Marriage, Divorce, and Tax and Transfer Policy

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Abstract

I use variation from the 1990s in the Earned Income Tax Credit and welfare reform to estimate the effects on marrying and divorcing. I examine flows into and out of marriage, use test scores to predict who is most likely to be affected by the policy changes, and employ a flexible functional form to estimate heterogeneous effects. I find that low-earning single parents are more likely to marry due to the EITC expansion and lower welfare generosity, while mid-earning married parents are less likely to divorce and high-earning married parents are more likely to divorce due to the EITC expansion.

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1 Introduction

The tax and transfer systems in the United States create an intricate web of family structure incentives: transfer programs for the needy often discourage marriage, while the tax system discourages marriage for some and encourages marriage for others. Recent changes to the Earned Income Tax Credit and earlier changes to the cash welfare system seek to reduce marriage disincentives. While the same individuals may be eligible for various tax credits and transfer programs depending on whether they marry, much of the literature has dealt separately with either one or the other. I take advantage of policy variations in both tax and transfer programs in the 1990s to estimate how individuals respond to family structure incentives.

Previous quasi-experimental studies find weak evidence, at best, that individuals respond to family structure incentives contained in the U.S. tax and transfer systems. The most convincing of these find that there are generally small effects of the marriage tax penalty/subsidy on the probability of marrying, and little to no effect on the probability of divorcing.[1] Many studies in this literature rely on repeated cross sections of data, which do not allow the researchers to distinguish between previously married and unmarried individuals. This aspect of the data combines individuals who were able to respond to the policy by entering into marriage with those who were not, which biases the estimated effect of the tax and transfer systems toward zero due, for instance, to already married individuals appearing to not respond to the policy. Additionally, cross-sectional analysis blurs the marriage and divorce response margin, because if a cross-section shows an increase in the probability of being married it could result either from more people marrying or from fewer divorcing. In essence, the issue is that marriage entry and exit are not necessarily symmetric. Using the 1991–1998 waves of the National Longitudinal Survey of Youth 1979 (NLSY79), I construct marriage and divorce risk samples, which include only individuals who were eligible to marry (because they were unmarried) or divorce (because they were married), respectively. I also distinguish between individuals with and without children because families with children

1. To name a few, Alm and Whittington (1995a) estimate that the elasticity of marrying with respect to the tax cost of marriage is -0.012, Eissa and Hoynes (2003) estimate the elasticity of being married with respect to the tax cost of marriage to be -0.004, and Michelmore (2015) finds that a $1,000 increase in the EITC cost of marriage decreases the probability of marrying by 1.1 percentage points (8.5%).

faced substantial changes to their EITC schedules and welfare environments compared to families without children.

Another important feature of the literature is the use of education as a means to separate likely welfare or EITC recipients. For example, Eissa and Liebman (1996), Meyer and Rosenbaum (2001), Eissa and Hoynes (2003, 2004), Schoeni and Blank (2003), and Michelmore (2015) all use education to isolate likely low-earning families in at least some specifications. My approach, on the other hand, uses individuals' Armed Forces Qualification Test (AFQT) z-scores, instead of education, to identify likely welfare or EITC recipients, and uses a flexible spline specification to allow differential effects along the AFQT distribution. This approach offers more variation and identifying power in estimation while still serving the same role as education in other studies.

I employ a triple–difference approach to estimate the effect of the 1993–1996 EITC expansion on the probability of marrying or divorcing among men and women in the NLSY79, who were 27–41 years old between 1991–1998.[2] I use the presence of at least one EITC-eligible child in the previous period and the individual's AFQT z-score as the two dimensions of treatment.[3] The first dimension captures the differential changes in family structure incentives between individuals with and without children, where individuals with children experienced dramatic increases in EITC generosity and decreases in AFDC/TANF generosity compared to childless individuals. The second dimension captures the varying changes in family structure incentives between low- and high-earning individuals, and aids in circumventing the endogeneity issues associated with earnings in this context; namely, that changes to EITC and AFDC/TANF program parameters cause individuals to manipulate their earnings and, thus, their statuses as treated or non-treated individuals.[4] I also use the marriage and birth histories of women in the 1995 June Current Population Survey to create an alternative panel in order to investigate the parallel trends assumption. I plot

2. I use the term "divorcing" to refer to either a separation or a divorce, which is conventional in the literature. As noted by Whittington and Alm (1997), who study the effect of income taxes on divorce between 1969–1989, it is relatively easy to be able to file under single status or as "head-of-household" if one is separated.

3. An EITC-eligible child must satisfy specific relationship, age, and residence requirements. The child must be related to the tax filer by marriage, blood, or law, must be 18 years old or younger, and must live with the tax filer for at least half of the relevant tax year. The age requirement extends to children 24 years old or younger if the child is a full-time student. There are additional exceptions in the case that a child lives with an extended family member, such as an aunt or uncle, instead of a parent. Therefore, I maintain the assumption that fertility is exogenous, which is common in this literature.

4. The 1993–1996 EITC expansion and AFDC/TANF reform also strengthened labor supply incentives. I discuss the implications of this further in Section 6.

new marriage and divorce rates and use an event study approach to examine pre-trends in family structure decisions. I find evidence that the parallel trends assumption is satisfied in the marriage and divorce risk samples.

