2016.
D. L. Sjoquist and M. B. Walker. The marriage tax and the rate and timing of marriage. *National Tax Journal*, pages 547–558, 1995.
P. J. Smock, W. D. Manning, and M. Porter. everything's there except money: How money shapes decisions to marry among cohabitors. *Journal of Marriage and Family*, 67(3):680–696, 2005.
L. Waite. Does marriage matter? *Demography*, 32(4):483–507, 1995.
L. A. Whittington. Taxes and the family: the impact of the tax exemption for dependents on marital fertility. *Demography*, 29(2):215–226, 1992.
L. A. Whittington. State income tax policy and family size: fertility and the dependency exemption. *Public Finance Quarterly*, 21(4):378–398, 1993.
J. Zhang, J. Quan, and P. Van Meerbergen. The effect of tax-transfer policies on fertility in canada, 1921-88. *Journal of human Resources*, pages 181–201, 1994.

11. Tables and Figures

Table 1: Summary Statistics

	Full Sample				Transition to Adulthood Sample (for Tables 8 and 9)			
Variable	Mean	Std Dev	Min	Max	Mean	Std Dev	Min	Max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	0.26	0.44	0	1	0.50	0.50	0	1
Number of Kids	1.04	1.20	0	11	0.59	0.96	0	11
Years of Education	13.89	2.48	0	18	13.25	3.44	0	18
White	0.77	0.42	0	1	0.74	0.44	0	1
Black	0.16	0.37	0	1	0.00	0.00	0	0
Married	0.58	0.49	0	1	0.17	0.37	0	1
Birth Year	1962.58	9.99	1941	1990	1988.59	2.76	1984	1995
Age	30.00	4.75	21	39	21.29	2.49	18	27
State EITC Rate (% of Federal EITC)	2.41	7.93	0	75	6.08	10.71	0	43
Max Possible Federal + State EITC (2013 $)	1574.9	1779.8	0	8784.1	1828.90	1872.50	399	8089.5
Employed	0.86	0.35	0	1	-	-	-	-
Earned Income of Head (1000s of 2013 $)	39.52	49.73	0	7690.5	-	-	-	-
Family Earned Income (1000s of 2013 $)	50.52	58.70	0	7745.4	-	-	-	-
Number of Observations		76,259				6,803		
Unique Observations		13,533				2,497		

Source: 1980 to 2013 PSID. Observations are 21 to 39 year-old household heads. PSID weights used. Transition to Adulthood sample uses all 18-27 year olds in the PSID's TA sample. Employed and earnings are not given for this sample, many of them live with parents.

Table 2: EITC Increases Likelihood of Having Another Child (in Year t + 2): Similar Effect Across Controls

Panel A: Treatment Variable = Change in State EITC Rates								
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State EITC Rate Change: Year *t-1 to Year t*	0.029***	0.031***	0.028***	0.026***	0.026***	0.026***	0.024***	0.021***
(10-Percentage-Point Units)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
R-squared	0.003	0.029	0.043	0.049	0.049	0.050	0.051	0.126
Panel B: Treatment Variable = Max Possible Federal + State EITC Benefits (2013 $)								
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Annual Level of Max Potential EITC Benefits	0.008***	0.007***	0.032***	0.033***	0.033***	0.033***	0.036***	0.038***
with One More Child ($1000s of 2013 $)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)
R-squared	0.004	0.030	0.046	0.052	0.052	0.052	0.054	0.129
Controls								
Number of Kids in Year *t*	X	X	X	X	X	X	X	X
Head Gender, Married, Race		X	X	X	X	X	X	X
Year FE, Birth Year FE, Age Cubic			X	X	X	X	X	X
State FE, State-Race FE				X	X	X	X	X
Education					X	X	X	X
State-Year Policies and Economic Conditions						X	X	X
State-Specific Time Trends							X	X
Family FE								X
Observations	76,259	76,259	76,259	76,259	76,259	76,259	76,259	76,259
Unique Observations	13,533	13,533	13,533	13,533	13,533	13,533	13,533	13,533
Mean Dependent Variable (Having an Additional Children in Year *t+2*) = 0.178								

Source: 1980 to 2013 PSID. Robust standard errors clustered at the individual level in parentheses. Observations are 21 to 39 year-old household heads. PSID weights used. Each regression represents the effect of a 10 percentage point increase in state EITC benefits (Panel A) or a $1,000 incrase in maximum possible federal plus state EITC benefits (determined by year, state, number of children) on the likelihood of the household having an additional child within two years. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Effect of the EITC on Fertility: Dose Response, Subgroups, and Placebo Tests

Subgroup:	EITC Eligibility	Age	Educ.	Race	All	
Measure of EITC Benefits	State EITC (Fraction of Federal EITC)				Max Federal + State EITC Benefits	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
State EITC Rate Change x Eligible for More EITC Benefits with Another Child	0.029**					
	(0.012)					
State EITC Rate Change x Not Eligible for More EITC Benefits with Another Child	0.017					
	(0.011)					
State EITC Rate Change x Age 21-39		0.024***				
		(0.008)				
State EITC Rate Change x Age 40-59		-0.005				
		(0.003)				
State EITC Rate Change x Low Ed			0.045**			
			(0.022)			
State EITC Rate Change x Medium Ed			0.014			
			(0.010)			
State EITC Rate Change x High Ed			0.029*			
			(0.016)			
State EITC Rate Change x Nonwhite				0.035*		
				(0.018)		
State EITC Rate Change x White				0.022**		
				(0.009)		
Annual Level of Max Potential EITC Benefits with One More Child ($1000s of 2013 $)					0.036***	
					(0.003)	
Annual Change in Max Potential EITC Benefits with One More Child ($1000s of 2013 $)						0.031***
						(0.005)
Observations	76,259	136,016	76,259	76,259	76,259	62,768
Unique Observations	13,533	17,425	13,533	13,533	13,533	13,533
R-squared	0.051	0.072	0.077	0.052	0.054	0.055
P-Value from F-Test for Identical Estimates	0.46	0.0003	0.36	0.52	--	--

Source: 1980 to 2013 PSID. Robust standard errors clustered at the individual level in parentheses. Observations are 21 to 39 year-old household heads, except in column 3 where they are 21 to 59. PSID weights used. Each regression represents the effect of a 10 percentage point increase in state EITC benefits on the likelihood of the household head having an additional child in the following year. Households eligible for more EITC benefits with another child had at most 1 child before 1990, at most 2 children between 1991 and 2008 and at most 3 children after 2009. Max EITC benefits determined by state, year, number of children. Column 6 has less observations since I do not impute max EITC benefits in the year before individuals are first observed (whereas for state EITC rate I do know this, assuming they do not move states). *** p<0.01, ** p<0.05, * p<0.1.

Table 4: EITC Increase Likelihood of Being Married Next Year: Similar Effect Across Controls

Panel A: Treatment Variable = Change in State EITC Rates

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State EITC Rate Change: Year *t-1 to Year t*	0.016***	0.014**	0.014**	0.015***	0.015***	0.015***	0.015**	0.014**
(10-Percentage-Point Units)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
R-squared	0.760	0.770	0.770	0.771	0.772	0.772	0.773	0.785

Panel B: Treatment Variable = Change in Max Federal + State EITC Amount ($100s of 2013 $)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State EITC Rate Change: Year *t-1 to Year t*	0.0050***	0.0050***	0.0054***	0.0055***	0.0055***	0.0055***	0.0055***	0.0054***
(10-Percentage-Point Units)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
R-squared	0.768	0.777	0.778	0.779	0.780	0.780	0.780	0.792
Controls								
Marital Status in Year *t*	X	X	X	X	X	X	X	X
Head Gender, Kids, Race		X	X	X	X	X	X	X
Year FE, Birth Year FE, Age Cubic			X	X	X	X	X	X
State FE, State-Race FE				X	X	X	X	X
Education					X	X	X	X
State-Year Policies and Economic Conditions						X	X	X
State-Specific Time Trends							X	X
Family FE								X
Observations	76,259	76,259	76,259	76,259	76,259	76,259	76,259	76,259
Unique Observations	13,533	13,533	13,533	13,533	13,533	13,533	13,533	13,533

Mean Dependent Variable (Married in Year *t+1*) = 0.51

Source: 1980 to 2013 PSID. Robust standard errors clustered at the individual level in parentheses. Observations are 21 to 39 year-old household heads. PSID weights used. Each regression represents the effect of a 10 percentage point increase in state EITC benefits on the likelihood of the household head being married in the following year. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: State EITCs Increase Marriage Formation and Marriage Stability

Sample of Household Heads:	All	Currently Married	Never Married	Currently Divorced	All
VARIABLES	(1)	(2)	(3)	(4)	(5)
State EITC Rate Change: Year *t-1 to Year t*	0.015**	0.006	0.023**	0.028	
(10-Percentage-Point Units)	(0.006)	(0.004)	(0.012)	(0.022)	
State EITC Rate Change x Married					0.002
					(0.005)
State EITC Rate Change x Never Married					0.030**
					(0.012)
State EITC Rate Chnage x Previously Married					0.021
					(0.017)
Observations	76,259	39,112	24,989	7,216	76,259
Unique Observations	13,533	7,124	2,252	1,918	13,533
R-squared	0.772	0.058	0.089	0.142	0.773
Mean Dependent Variable (Married in Year *t+1*)	0.55	0.95	0.06	0.06	0.55

Source: 1980 to 2013 PSID. Robust standard errors clustered at the individual level in parentheses. Observations are 21 to 39 year-old household heads. PSID weights used. Each regression represents the effect of a 10 percentage point increase in state EITC benefits on the likelihood of the household head being married in the following year. Previously married includes divorced, widowed, and separated. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Effect of the EITC on Marriage: Subgroups, Dose Response, and Placebo Tests