While the EITC expansion occurred at the national level, AFDC/TANF parameters are set by each state, and therefore changed differentially across states and time. In order to leverage this variation, I measure potential AFDC/TANF benefits or losses using the maximum attainable monthly AFDC/TANF payment for a family of three in the individual's state for the given year. I define AFDC/TANF eligibility using the interaction between an individual's AFQT z-score and the presence of at least one child in the previous period along with an additional indicator variable equal to one if the individual is female.[5] This last interaction reflects the fact that AFDC/TANF is largely targeted at single mothers. Assuming an individual becomes ineligible for AFDC/TANF upon marriage, this variable provides a measure of what the individual would lose in welfare benefits if she were to marry. Variation in eligibility as well as benefit levels across states and time identify the effect of the AFDC/TANF transfer system generosity on the probability of marrying or divorcing.

I find that the 1993–1996 EITC expansion increased the probability of marrying among single parents who were likely EITC eligible, and created heterogenous effects on the probability of divorcing among a similar group who were initially married. I also find evidence of an effect of AFDC/TANF generosity on the probability of marrying, and no effect on the probability of divorcing. I estimate that the expansion of the EITC increased the probability of marrying between 1997–1998 (one to two years after the expansion was complete) by 5.2 percentage points (47.7%) for each standard deviation reduction in AFQT score among likely low-earning single parents. Meanwhile, I estimate that a $100 decrease in the monthly AFDC/TANF payment for a family of three increases the probability of marrying by 0.4 percentage points (4.5%) for single mothers who are likely eligible for AFDC/TANF benefits, but this evidence is not strong. I also find that the EITC expansion decreased the probability of divorcing in 1994 by 6.0 percentage points (78.9%) for each standard deviation reduction in AFQT score among likely mid-level-earning married par-

5. This eligibility definition is similar to the triple–difference specification I use to measure the effect of the EITC, but does not take in to account specific eligibility restrictions instituted by the Personal Responsibility and Work Opportunity Reconciliation Act of 1996. Omitting these eligibility requirements likely results in labeling more individuals as being eligible for AFDC/TANF than are truly eligible.

ents, but increased the probability of divorcing between 1997–1998 by 10.5 percentage points (96.3%) for each standard deviation reduction in AFQT score among likely high-earning married parents, which is consistent with increased marriage incentives for low-earners and increased divorce incentives for high-earners. Additionally, I find no evidence that AFDC/TANF generosity affects the probability of divorcing for single mothers who are likely eligible for AFDC/TANF benefits. I examine the robustness of my findings by comparing my results to those using a sample of repeated cross sections, comparing my results to those using education instead of AFQT score, and using a continuous variable for EITC generosity. I also examine the robustness of my results by estimating the model separately for men and women, where I find some evidence of differential family structure patterns between male and female parents that imply stronger marriage incentives from the EITC among men and stronger divorce incentives from the EITC among women.

These estimates suggest that recent EITC expansions, such as lengthening the plateau range for married families, may have important effects in terms of encouraging marriage among low-earning families. However, these policies likely affect single and married taxpayers differently, creating asymmetric responses for marriage flows and divorce flows as well as asymmetric responses along the income distribution.

The remainder of the paper is organized as follows. Section 2 discusses the relevant literature, Section 3 discusses policy background, Section 4 presents the theoretical motivation, and Section 5 discusses the data. Section 6 presents the empirical strategy and Section 7 presents the main results along with some alternative specifications. Finally, Section 8 concludes.

2 Relevant Literature

My research differs from most in the literature in three important ways. First, the literature concerning the family structure effects of tax and transfer systems focuses on either taxes or transfers. I connect these strands of literature by incorporating measures of both systems. In addition, many studies examining the effects of the Earned Income Tax Credit (EITC) limit or separate the data by education level as a method to differentiate between likely low- or high-earning families. I employ

an alternative method by using an individual's Armed Forces Qualification Test (AFQT) score. Finally, I use longitudinal data to study transitions into and out of marriage, which distinguishes my analysis from prior cross-sectional studies. This type of analysis allows for differential responses upon beginning or ending a marriage (Eissa and Hoynes 2000).

A few studies incorporate one or two of the features that I do. Dickert-Conlin (1999) focuses on both tax and transfer incentives for divorce and uses longitudinal data. Using women from the 1990 Survey of Income and Program Participation (SIPP), the author finds that tax penalties for marriage increase the probability of divorce, but that transfer penalty effects are not statistically different from zero: the marginal effect of a $1,000 increase in the tax penalty at the mean is 0.41–0.83 percentage points (15.2–30.7%).[6] The SIPP, however, contains a very short panel, and allows Dickert-Conlin to use only a short time window for analysis spanning 1990–1991. My analysis uses the NLSY79's longer panel to examine a time period of substantial policy change and allows for differential effects of the EITC expansion along the AFQT distribution.

More recently, Light and Omori (2008) use a longitudinal approach with the NLSY79 to estimate a three stage model of cohabitation and marriage. They also jointly incorporate tax and transfer system incentives. The authors estimate that increasing welfare generosity decreases the probability of marrying for a representative white woman, and the size of their estimate is similar to mine.[7] Light and Omori (2008), however, use variation in state income taxation between 1974–2004, whereas I focus specifically on the federal 1993–1996 EITC expansion and welfare reform.[8]

Numerous authors have considered the effect of the EITC in influencing marriage and divorce decisions, including Ellwood (2000), Dickert-Conlin and Houser (2002), Herbst (2011), and

6. The mean tax penalty is actually a $498 subsidy. The baseline probability of divorce is 2.7%.

7. Light and Omori (2008) only report the mean and standard deviation of their AFDC/TANF payment variable. I roughly calculate the 90th percentile to be $mean + SD \times 1.282 = 475.44 + 177.39 \times 1.282 = 702.85$, which assumes a normal distribution. Thus, I calculate that an increase in the maximum attainable monthly AFDC/TANF payment for a family of four from the mean to the 90th percentile is roughly an increase of $227.41. This equates roughly to claiming that a $100 increase in welfare generosity causes a 0.49 percentage point (10%) decrease in the probability of transitioning from being single to being married.