Subgroup:	Age	Education	Race	Ever EITC-Eligible	Never EITC-Eligible	All
Measure of EITC Benefits:	State EITC (Fraction of Federal EITC)			Max Federal + State EITC Benefits		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
State EITC Rate Change x Age 21-39	0.015***					
	(0.005)					
State EITC Rate Change x Age 40-59	-0.004					
	(0.004)					
State EITC Rate Change x Low Ed		0.009				
		(0.007)				
State EITC Rate Change x Medium Ed		0.025**				
		(0.011)				
State EITC Rate Change x High Ed		0.012				
		(0.011)				
State EITC Rate Change x Nonwhite			0.011			
			(0.010)			
State EITC Rate Change x White			0.016**			
			(0.007)			
Annual Level of Max Potential EITC				0.007***	-0.002	
Benefits ($1000s of 2013 $)				(0.002)	(0.002)	
Annual Change in Max Potential EITC						0.005***
Benefits ($100s of 2013 $)						(0.001)
Observations	136,016	76,259	76,259	39,017	37,242	76,259
Unique Observations	17,425	13,533	13,533	6,483	7,050	5,646
R-squared	0.817	0.772	0.772	0.750	0.789	0.780
P-Value from F-Test for Identical Estimates	0.003	0.33	0.68	-	-	-

Source: 1980 to 2013 PSID. Robust standard errors clustered at the individual level in parentheses. Observations are 21 to 39 year-old household heads, except in column 3 where they are 21 to 59. PSID weights used. Each regression represents the effect of a 10 percentage point increase in state EITC benefits on the likelihood of the household head having an additional child in the following year. Max potential EITC benefits is based on state, year, and current number of kids. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Effect of State EITC on Intermediate Outcomes

Outcome:	Increased Female Labor Supply			Increased EITC Benefits (Federal + State EITC in 1000s of 2013 $)			Less Stress
Dependent Variable:	Employed	Annual Work Weeks	Weekly Work Hours	Max Potential EITC Benefits	Estimated EITC Benefits	Estimated Additional EITC Benefits with One More Child	Psych. Distress: Scale 0-24
Panel A: Pooling Male and Female Household Heads							
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
State EITC Rate	0.004	0.44**	0.29*	235.0***	71.6***	92.7***	-0.49*
(10-Percentage-Point Units)	(0.005)	(0.20)	(0.17)	(20.9)	(12.6)	(13.7)	(0.26)
Observations	76,259	73,311	67,215	76,259	76,259	76,259	13,302
R-squared	0.118	0.149	0.041	0.721	0.203	0.261	0.10
Mean dependent variable:	0.82	40.95	45.51	1.87	0.41	0.27	3.82
Panel B: Estimating Effects Separately for Male and Female Household Heads							
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
State EITC Rate x Male Household Head	-0.003	0.23	0.10	238.6***	46.0***	69.5***	-0.63**
	(0.005)	(0.20)	(0.17)	(22.2)	(13.5)	(16.4)	(0.27)
State EITC Rate x Female Household Head	0.023***	1.04***	0.89***	225.0***	142.8***	157.0***	-0.19
	(0.008)	(0.40)	(0.30)	(40.1)	(34.3)	(26.8)	(0.28)
Observations	76,259	73,311	67,215	76,259	76,259	76,259	13,302
R-squared	0.119	0.150	0.041	0.721	0.205	0.262	0.10
Mean dependent variable:	0.75	38.24	44.16	2.36	0.76	0.33	4.19

Source: 1980 to 2013 PSID. Robust standard errors clustered at the individual level in parentheses. Observations are 21 to 39 year-old household heads. PSID weights used. Each regression represents the effect of a 10 percentage point increase in state EITC benefits on each outcome. Max potential EITC benefits determined by state, year, number of children. Estimated EITC benefits determined by state, year, number of children, marital status, and household earnings. Additional EITC benefits with one more child assumes household earnings do not change. Psychological distress from the PSID's Transition to Adulthood subsample and was developed by Dr. Ronald Kessler, Professor of Healthcare Policy at Harvard Medical School. Details found here: https://simba.isr.umich.edu/cb.aspx?vList=TA050938. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: State EITCs Decrease Likelihood of Cohabitating Next Year: Similar Effect Across Controls

Panel A: Dependent Variable = Contemporaneous Cohabitation								
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State EITC Rate	-0.007	-0.005	-0.012	-0.012*	-0.012*	-0.014*	-0.015**	-0.017
(10-Percentage-Point Units)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.008)	(0.007)	(0.011)
Observations	6,803	6,803	6,803	6,803	6,803	6,803	6,803	6,803
Unique Observations	2,497	2,497	2,497	2,497	2,497	2,497	2,497	2,497
R-squared	0.023	0.029	0.051	0.063	0.064	0.065	0.079	0.306
Mean Dependent Variable (Cohabitating in Year *t+1*) = 0.140								
Panel B: Dependent Variable = Lagged Cohabitation								
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State EITC Rate	-0.038***	-0.034***	-0.025***	-0.024***	-0.024***	-0.028***	0.040	-0.034***
(10-Percentage-Point Units)	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)	(0.008)	(0.036)	(0.012)
Observations	4,308	4,308	4,308	4,308	4,308	4,308	4,308	4,308
Unique Observations	1,974	1,974	1,974	1,974	1,974	1,974	1,974	1,974
R-squared	0.096	0.101	0.105	0.118	0.118	0.122	0.134	0.389
Mean Dependent Variable (Cohabitating in Year *t+1*) = 0.168								
Controls								
State FE	X	X	X	X	X	X	X	X
Gender, Kids, Race		X	X	X	X	X	X	X
Year FE, Birth Year FE, Age Cubic			X	X	X	X	X	X
State-Race FE				X	X	X	X	X
Education					X	X	X	X
State-Year Policies and Economic Conditions						X	X	X
State-Specific Time Trends							X	X
Family FE								X

Source: 2005 to 2013 PSID. Robust standard errors clustered at the individual level in parentheses. Sample contains all individuals in the PSID Transition to Adulthood sample (17 to 27 years old). PSID weights used. Each regression represents the effect of an additional 10 percentage points of state EITC benefits on the likelihood of cohabitation in the following year. *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Effect of State EITCs on Cohabitation for Various Subgroups

Dependent Variable:	Lagged Cohabitation			
Subgroup:	Current Cohab Status	Current Marital Status	Education	Race
VARIABLES	(1)	(2)	(3)	(4)
State EITC Rate x Currently Cohab.	-0.047*			
	(0.026)			
State EITC Rate x Currently Not Cohab.	-0.025***			
	(0.008)			
State EITC Rate x Currently Married		-0.061***		
		(0.014)		
State EITC Rate x Currently Unmarried		-0.019**		
		(0.008)		
State EITC Rate x Low Ed.			-0.036***	
			(0.009)	
State EITC Rate x Med. Ed.			-0.029*	
			(0.016)	
State EITC Rate x High Ed.			-0.007	
			(0.014)	
State EITC Rate x Nonwhite				-0.016
				(0.028)
State EITC Rate x White				-0.029***
				(0.009)
Controls from Table 6 Column 6	X	X	X	X
Observations	4,308	4,308	4,308	4,308
Unique Observations	1,915	1,915	1,915	1,915
R-squared	0.122	0.125	0.126	0.122

Source: 2005 to 2013 PSID. Robust standard errors clustered at the individual level in parentheses. Sample contains all individuals 18-27 in the PSID Transition to Adulthood sample. PSID weights used. Each regression represents the effect of an additional 10 percentage points of state EITC benefits on the likelihood of cohabitating in the following year. Effects are similar, but less precise, for contemporaneous cohabitation. *** p<0.01, ** p<0.05, * p<0.1.

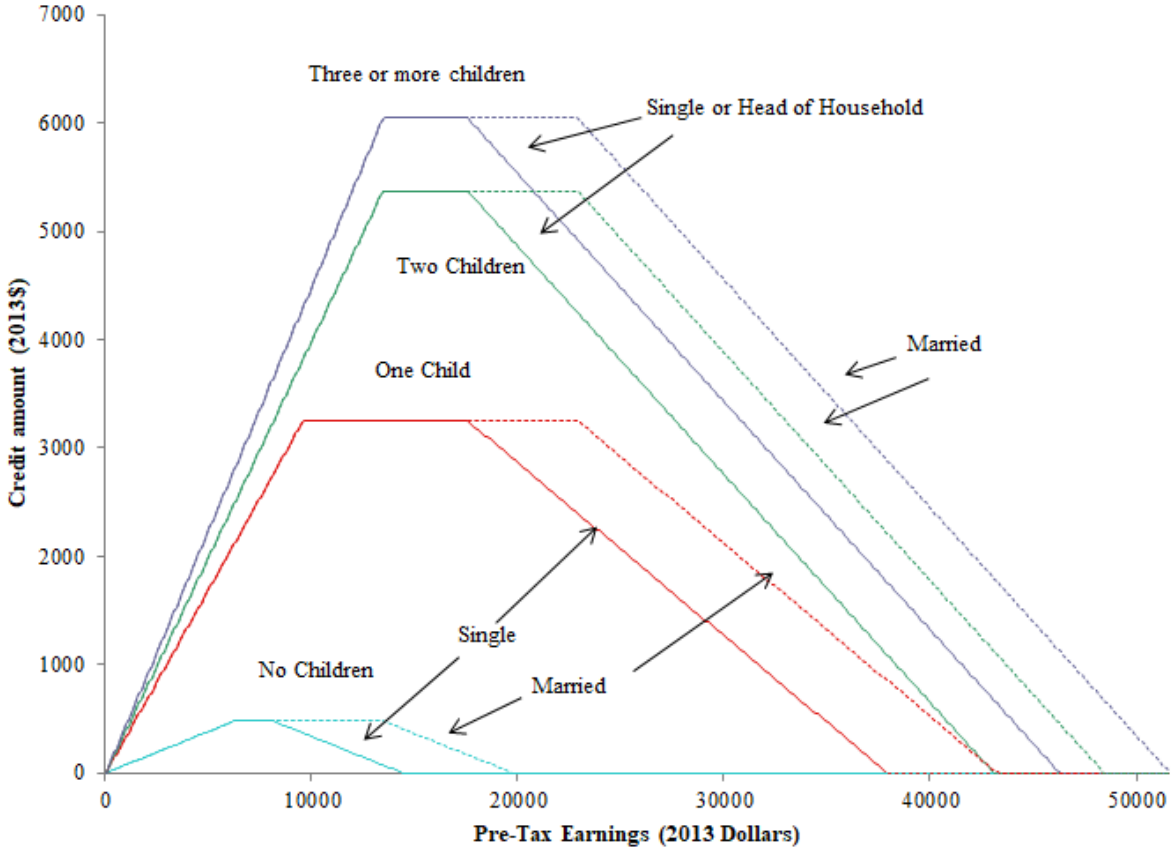

Fig. 1. 2013 EITC Schedule by Number of Children and Marital Status

Notes: Bastian and Michelmore (2017).