8. The model of Light and Omori (2008) differs in a number of ways. First, it is an ordered, three stage model in which the first stage considers transitions from being single to either cohabiting or being married, the second stage considers transitions from cohabitation to either being single or being married, and the third stage considers transitions from being married to being single. My model would constitute only their first and third stages. In addition, an individual remains in their sample from 1979 through the end of her first union, whereas an individual exits my sample after the first observation of a family structure change. Finally, my sample only includes 1991–1998, whereas theirs spans 1979–2004.

Michelmore (2015).[9] Their studies, however, exhibit some important limitations. Herbst uses Vital Statistics data, which does not allow him to use any individual-level control variables. In the case of the pooled samples of Ellwood, Dickert-Conlin, and Houser, the authors cannot differentiate between individuals who were previously unmarried or previously married. This results in estimates that are biased toward zero, as I demonstrate later. In addition, the samples constructed by Dickert-Conlin and Houser (2002) only extend through 1995. Given that the 1993–1996 EITC expansion was not completely phased in until 1996, and that marriage and divorce decisions may take one to two years to manifest in the data, I use data through 1998. As a result, I find a statistically significant, positive effect of the EITC expansion on the probability of marrying among single individuals, whereas Dickert-Conlin and Houser (2002) find no effect. Michelmore (2015) uses SIPP data from 2001, 2004, and 2008, although the SIPP offers shorter panels than the NLSY79.

Recent research on the EITC has focused on the EITC's additional effects, including its usefulness as a poverty-reduction tool and its effects on the distribution of earnings (Hoynes and Patel 2015) and its effects on children's outcomes (Dahl and Lochner 2012; Hoynes, Miller, and Simon 2015; Bastian and Michelmore 2016). In general, researchers conclude that the EITC is effective at reducing poverty among low-earning families and that the additional family income from the EITC is beneficial to children in those families along numerous dimensions. Aside from additional outcomes, other researchers have examined whether taxpayers' understanding (or lack thereof) of the EITC structure and its incentives contributes to estimates of the EITC's impacts. Chetty and Saez (2013) find experimental evidence that explaining the incentives of the EITC had negligible impacts on an individual's EITC the following tax year. Chetty, Friedman, and Saez (2013) use a quasi-experimental approach and find that maximizing one's EITC amount by bunching at the first EITC kink point can be partially explained by knowledge diffusion from EITC-knowledgable taxpayers to others.

Others have more broadly considered the effect of the tax cost of marriage, including Alm and Whittington (1995a, 1995b), Whittington and Alm (1997), and Eissa and Hoynes (2003). They

9. Ellwood (2000) also incorporates welfare reform in to his analysis, although he considers this separately from the effect of the EITC.

all use variation from the full tax code (including the EITC), but conduct their studies outside the context of the 1993–1996 EITC expansion and AFDC reform. They estimate the effect of income taxation on the probability of marrying, the probability of being married, and the probability of divorcing, respectively. They find generally small elasticities with respect to the tax cost of marriage. As I find below, the authors find stronger responses to taxation when considering the flow into marriages than when considering the stock of marriages. The authors' results also point to the possibility of differential effects of taxation upon beginning, rather than ending, a marriage, further motivating the consideration of flows into and out of marriages instead of stocks.

Another strand of the literature considers the effects of welfare benefits on marriage rates. Results here are mixed. Bitler et al. (2004) find that AFDC waivers and the transition to TANF cause decreases in the probability of both marrying and divorcing, but find only weak evidence of an additional effect of the state's level of welfare generosity. In contrast, Schoeni and Blank (2003) find that AFDC waivers increased the percent married among women without a high school degree, and decreased the percent married among women with exactly a high school degree, again pointing to possible heterogenous effects of the policy. Teitler et al. (2009) find that current TANF participation is positively associated with the probability of marrying, whereas past TANF participation is not influential. I contribute to this strand of the literature by incorporating more specific welfare generosity measures (i.e., the dollar value of a state's maximum attainable welfare payment) and by jointly incorporating tax system effects.

Other researchers, such as Brien, Lillard, and Stern (2006), Sheran (2007), and Gemici and Laufer (2014) estimate structural models of family formation and conduct counterfactual analyses that alter the costs or benefits of marriage. My quasi-experimental approach imposes fewer assumptions on the structure of flows in and out of marriage.

One final, important feature of the literature is the use of education as a means to separate likely welfare or EITC recipients in order to circumvent endogeneity concerns. For example, Eissa and Liebman (1996), Meyer and Rosenbaum (2001), Eissa and Hoynes (2003, 2004), Schoeni and Blank (2003), and Michelmore (2015) all use education to isolate likely low-earning families in

at least some specifications. My approach, on the other hand, uses individuals' Armed Forces Qualification Test (AFQT) scores. AFQT scores offer more variation and identifying power in estimation while still circumventing endogeneity issues associated with earnings.

3 Policy Background

Substantial changes to programs that aid low-earning families during the early- to mid-1990s drastically altered the tax and welfare environment these families faced. Both the 1993–1996 EITC expansion and the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA), which replaced the AFDC program with TANF, sought to encourage work, discourage welfare receipt, and encourage marriage among low-earning families.[10]

3.1 The Earned Income Tax Credit

Unlike other tax credits, the federal EITC is refundable, meaning that even if the individual's tax liability is zero he will still receive the full amount of his credit from the government. Figure 1 displays the EITC schedules for 1996 as an example of its structure. The amount of a family's credit increases at a constant rate with each additional dollar of earned income in the phase-in range, remains constant in the plateau range, and decreases at a constant rate in the phase-out range until earnings are too high for the family to receive any credit.[11]

Over the first 10 years, the EITC experienced some modest expansions. Since then, three major policies have affected the EITC: the Tax Reform Act of 1986, the 1990 Omnibus Budget Reconciliation Act, and the 1993 Omnibus Budget Reconciliation Act.[12] The changes contained

10. I ignore some additional aspects of these policies. For example, many states experimented with AFDC waivers before implementing TANF. I do not consider these waivers nor the individual welfare receipt regulations that may accompany them, which likely leads to labeling more individuals as being eligible for AFDC/TANF than are truly eligible. To the extent that the probability of marrying or divorcing is correlated with being mistakenly labeled as being eligible for AFDC/TANF, the coefficient estimates will be biased. Additionally, the Omnibus Budget Reconciliation Act of 1993 instituted further tax code changes such as introducing higher statutory marginal tax rates of 36% and 39.6% and increased tax rates under the alternative minimum tax. I do not differentiate between these other individual aspects of the act.

11. Tax filers can receive their EITC payment in one of two ways: they may elect to receive their credit as a part of their paycheck throughout the year or as a lump sum after filing their taxes. The option to receive one's credit in installments has been allowed since 1979, but very few tax filers choose this method of recipiency and instead receive their credit as a lump sum (United States General Accounting Office 1992; Romich and Weisner 2000). I ignore this aspect of the EITC because it is unlikely to influence family structure responses.

12. The 1986 act indexed the EITC to inflation and modestly increased generosity, the 1990 act split the credit to differentiate between families with one and two or more children, and the 1993 act instituted a small EITC for childless families and greatly expanded the maximum credit for families with children. The 1990 Omnibus Budget Reconciliation Act also instituted an additional credit for families with children younger than one year old, which was repealed in the 1993 Omnibus Budget Reconciliation Act (U.S. Congress 2004, 1990).

in the 1993 act were phased in over the next three years. Table 1 displays the EITC parameters for the sample years I use in this paper. By 1998, the maximum EITC increased by $837 (58%) for families with one child and $2,245 (149%) for families with two or more children, relative to 1993. This expansion constituted the most dramatic EITC expansion to date (Nichols and Rothstein 2015).[13]

3.2 Aid to Families with Dependent Children and Temporary Assistance for Needy Families

The AFDC program was originally targeted at single mothers, although in 1961 the program began to provide support to two-parent families in which the principal earner became unemployed.[14] AFDC generosity varies among states and over time because the states set their own benefit levels (Moffitt 2003).[15] In addition, the benefit take-away rate as a function of earnings is generally quite high, and did not vary greatly across states under AFDC.

As a result of Personal Responsibility and Work Opportunity Reconciliation Act of 1996, TANF replaced AFDC, and drastically altered the welfare environment. New TANF policies, some of which were left up to state choice, included lifetime limits for welfare receipt, work requirements, eligibility for two-parent families, and non-cash forms for benefits. The subjective nature of many of these changes makes them difficult, if not impossible, to quantify at the family level. I focus on one measure of AFDC/TANF generosity: the maximum monthly payment available in each state.

Overall, the transfer system primarily creates marriage disincentives because the benefit levels for a single-parent family are higher than those for a two-parent family, if such benefits are available at all. TANF's more stringent requirements primarily decreased the benefit of remaining single and on welfare compared to AFDC.

13. In addition, six states had implemented state EITCs by 1991, for which I account in my analysis.
14. Although the AFDC Unemployed Parent (AFDC-UP) program was created in 1961, states were not required to implement it until 1988.
15. In 1991, for instance, the maximum AFDC payment for a one-parent family with two children in Mississippi was $120 per month, whereas the maximum payment in California was $694 per month.

3.3 Other Policy Changes

In addition to changes to the EITC and AFDC/TANF, there were two Medicaid expansions in 1989 and 1990 required states to offer Medicaid coverage to pregnant women and to children in low-income families. These expansions would also have introduced marriage incentives among a similar sample of people as those affected by the 1993–1996 EITC expansion. The 1989 expansion came into effect in April 1990, and so should not introduce much (if any) bias to my estimates because my sample period begins in 1991. The 1990 expansion came into effect in July 1991, and so may introduce a small amount of bias due to the policy change.

Card and Shore-Sheppard (2004) estimate the effects of each of these Medicaid expansions on numerous health insurance outcomes using a regression discontinuity approach. They conclude that the "overall effect of the Medicaid expansions was substantially limited by low takeup rates among the newly eligible children." In addition, I re-estimate my model using only years 1992–1998, so that the 1990 Medicaid expansion would have been in effect for the entire sample period, and find qualitatively and quantitatively similar results. Thus, I find little evidence of bias in my estimated effects of the 1993–1996 EITC expansion due to the preceding Medicaid expansion.

4 Marriage and Divorce Predictions

As in Becker (1973, 1974), I model individuals as choosing to marry if the utility from being married is greater than the utility from being single, and analogously for divorce. Since AFDC/TANF is generally collected by single parents, an increase in AFDC/TANF generosity should unambiguously make being single more attractive. However, the incentive effects of the EITC are ambiguous.