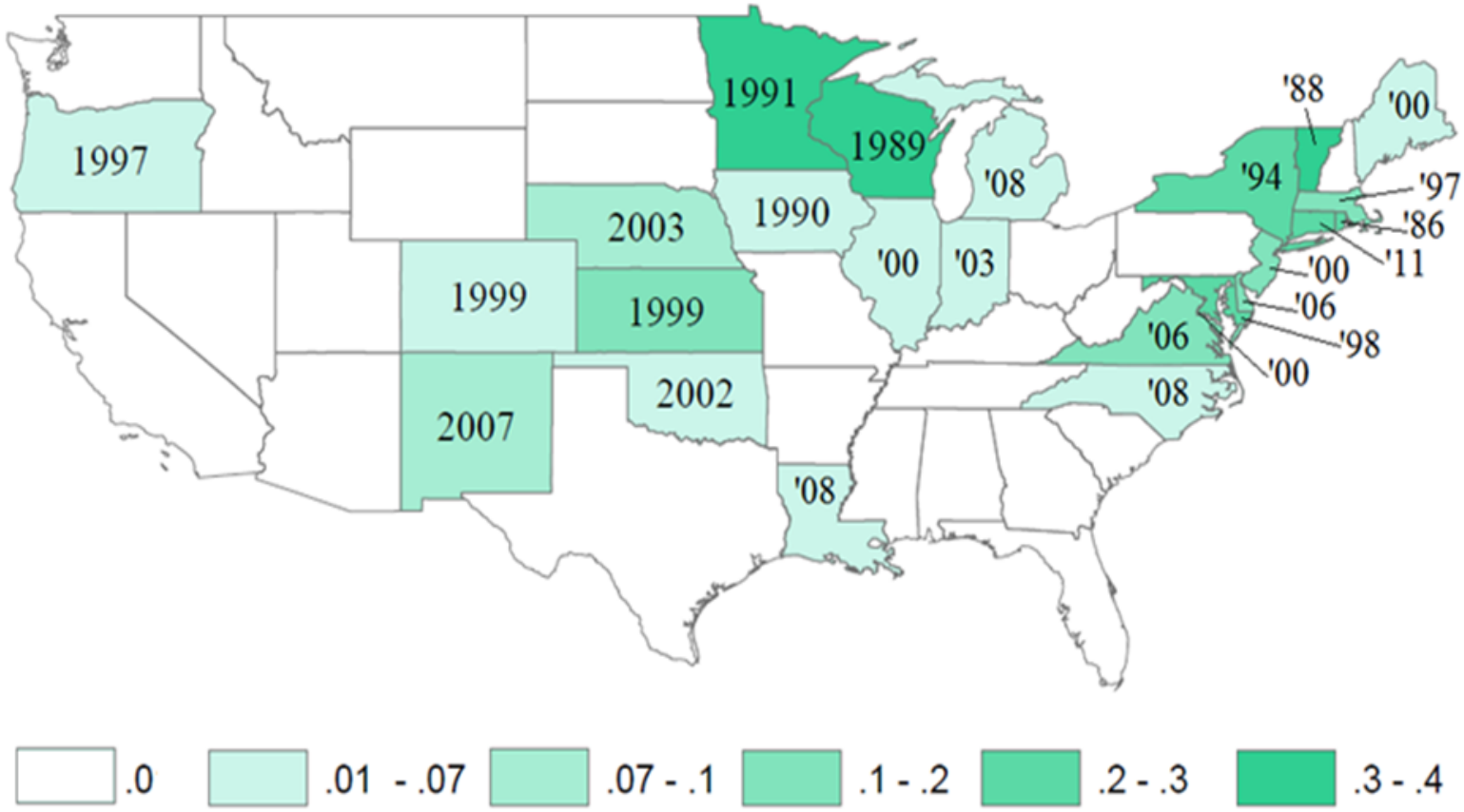

Fig. 2. State EITC Benefits in 2013 (as a Fraction of Federal EITC) and Year of Enactment

Notes: Author's calculations from IRS data.

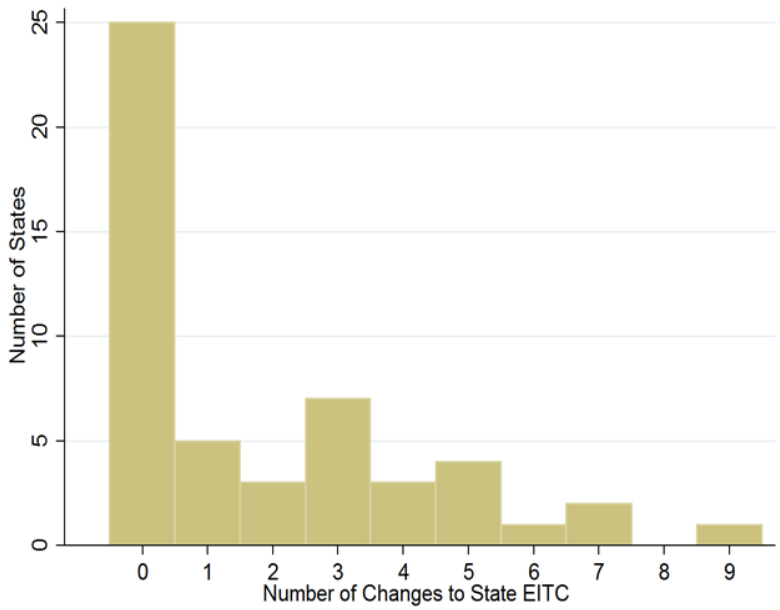

Fig. 3. Number of Times that States Have Changed Their EITC Program

Notes: Author's calculations from IRS data.

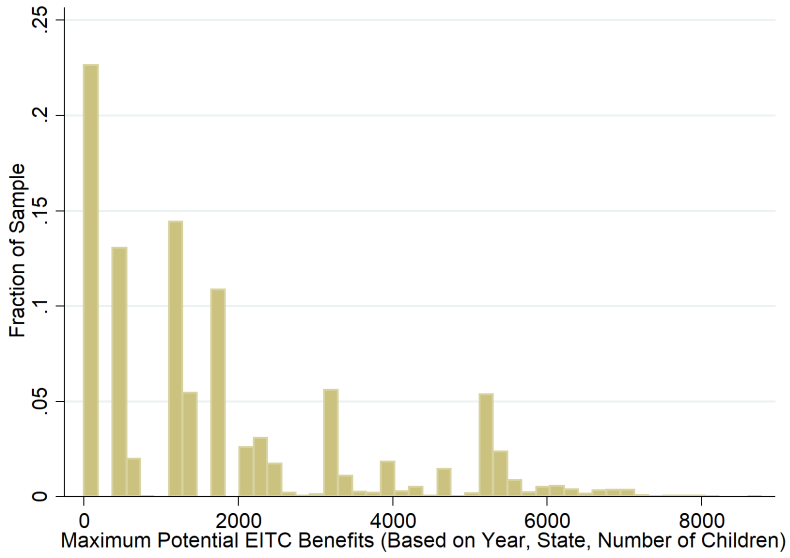

Fig. 4. Variation in Maximum Potential Federal + State EITC Benefits

Notes: PSID data and main sample used. Maximum potential EITC benefits is determined by state, year, number of children, and is independent of earnings.

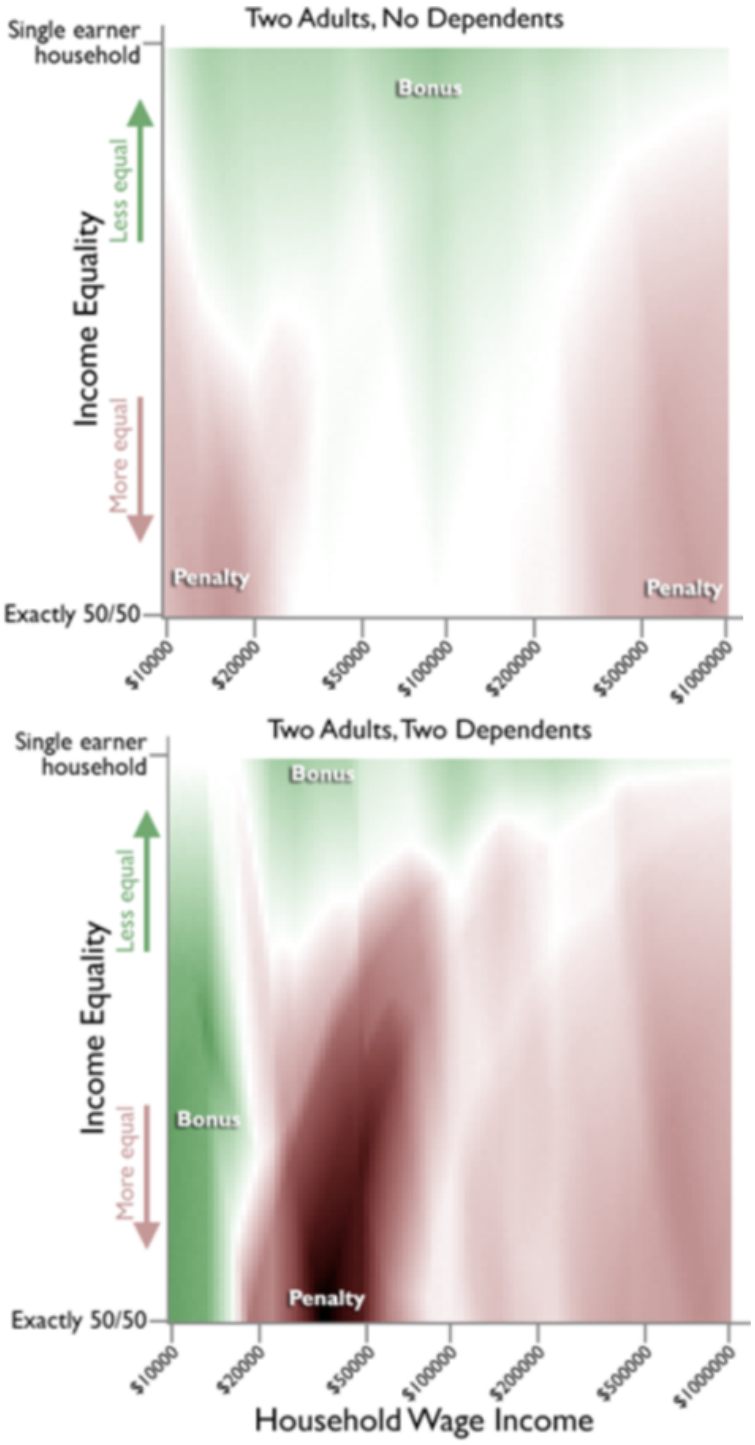

Fig. 5. Marriage Tax Bonus or Penalty Depends on Distribution of Earnings within a Couple

Source: `https://taxfoundation.org/marriage-penalties-and-bonuses-families-children-edition/` accessed 1/25/2017.

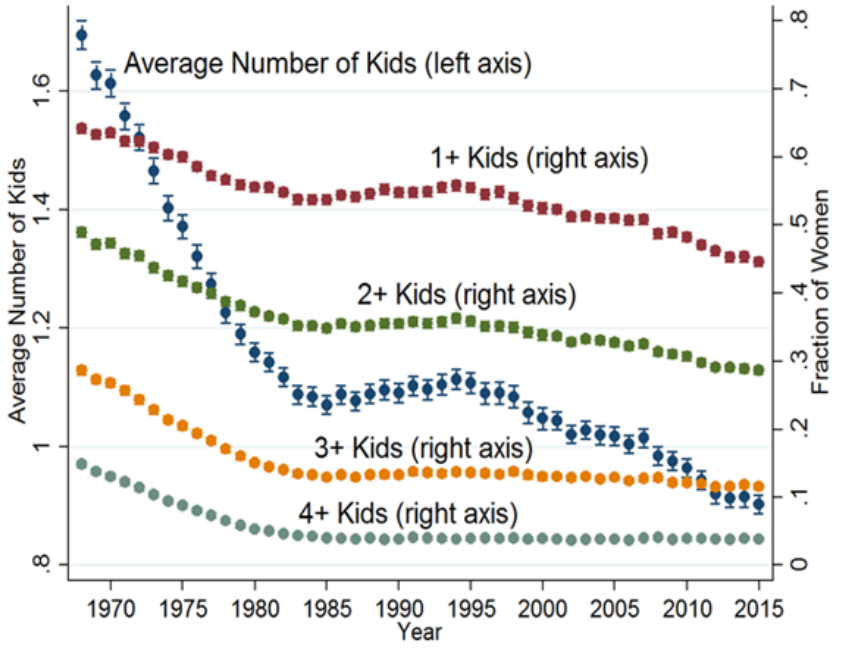

Fig. 6.A. Number of Children has Been Declining for 50 Years

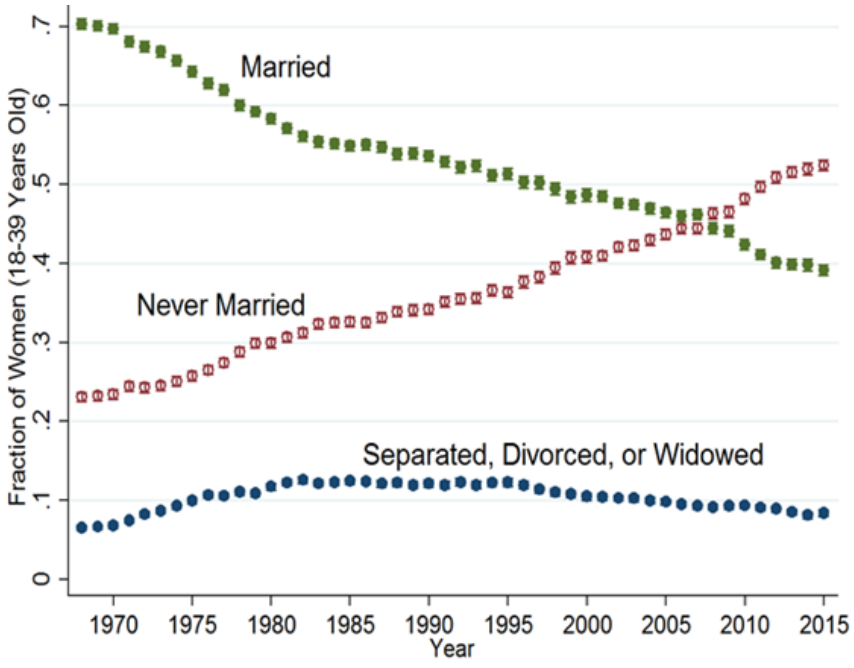

Fig. 6.B. Marriage Rates Have Been Declining for 50 Years

Notes: 1968 to 2015 March Current Population Survey. 95% confidence interval shown for robust standard errors clustered at the state level. Observations are 18 to 40 year-old women.

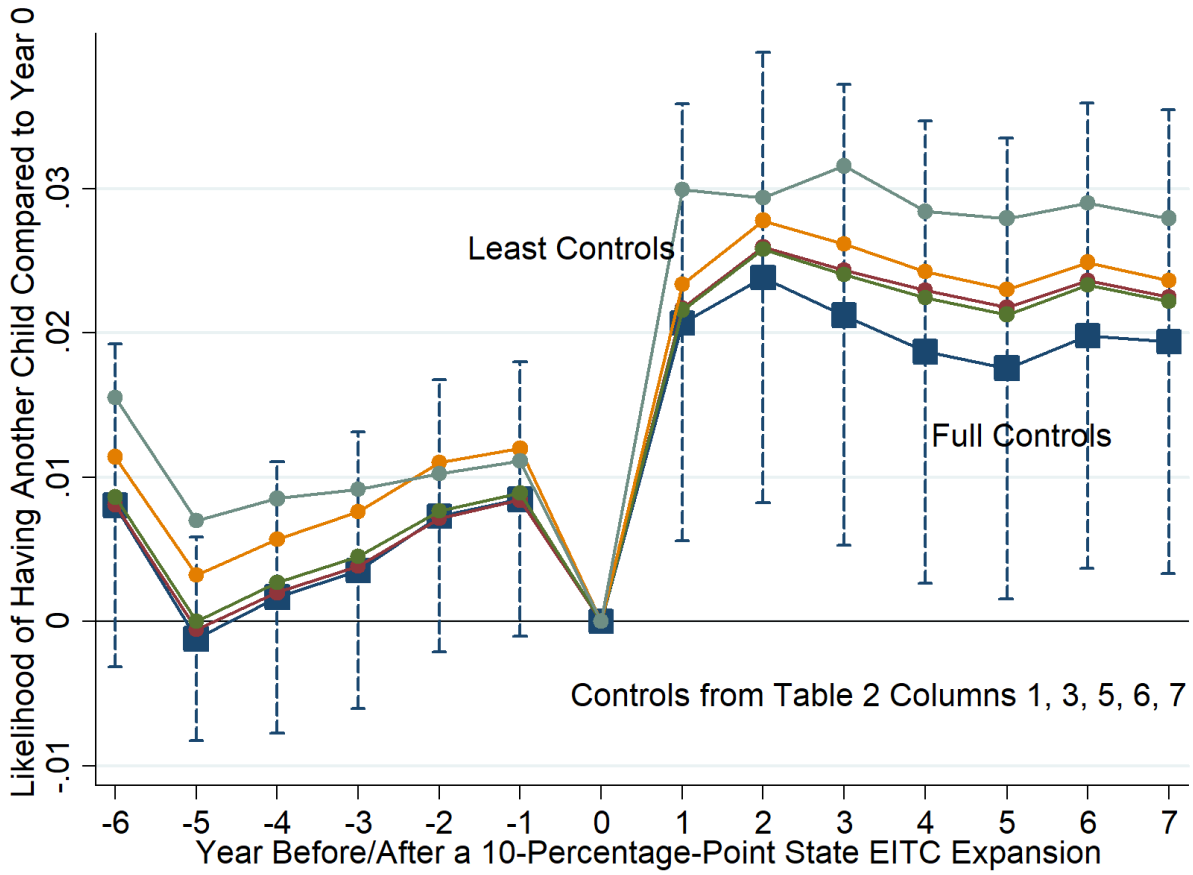

Fig. 7. Effect of State EITCs on Household Number of Children, Event Study

Notes: 1980 to 2013 PSID. Observations are 21 to 39 year-old household heads. PSID weights used. 95% confidence interval shown for robust standard errors clustered at the state level. Each regression represents the effect of a 10 percentage point increase in state EITC benefits on the number of children observed in the household, before or after the EITC rate change. Mean dependent variables (from t = -6 to t = 7) are 0.03, 0.05, 0.05, 0.05, 0.05, 0.04, 0.000, 0.127, 0.178, 0.227, 0.246, 0.264, 0.271, and 0.279, which means that the results as percentage effects are 30.2, 2.6, 3.5, 7.1, 15.6, 19.4, 0.0, 16.4, 13.4, 9.3, 7.6, 6.7, 7.3, and 7.0 percent.