The incentives created by the EITC vary dramatically between individuals and may even differ between individuals who are considering marrying each other. I plot six potential situations in Figure 2 an individual could face when considering marriage, which differ by the individual's number of children, the potential spouse's number of children, and the potential spouse's earnings. The figures display the difference between the individual's EITC while married and while single

along a range of their own possible earnings, with positive values indicating an increase in EITC, and thus a stronger incentive to marry.[16] I derive these incentives from the EITC schedules in Table 1, and assume that a low-earning potential individual earns $5,000 per year.[17]

Note that the EITC creates marriage disincentives in some situations, such as Figures 2a, 2d, and 2f, and marriage incentives in others. Figures 2a and 2d are situations in which the individual would not move up to a more generous EITC schedule through marriage because he already lives with the family's only EITC-eligible child. Figure 2f displays large sections of marriage disincentives in 1992 and 1994, even though a second EITC-eligible child joins the family via marriage, because the one- and two-child EITC schedules were very similar. The EITC gain through marriage can be as high as $1,500–$2,200, as in Figures 2b, 2c, and 2e, and the EITC loss through marriage can be as low as $700–$900, as in Figures 2d and 2f. However, the EITC difference, whether initially positive or negative, tends to shift in favor of marriage between 1992 and 1998. Conditional on earnings, Figure 2 shows that individuals' EITC differences increased as much as $500–$1,500 during this time period.

Combining the EITC and AFDC/TANF changes increases the magnitude of the average shift in favor of marriage. To illustrate this, Figure 3 displays the change in the marriage penalty/subsidy from 1992 to 1994, 1996, and 1998 due to changes in real AFDC/TANF benefit levels and the EITC, with positive values indicating an increase in the marriage subsidy (or, equivalently, a decrease in the marriage penalty).[18] In these graphs I use the average family AFDC/TANF payment for the given year as the measure of welfare, and I assume that an individual loses all AFDC/TANF benefits upon marriage.[19] Conditional on earnings, by 1998, individuals' annual gains from EITC and AFDC/TANF had increased $700–$2,700 relative to 1992. Figures 2 and 3 lead to my empirical question: did individuals respond to these changes to their marriage and divorce incentives, and, if so, by how much?

I use the presence of at least one EITC-eligible child in the previous period and the individual's

16. Note that these graphs are from an individual's perspective, meaning they compare the family's EITC while married to the individual's EITC while single. This perspective is comparable to the perspective I use throughout the empirical strategy, and does not consider cohabitation.

17. Earning $5,000 per year during this time frame is roughly the equivalent of working part time at the minimum wage.

18. As an example, the 1994 to 1992 difference plots $(EITC_{married,1994} - EITC_{single,1994} - welfare_{1994}) - (EITC_{married,1992} - EITC_{single,1992} - welfare_{1992})$ for each situation.

19. I also ignore other changes resulting from PRWORA that tightened eligibility for benefits

Armed Forces Qualification Test (AFQT) score as the two dimensions of treatment. I expect to see an increase in the probability of marrying over this time period among parents relative to childless individuals as a result of the 1993–1996 EITC expansion. I use the individual's AFQT score to separate likely low-earners from likely high-earners. Therefore, I expect to see an increase in the probability of marrying among individuals with low AFQT scores relative to individuals with high AFQT scores due to a higher likelihood of being eligible for the EITC. Overall, I expect to find that the EITC expansion increased the probability of marrying among parents with low AFQT scores relative to parents with high AFQT scores. I also expect to see that lower AFDC/TANF generosity increases the probability of marrying among mothers who are likely eligible for AFDC/TANF, relative to others.

5 Data

I use panel data from the National Longitudinal Survey of Youth 1979 (NLSY79) to estimate the marriage and divorce effects of the EITC and AFDC/TANF changes that occurred in the early- to mid-1990s. The NLSY79 allows me to observe individuals over a long time period, to separate individuals based on past marital status, and to use scores from the Armed Forces Qualification Test (AFQT) to separate likely low-earners from likely high-earners.

5.1 The NLSY79 Risk Samples

The data come from the 1991–1998 waves of the NLSY79, which offers a longer panel than the Survey of Income and Program Participation (SIPP) and a larger sample of the relevant age cohort than the Panel Study of Income Dynamics (PSID).[20] Through 1994 the NLSY79 surveyed individuals each year, but afterward the survey became biennial. When I begin my analysis in 1991, respondents are between 27–34 years old. By the end of the sample, the respondents are between 33–41 years old.

20. I begin my analysis in 1991 due to the timing of the policy variation. I use the restricted geocode data in order to link individuals with their state of residence, which is necessary in order to use variation in AFDC/TANF generosity between states and over time. I also limit the sample to observations with reported annual earnings less than $1,000,000.

The marriage and divorce risk samples consist of individuals who are eligible to be married and eligible to be divorced, respectively. Individuals are included in the marriage sample if they are unmarried that year or in their first year of marriage.[21] Subsequent observations of these individuals in their second years of marriage and beyond are excluded from the marriage sample. If the individual divorces he re-enters the marriage sample.[22] I define the divorce sample analogously. Note that some individuals appear intermittently in the data, some appear regularly and then leave, and some remain in the survey for the entire duration, creating an unbalanced panel of 4,500 individuals with 16,474 observations for the full marriage risk sample and 5,640 individuals with 23,335 observations for the full divorce risk sample.

The risk samples ensure that the observations I use to estimate the tax and transfer system effects are for those individuals who can respond to the policies by changing marital status in the specified ways. Previous studies often consider an individual to have responded to the policy if he is currently married or currently divorced. However, this process combines individuals who were able to respond the policy by marrying or by divorcing with those who were not. This limitation biases the estimated effects of the tax and transfer systems toward zero, which I illustrate later.

5.2 AFQT Z-Scores

Perhaps most importantly, the NLSY79 allows me to use Armed Forces Qualification Test (AFQT) scores to separate likely low-earners from likely high-earners. One empirical issue in determining EITC and AFDC/TANF eligibility is that individuals may manipulate their own earnings in order to become eligible for the programs or to earn a higher amount of assistance, potentially introducing endogeneity due to unobservable characteristics that would influence both earnings manipulation and marital status changes. For this reason, much of the literature uses education to circumvent this endogeneity concern and separate likely EITC and AFDC/TANF eligible individuals from

21. The NLSY79 collects information on the beginning and ending dates of first, second, and third marriages. Therefore, although the survey became biennial in 1994, it is possible to differentiate between marriages that occurred in 1995 (a non-survey year) from those that occurred in 1996 (the next survey year). I do not make this distinction in the empirical strategy because of the absence of other necessary covariates in non-survey years, such as number of children and state of residence. These are particularly important because they determine whether AFDC/TANF is available to the individual and, if so, how much.

22. There are instances in which an individual is married in one wave, divorced in the following wave, and married again in the next wave. In this case, the individual would be included in the divorce sample for all three of those observations. There are 157 (0.7%) such occurrences within the divorce sample. There are 104 (0.6%) analogous occurrences within the marriage sample.

others. I extend this common practice by defining treatment for an individual as their AFQT z-score.[23] AFQT z-scores are unique to these data and offer greater variation and more estimating power than using education in a similar manner. I convert reported AFQT percentile scores to a z-score by assuming a standard normal distribution of AFQT scores and computing AFQT z-score$= \Phi^{-1}$(AFQT percentile), where $\Phi^{-1}(\cdot)$ is the inverse of the standard normal cumulative distribution function.[24]

An individual with a low AFQT z-score likely has low annual earnings as well, which makes him more likely to be eligible for the EITC and AFDC/TANF. I demonstrate this positive relationship in Figure 5, which plots the average annual earnings by AFQT z-score bins for the marriage and divorce risk samples, along with their 95% confidence intervals. Therefore, my analysis compares individuals who had differing z-scores.

AFQT scores are a portion of the larger Armed Services Vocational Aptitude Battery (ASVAB) administered to the majority of the respondents of the NLSY79. The AFQT combines arithmetic reasoning, word knowledge, paragraph comprehension, and numeric operations scores into a single measure.[25] The NLSY79 survey administered the ASVAB to its respondents in part to help the military create a standard by which to judge military enlistees because the NLSY79's initial sample was nationally representative.[26]

5.3 EITC Eligibility and AFDC/TANF Generosity

I use a spline function in the individual's AFQT z-score to separate individuals who are more likely to be eligible for the EITC and AFDC/TANF from others, and to allow for differential effects of the EITC expansion along the AFQT distribution. I use Figure 5 to help identify trends in the relationship between earnings and z-score and to locate possible notch points in the spline function.

23. In practice I use the negative of the individual's AFQT z-score. Defining the AFQT variable this way makes the interpretation more natural, so that a higher variable value is associated with a higher likelihood of treatment due to a lower AFQT z-score.

24. This approach is common in the literature using AFQT scores from the NLSY79. For example, Neal and Johnson (1996) adjusts AFQT scores in the NLSY79 in a similar manner.

25. The other subtests cover general science, coding speed, auto and shop information, mathematics knowledge, mechanical comprehension, and electronics information. Segal (2012) provides evidence that the coding speed test measures non-cognitive attributes, such as intrinsic motivation, among the NLSY79 respondents, and is therefore positively correlated with earnings. More generally, because the ASVAB tests were unincentivized, performance on these tests may measure both cognitive and non-cognitive attributes, both of which predict earnings. This aspect of the ASVAB tests in the NLSY79 provides further justification to use AFQT z-scores as a method to separate likely low-earners from likely high-earners.

26. The military primarily uses the ASVAB to sort enlistees into military professions, but also uses the AFQT subset to judge overall trainability and suitability for the military.

Although the relationship between z-score and reported earnings is not overwhelmingly strong, individuals with z-scores less than 0, on average, appear to have earnings lower than approximately $26,000 and therefore fall in the EITC eligibility range. In general, the lines of best fit displayed in Figure 5a (the marriage sample) appear largely linear up to a z-score of 0, with a possible difference in the relationship for individuals with z-scores between 0 and 1 or z-scores above 1. Therefore, I place notches in the spline function at z-scores of 0 and 1, to allow for differential effects of the 1993–1996 EITC expansion along the AFQT distribution.

I extend much of the past literature in this field by incorporating welfare incentives as well. I measure AFDC/TANF generosity in the individual's state using the maximum attainable monthly AFDC/TANF payment for a family of three.[27] It is not sufficient to include this same measure in the regression for all individuals, however, as some individuals are not eligible for AFDC/TANF due to a number of potential reasons. In order to more accurately reflect an individual's potential gain or loss, I interact the maximum attainable monthly AFDC/TANF payment with the individual's z-score, an indicator equal to one if the individual has at least one child this period, and an indicator variable equal to one if the individual is female.[28] This last interaction reflects the fact that AFDC/TANF is largely targeted at single mothers.

5.4 Dynamic Selection

Because the sample ages in unison and is not replenished, there is a concern that over time the sample of individuals who are eligible to marry will become biased toward individuals who will never marry due to some unobservable factor. In addition, most transitions into marriage occur in the mid- to late-20s, and so extending the sample period to include older individuals may bias the analysis due to negative duration dependence.[29] In this case, the sample of unmarried individuals

27. Bitler et al. (2004), Meyer and Rosenbaum (2001), and others also use the maximum attainable monthly AFDC/TANF payment to estimate the effect of the transfer system.