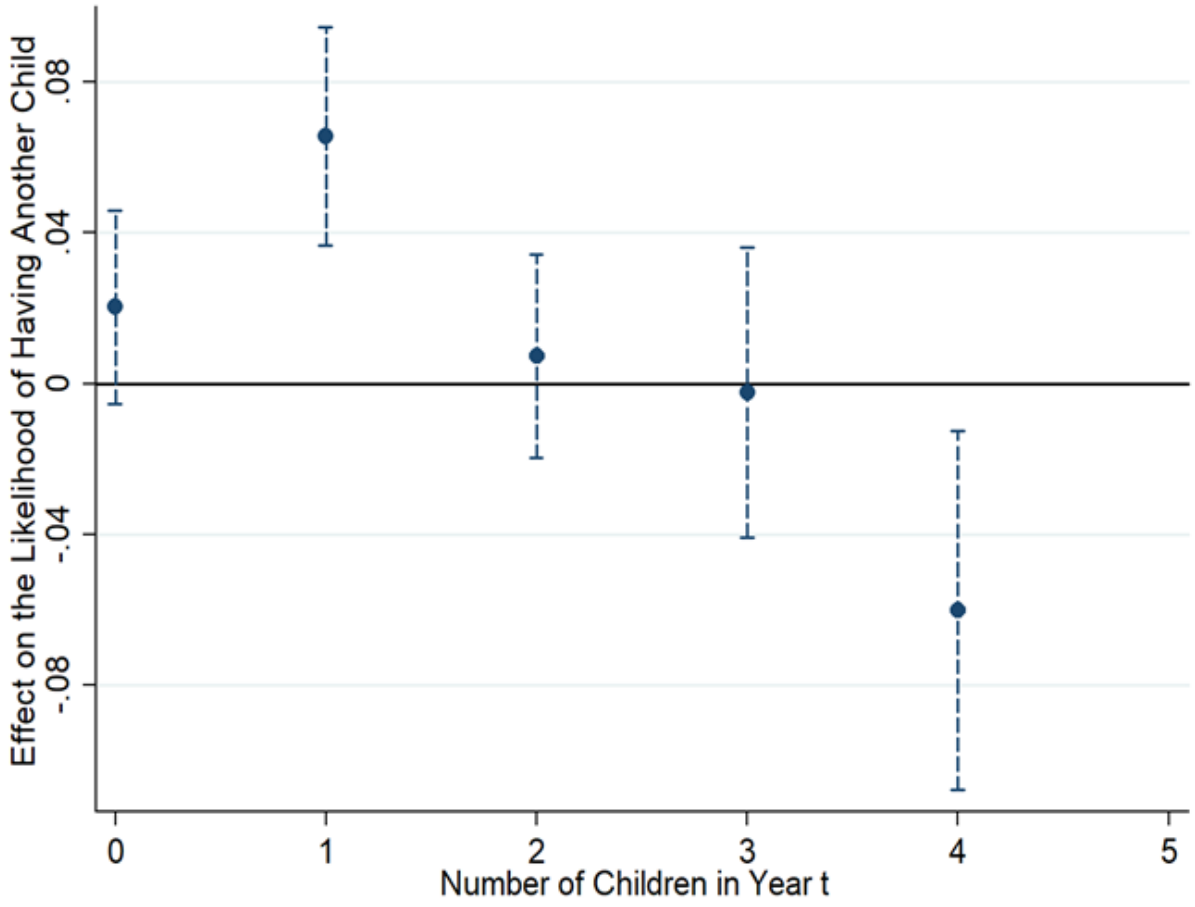

Fig. 8. EITC Has Postive Fertility Effect for Some, But Negative Effect on Higher-Order Fertility

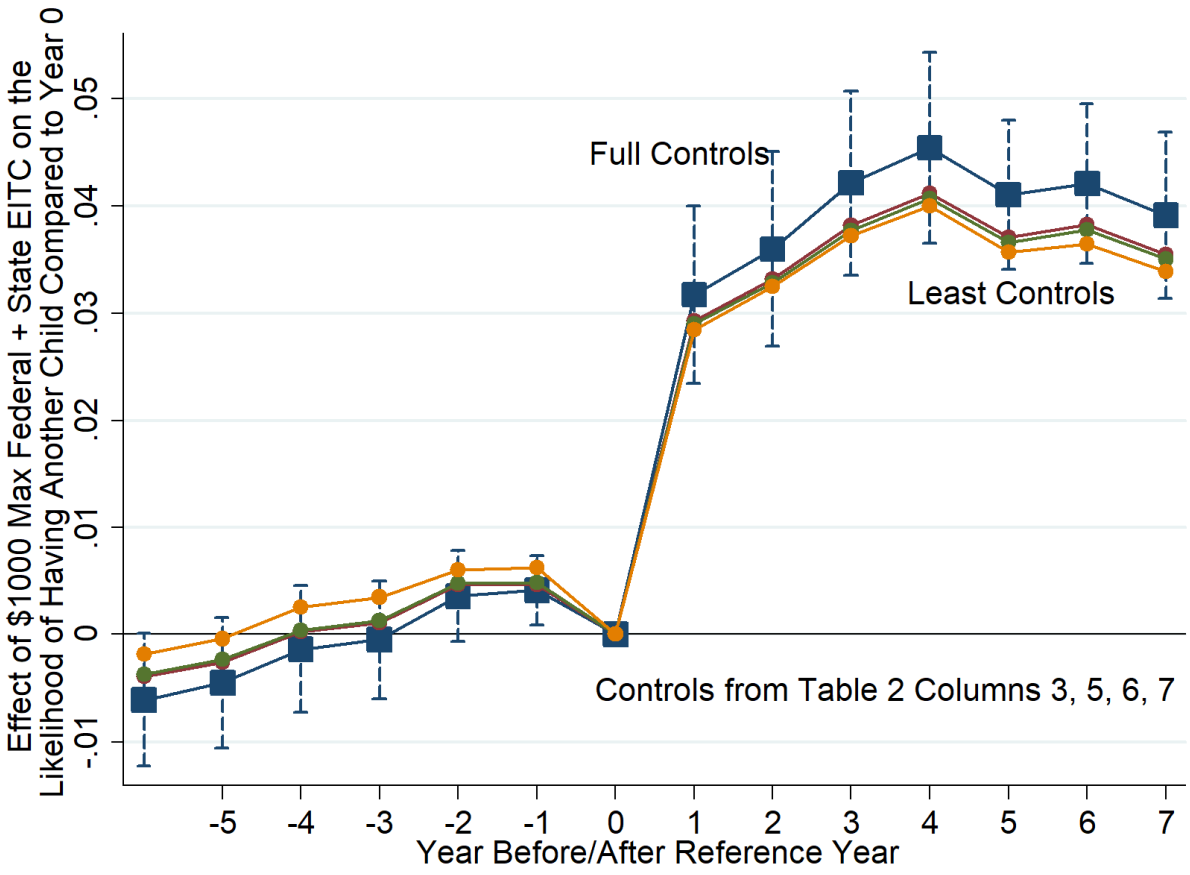

Fig. 9. Effect of Federal + State EITC on Household Number of Children, Event Study

Notes: See notes in Figure 7. Maximum federal and state EITC determined by year, state, number of children, and is independent of earnings. Max EITC in levels.

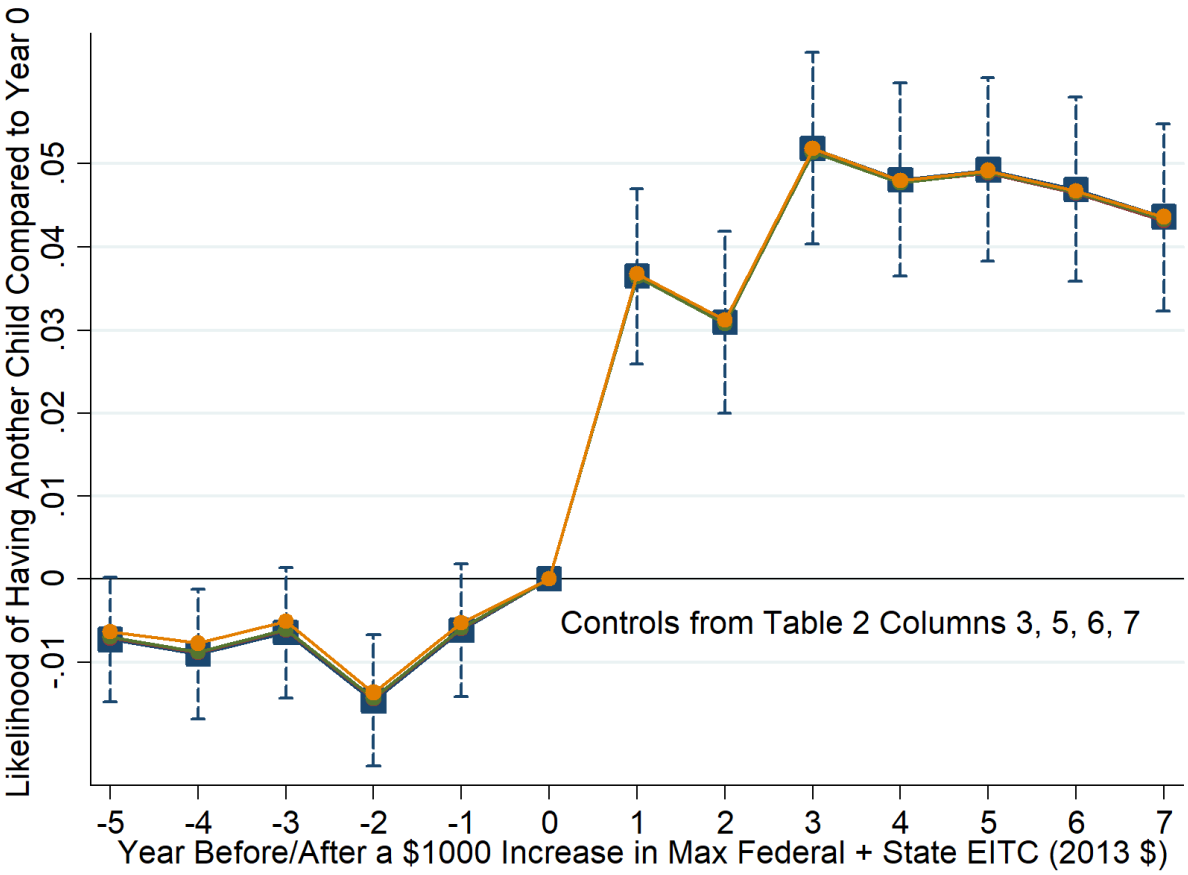

Fig. 10. Effect of Federal + State EITC on Household Number of Children, Event Study

Notes: See notes in Figure 7. Maximum federal and state EITC determined by year, state, number of children, and is independent of earnings. Max EITC in year on year change.