28. In specifications that use only women this definition is the same as the triple–difference definition. In specifications that use only men the regression fails. Therefore, I remove the interaction with the female indicator variable in specifications that use only women or only men, making the AFDC/TANF eligibility variable similar to the triple–difference interaction. In alternative specifications I utilize two other AFDC/TANF eligibility definitions; one based on predicted earnings and the other omitting the female interaction in all specifications. These results are available upon request.

29. Figure 4 displays the hazard rate of new marriages by age among women who were 27–43 years old in 1990, calculated from the 1990 June Current Population Survey. The declining hazard rate at higher ages is another reason I omit survey years beyond 1998 in order to exclude the right-most tail of the age distribution in Figure 4.

becomes increasingly negatively selected over time and we would expect the estimated effects of the 1993–1996 EITC expansion and AFDC/TANF generosity to be biased toward zero in later years.[30] Analogous dynamic selection is also possible in the divorce risk sample. These dynamic selection issues are important considerations, and I therefore limit the sample period and consider only marital transitions between 1991–1998 in order to alleviate, but not completely eliminate, this concern. Although determining the direction and extent of dynamic selection is not feasible in my current framework, I present a simple theoretical model in the online appendix to demonstrate that dynamic selection can lead to a sample that is increasingly unlikely to leave its current state.

5.5 Summary Statistics

Columns 2–5 of Table 2 present the summary statistics for the marriage risk sample as of 1991. I calculate the summary statistics only for individuals whose first observation places them in the marriage sample.[31] Notably, while the marriage and divorce risk samples are similar in terms of gender and age, individuals initially in the marriage risk sample are more likely to be black than individuals initially in the divorce risk sample. Predictably, individuals with lower AFQT z-scores are also more likely to have exactly a high school education or less. The average individual in the marriage risk sample is 30 years old, and 30% of them have at least one child, and so are eligible for a generous EITC.

Columns 6–9 of Table 2 presents the initial summary statistics for the divorce risk sample as of 1991. Again, I calculate the summary statistics only for individuals whose first observation places them in the divorce sample. The divorce risk sample, which is slightly older and has more children than the marriage risk sample, otherwise exhibits trends that are similar to those of the marriage risk sample. Notably, individuals with lower AFQT z-scores are more likely to have exactly a high school education or less and be black or hispanic than are individuals with higher z-scores. 50% of individuals in the divorce sample have at least one child. In addition, individuals in the divorce

30. This is just one possible example of dynamic selection, as any dynamic selection within the samples may work in the opposite direction.

31. These statistics do not include individuals who enter the marriage sample via divorce. Including individuals who enter the marriage sample via divorce may result in individuals being included twice or individuals being included in both the marriage and divorce sample summary statistics. The summary statistics in Table 2 are not fully representative of the panel because they only appear once.

risk sample are more likely to have children, and have, on average, approximately one more child, than individuals in the marriage risk sample.[32]

6 Empirical Strategy

My goal is to estimate the effects of the EITC and AFDC/TANF on the probability of marrying or divorcing using policy changes that occurred in the early- to mid-1990s. I use a difference-in-differences approach comparing parents to childless individuals before and after the policies. Using the presence of children as a treatment dimension means that the analysis focuses on those individuals in Figures 2–3, panels d–f, in which a single parent with one child considers marriage, and more precisely isolates individuals who would most likely be affected by the EITC expansion.

Expanding upon the general method of Eissa and Liebman (1996), I use a spline function in AFQT z-score to estimate heterogeneous effects of the EITC expansion along the AFQT (and resulting earnings) distribution.[33] I use the individual's AFQT z-score, rather than reported earnings, to avoid endogeneity concerns associated with using reported earnings directly.[34] Finally, I use the state's maximum attainable monthly AFDC/TANF payment to measure the effects of changes in the transfer system, using variation between states and over time. All models are linear probability models due to the large number of fixed effects.

Recall that the NLSY79 becomes biennial in 1994. Thus, I can observe behavioral responses in 1994, 1996, and 1998 only, compared to the pre-policy years of 1991, 1992, and 1993. In light of this, I estimate the following equation:

32. This aspect of the divorce sample is likely due to the fact that being married and having children are correlated, and is unlikely due to age. The average individual in the divorce sample is 0.4 years older than the average individual in the marriage sample, yet 50% of the divorce sample has at least one child whereas only 30% of the marriage sample has at least one child.

33. I convert reported AFQT percentile scores to a z-score by assuming a standard normal distribution of AFQT scores and computing AFQT z-score $= \Phi^{-1}$(AFQT percentile), where $\Phi^{-1}(\cdot)$ is the inverse of the standard normal cumulative distribution function. Additionally, in practice I use the negative of the individual's AFQT z-score, so that a higher value of this variable reflects a higher likelihood of being eligible for the EITC and AFDC/TANF due to a lower AFQT score.