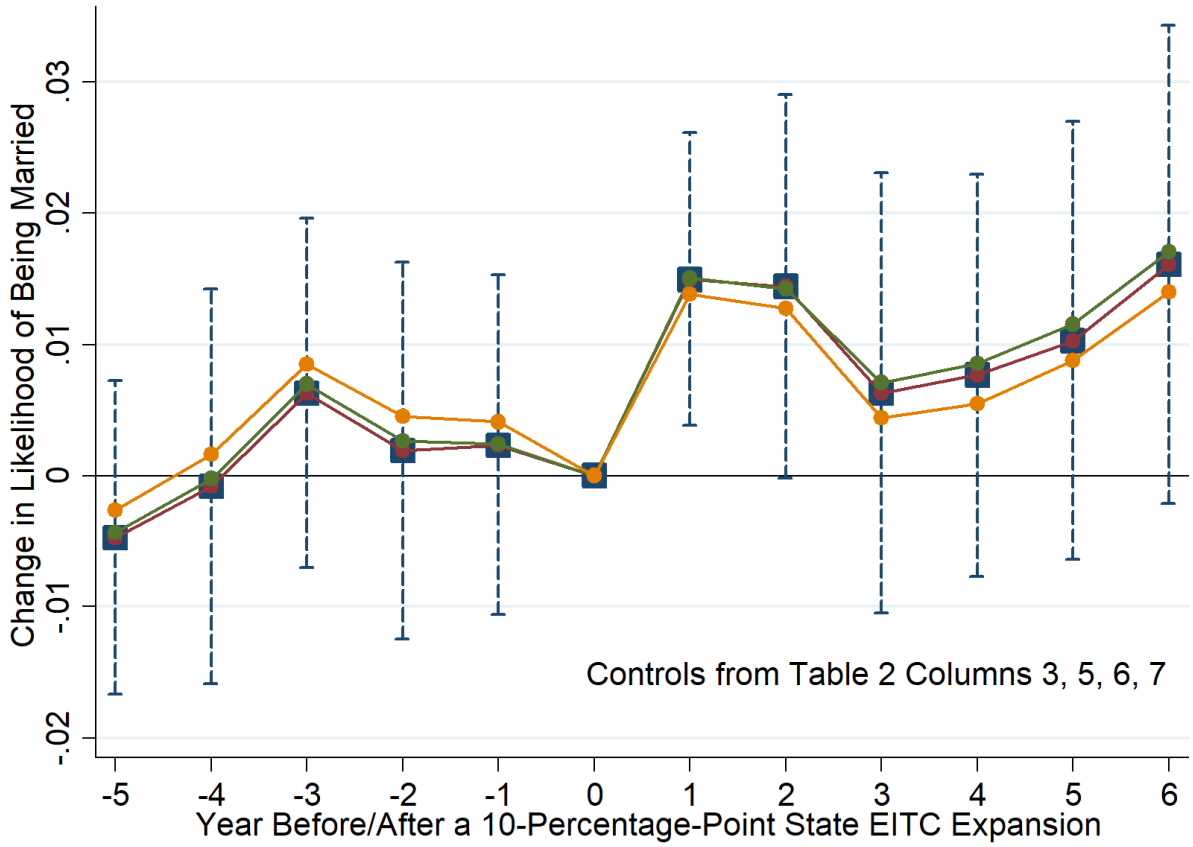

Fig. 11. Effect of State EITCs on Marriage, Event Study

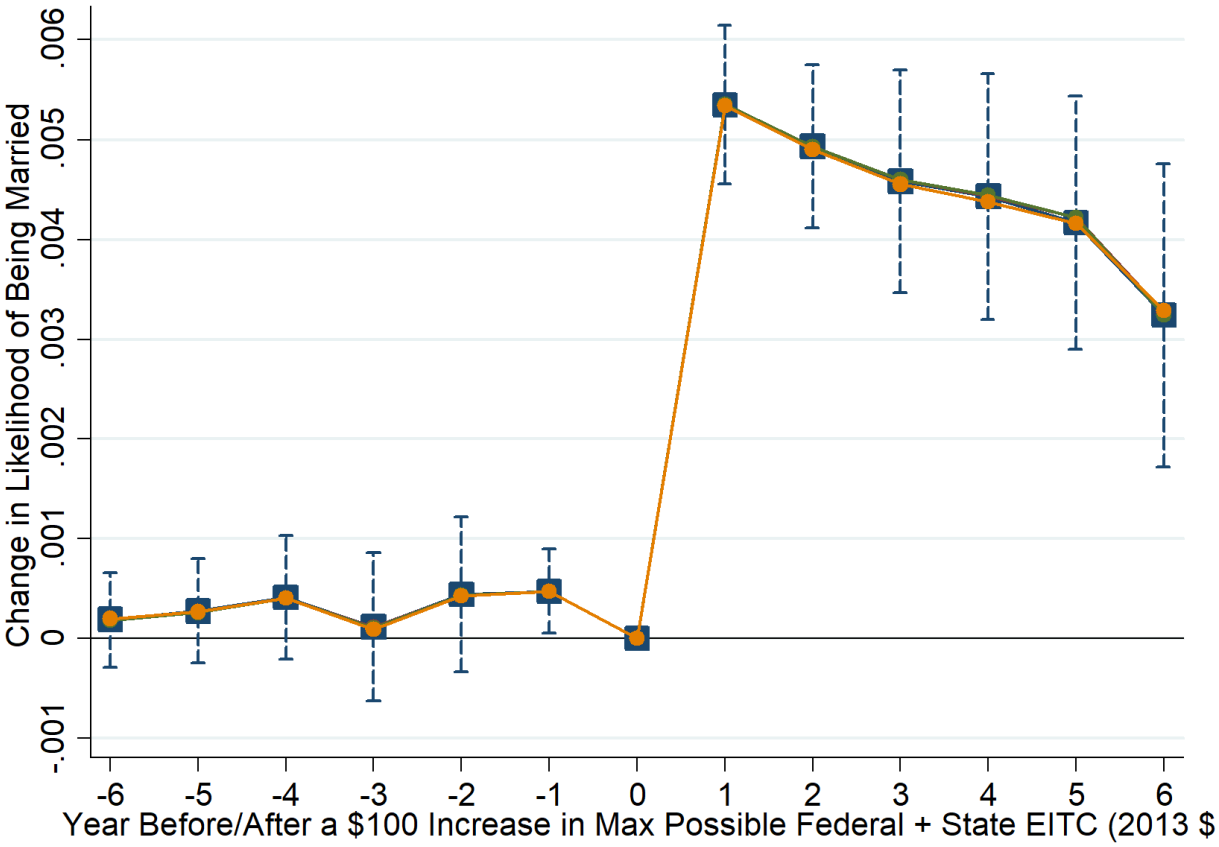

Fig. 12. Effect of Federal + State EITC on Marriage, Event Study

Appendix: Additional Tables and Figures

Appendix Table A1: Testing Exogeneity of State EITC Rates

Dependent Variable = State EITC Rate			
Weight:	None	Sum of PSID Weights in Main Sample (State-Year Cells)	Sum of PSID Weights in Main Sample (State Cells)
Mean Dependent Variable:	0.053	0.053	0.052
VARIABLES	(1)	(2)	(3)
State GDP per Capita	0.008	0.038	0.035
(in $1000s)	(0.063)	(0.099)	(0.099)
Lagged State GDP per Capita	0.058	0.100	0.107
(in $1000s)	(0.067)	(0.082)	(0.086)
Unemployment Rate	-0.001	-0.007	-0.006
	(0.004)	(0.006)	(0.006)
Lagged Unemployment Rate	-0.008*	-0.009*	-0.009*
	(0.004)	(0.005)	(0.005)
Top Marginal Income Tax Rate	0.005	0.008	0.009
	(0.006)	(0.006)	(0.006)
Lagged Top Marginal Income Tax Rate	0.002	0.001	0.001
	(0.003)	(0.004)	(0.004)
Real Minimum Wage	-0.005	-0.010	-0.009
	(0.005)	(0.007)	(0.007)
Lagged Real Minimum Wage	-0.004	-0.001	-0.003
	(0.004)	(0.004)	(0.004)
Maximum Monthly Welfare Benefits for a	0.009	0.008	0.010
Family of 3 (in $100s)	(0.007)	(0.009)	(0.010)
Maximum Monthly Welfare Benefits for a	-0.010	-0.008	-0.007
Family of 3 (in $100s)	(0.007)	(0.008)	(0.009)
Higher Education Spending	-0.007	-0.014	-0.012
	(0.007)	(0.009)	(0.009)
Lagged Higher Education Spending	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
State Tax Revenue	-0.001	-0.001	-0.002
(in millions of 2013 dollars)	(0.001)	(0.001)	(0.001)
Lagged State Tax Revenue	0.000	0.000	0.000
(in millions of 2013 dollars)	(0.000)	(0.001)	(0.001)
State and Year Fixed Effects	X	X	X
P-Value from Joint F-Test (Excluding FE)	0.352	0.141	0.200
Observations	1,071	1,071	1,071
R-squared	0.834	0.803	0.806

Source: Dependent variable is state EITC rates as a fraction of federal EITC (between 0 and 1). Observations are at the state-year level and span 1992 to 2013. Unemployment rates from BLS. GDP from BEA regional data. Tax data from the NBER. Minimum wage from the Tax Policy Center's Tax Facts. Spending on higher education from the State Higher Education Executive Officers. Welfare benefits from the Urban Institute's Welfare Rules Database. *** p<.01 ** p<.05 * p<.10

Appendix Table A2: Transition Matrix for Fertility and Marital Status

Panel A: Number of Children

	# Kids in Year *t+1*					
# Kids in Year *t*	0	1	2	3	4+	Total
0	25,124	3,015	484	161	60	28,844
1	877	12,168	3,000	203	32	16,280
2	511	774	15,582	1,635	122	18,624
3	196	104	642	7,066	673	8,681
4+	87	28	93	359	3,263	3,830
Total	26,795	16,089	19,801	9,424	4,150	76,259

Panel B: Marital Status

	Marital Status in Year *t+1*					
Marital Status in Year *t*	Married	Not Married	Widowed	Divorced	Separated	Total
Married	36,692	90	63	777	1,490	39,112
Not Married	1,600	22,720	22	322	325	24,989
Widowed	19	10	427	7	5	468
Divorced	570	218	17	6,215	196	7,216
Separated	329	94	22	1,172	2,857	4,474
Total	39,210	23,132	551	8,493	4,873	76,259

Source: Author's calculation from 1980 to 2013 PSID using the main sample of household heads 21 to 39 year-old.

Appendix Table A3: Results Robust to Defining New Children According to Age of Youngest Child

Age Upper Bound of Youngest Child	None	6	5	4	3	2	1
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
State EITC Rate Change: Year *t-1 to Year t*	0.024***	0.021***	0.021***	0.021***	0.017**	0.017**	0.014*
(10-Percentage-Point Units)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)
Observations	76,259	76,259	76,259	76,259	76,259	76,259	76,259
Unique Observations	13,533	13,533	13,533	13,533	13,533	13,533	13,533
R-squared	0.051	0.054	0.054	0.054	0.054	0.054	0.054
Mean Dependent Variable	0.173	0.165	0.164	0.162	0.16	0.158	0.155

Source: 1980 to 2013 PSID. Robust standard errors clustered at the state level in parentheses. Observations are 21 to 39 year-old household heads. PSID weights used. Each regression represents the effect of a 10 percentage point increase in state EITC benefits on the likelihood of the household having an additional child in the following year. Results in column 7 may be attenuated because PSID data is every other year beginning in 1997 and may not observe infants at or below age 1. *** p<0.01, ** p<0.05, * p<0.1.

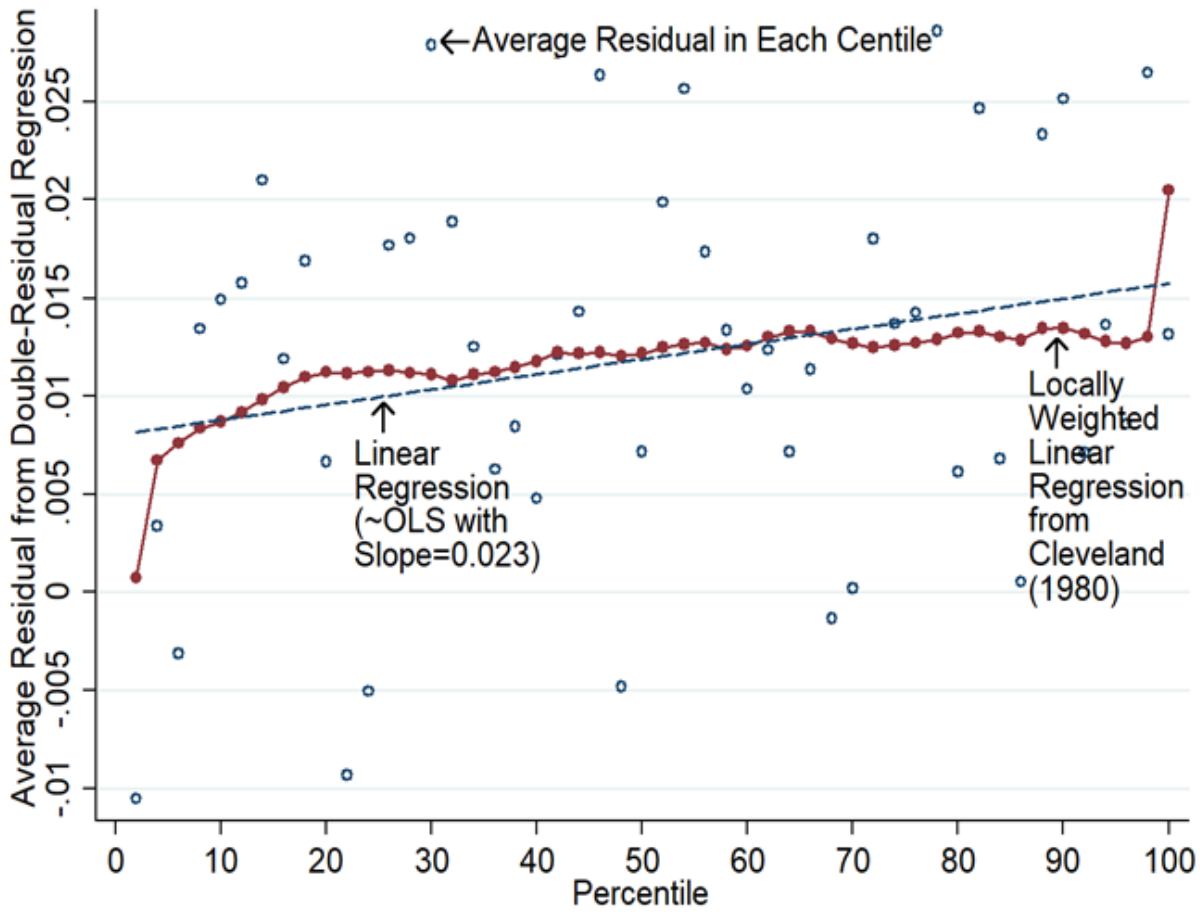

Fig. A1. State EITC Increases Fertility, Locally Weighted Double-Residual Regression

1980 to 2013 PSID. Observations are 21 to 39 year-old household heads. PSID weights used. Residuals are averaged into 50 quantiles. The linear best fit line and locally weighted linear regression uses all the original residuals. Locally weighted regression is from Cleveland (1979) and differs from regular local polynomial regression as it downweights observations with large residuals. A bandwidth of 0.8 is used, running-line least squares smoothing, and Cleveland (1979)'s tricube weighting function. The non-parametric regression shown approximates linear OLS estimate quite closely except for the highest and lowest values of state EITC benefits. However, boundary bias is a common issue with these methods.

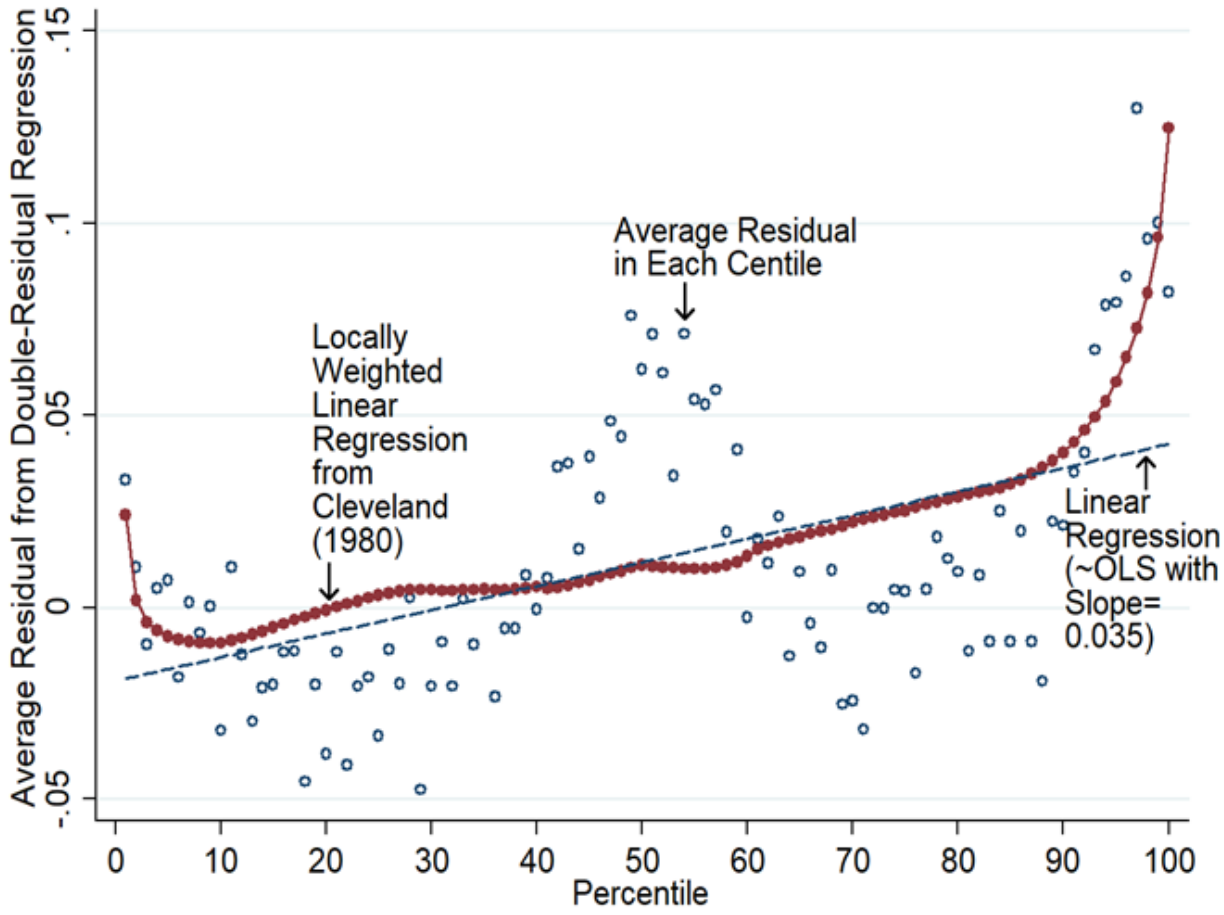

Fig. A2. State EITC Increases Fertility, Locally Weighted Double-Residual Regression

1980 to 2013 PSID. Observations are 21 to 39 year-old household heads. PSID weights used. Residuals are averaged into 50 quantiles. The linear best fit line and locally weighted linear regression uses all the original residuals. Locally weighted regression is from Cleveland (1979) and differs from regular local polynomial regression as it downweights observations with large residuals. A bandwidth of 0.8 is used, running-line least squares smoothing, and Cleveland (1979)'s tricube weighting function. The non-parametric regression shown approximates linear OLS estimate quite closely except for the highest and lowest values of state EITC benefits. However, boundary bias is a common issue with these methods.

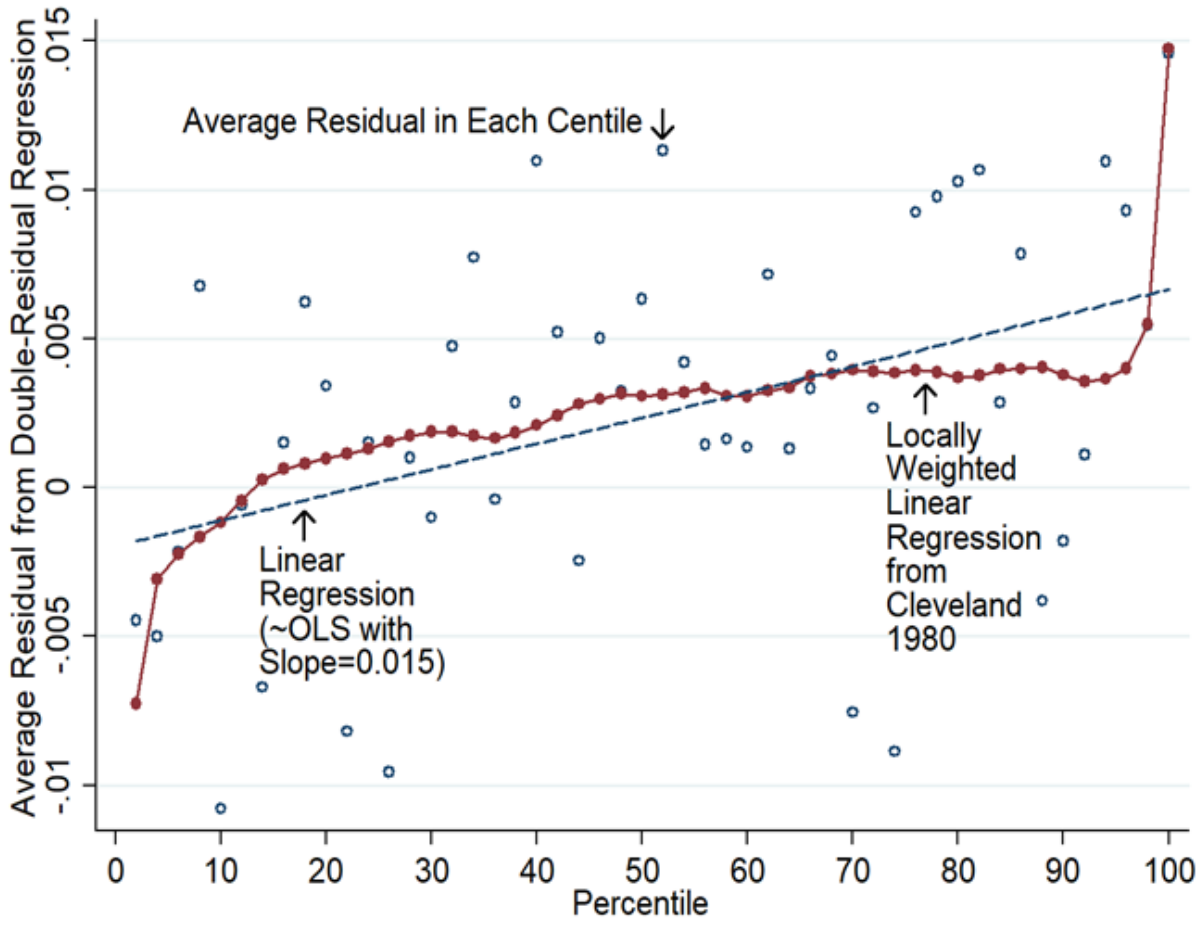

Fig. A3. State EITC Increases Fertility, Locally Weighted Double-Residual Regression

1980 to 2013 PSID. Observations are 21 to 39 year-old household heads. PSID weights used. Residuals are averaged into 50 quantiles. The linear best fit line and locally weighted linear regression uses all the original residuals. Locally weighted regression is from Cleveland (1979) and differs from regular local polynomial regression as it downweights observations with large residuals. A bandwidth of 0.8 is used, running-line least squares smoothing, and Cleveland (1979)'s tricube weighting function. The non-parametric regression shown approximates linear OLS estimate quite closely except for the highest and lowest values of state EITC benefits. However, boundary bias is a common issue with these methods.

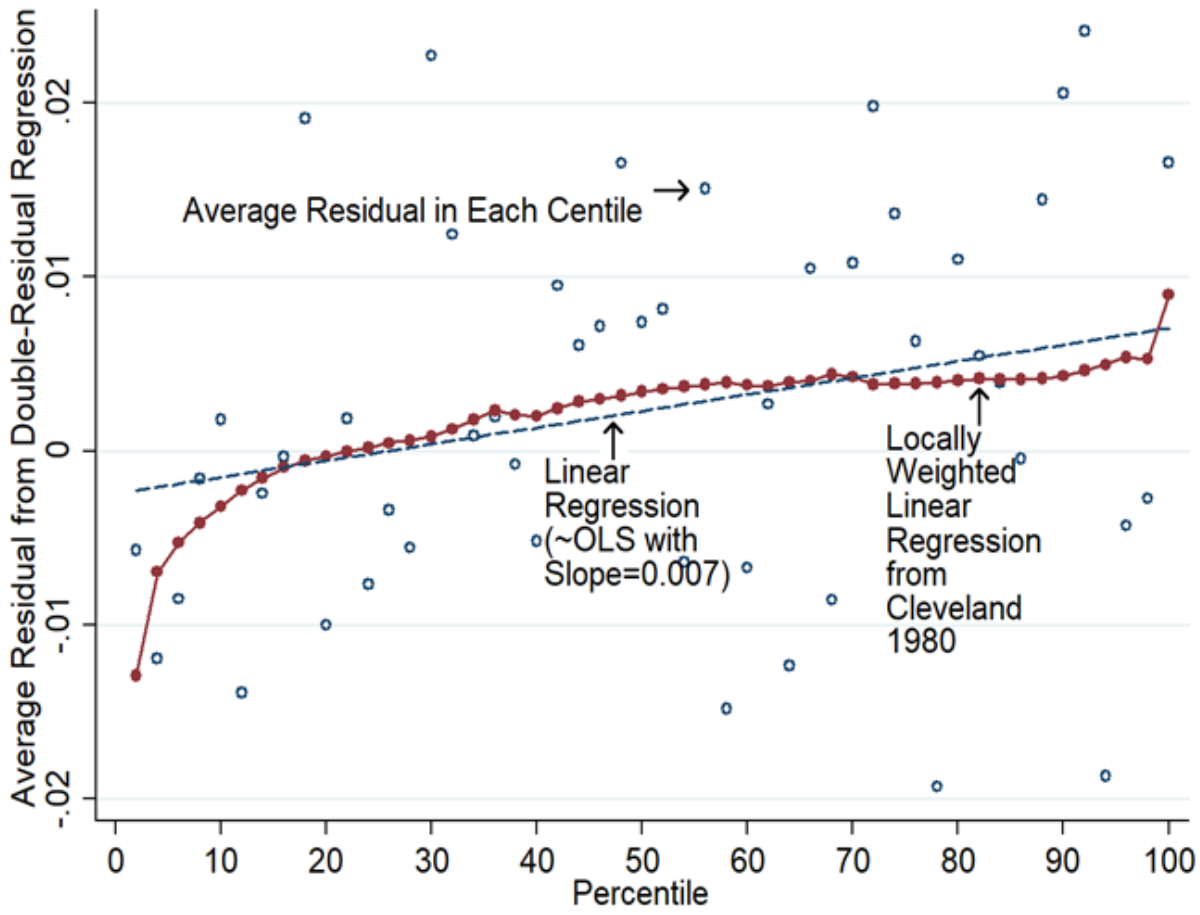

Fig. A4. State EITC Increases Fertility, Locally Weighted Double-Residual Regression

1980 to 2013 PSID. Observations are 21 to 39 year-old household heads. PSID weights used. Residuals are averaged into 50 quantiles. The linear best fit line and locally weighted linear regression uses all the original residuals. Locally weighted regression is from Cleveland (1979) and differs from regular local polynomial regression as it downweights observations with large residuals. A bandwidth of 0.8 is used, running-line least squares smoothing, and Cleveland (1979)'s tricube weighting function. The non-parametric regression shown approximates linear OLS estimate quite closely except for the highest and lowest values of state EITC benefits. However, boundary bias is a common issue with these methods.