34. Specifically, the concern is that there are unobservable factors that would influence the individual to manipulate his eligibility for the EITC or AFDC/TANF and to change his marital status.

$$
\begin{aligned}
Married_{it} = \beta_0 &+ \beta_1 f(\text{AFQT Z-Score}_i) \times HasChild_{it} \times PostYear_t \\
&+ \beta_2 \text{AFQT Z-Score}_i \times HasChild_{it} \times Female_i \times maxAFDC_{it} \\
&+ \beta_3 Z_{it} + \beta_4 X_{it} + \varepsilon_{it}
\end{aligned} \tag{1}
$$

The specification also includes (denoted by the vector Z_{it}) the $f(\text{AFQT Z-Score}_i)$, $HasChild_{it}$, and year fixed effect variables entered individually along with pairwise interactions between each of them. $Married_{it}$ is an indicator for being married in year t, $f(\text{AFQT Z-Score}_i)$ is a linear spline function in AFQT z-score with notches at z-scores of 0 and 1, $HasChild_{it}$ is an indicator of having at least one EITC-eligible child in the previous period, and $PostYear_t$ is a vector of indicator variables for the post-EITC expansions years 1994–1998. $maxAFDC_{it}$ is the maximum attainable monthly AFDC/TANF payment for a family of three (measured in hundreds of dollars) in the individual's state in year t. X_{it} is a vector of other covariates in year t that likely influence marriage decisions, including age group, race, gender, whether the state has a state EITC in year t, state fixed effects, and current, one-period, and two-period lagged number of children.[35]

I use age group and educational level dummies instead of the standard measure of age, age squared, or years of education due to possible non-linear effects on marital outcomes. Age groups begin with 28–31 years old and advance in three year groups up to 40 years old or older (27 years old or younger is the omitted category). Education groups are less than high school, high school degree, and some college (college degree or more is the omitted category). The spline function in AFQT, $f(\text{AFQT Z-Score}_i)$, flexibly allows parents to have differential responses to the EITC expansion along the AFQT distribution. The coefficients of interest are the vector β_1, which measures the effect of the 1993–1996 EITC expansion in 1994, 1996, and 1998, as well as β_2, which measures the effect of AFDC/TANF generosity in the individual's state.

The equations I estimate for the divorce sample are analogous to equation 1. The difference is that the dependent variable in these equations is equal to one if the individual reports being either divorced or separated within the last year, which is conventional in this literature. In addition, I

35. I include one- and two-period lags of the number of children because family structure decisions may take time to manifest in the data. Herbst (2011) lags his main EITC variable by two years for this reason.

include the number of years the individual has been married as an additional regressor in these models.[36]

Note that my empirical strategy does not distinguish between differing sources of incentives originating from the 1993–1996 EITC expansion nor AFDC/TANF reform. Specifically, both of these policies strengthened labor supply incentives among low-earning families. Ellwood (2000) provides an illustrative example concerning the EITC. If a married couple with two earners faces a marriage disincentive due to the EITC then they may be better off divorcing. However, expanding the EITC increases the family's income and creates labor supply disincentives for the secondary earner if the family falls in the phase-out range of the schedule. The secondary earner may specialize more in household production, which could benefit the family overall and counteract the divorce incentive. My empirical strategy does not differentiate between a mechanism such as in Ellwood's (2000) example from any other possible mechanism.

Assuming a mother may only receive AFDC/TANF if she is single, then I expect the effect of AFDC/TANF generosity on the probability of marrying to be negative. On the other hand, I expect the effect of the 1993–1996 EITC expansion on the probability of marrying to be positive among low earners. This prediction is based on Figure 3, which shows that the combined incentives from the EITC and AFDC shifted in favor of marriage over time. I expect the opposite-signed effects on the probability of divorcing.

7 Results

I estimate the effects of the 1993–1996 EITC expansion and of AFDC/TANF generosity on the probability of marrying and divorcing using risk samples including only unmarried or married individuals, respectively. I compare a treatment group of individuals who had at least one child in the previous period to a control group of childless individuals while taking into account differences in Armed Forces Qualification Test (AFQT) z-scores, which I use to indicate differing potential

36. Including the number of years married as an explanatory variable implies dynamic selection in the sample. This means that individuals who are married for longer are more likely to stay married. To the extent that dynamic selection effects are different between individuals with different AFQT percentile scores, the results will be biased.

levels of treatment. This approach circumvents endogeneity issues associated with using earnings to directly classify eligible individuals such as potential earnings manipulation in order to alter their statuses as treated or non-treated individuals. This approach also enables me to use a more flexible functional form compared to studies that use education to classify likely-eligible individuals, since I can use a flexible spline function that allows for identification of different responses to the EITC expansion within groups of people that have similar z-scores. I also allow the effects of the EITC expansion to vary across time, which can capture both the fact that the EITC grows in magnitude each year and that family structure decisions may manifest in years after the initial policy change.

I find that single parents with the lowest z-scores are more likely to marry after the EITC expansion. I also find that married parents with mid-range z-scores are less likely to divorce, while married parents with the highest z-scores are more likely to divorce as a result of the 1993–1996 EITC expansion. These effects are consistent with the hypothesized effects in Section 4 based on likely earnings of individuals in these z-score ranges. In addition, I find subtle differences in family structure responses between men and women, which suggest that male and female parents may marry different types of people. Single fathers, for example, are more likely to increase their number of children upon marriage, which can strengthen marriage incentives from the EITC by increasing the family's tax credit. I also find some evidence that declines in AFDC/TANF generosity increase the likelihood of marriage.

7.1 Main Results

Table 3 presents my main results. Among single parents who are the most likely to be eligible for the EITC, I estimate that the EITC expansion significantly increased the probability of marrying between 1997–98 by 5.2 percentage points for each standard deviation reduction in AFQT score. In other words, I estimate that due to the EITC expansion, an unmarried parent with a z-score of -1 is 5.2 percentage points (47.7%) more likely to marry one to two years after the expansion was complete than an unmarried childless individual with a z-score of 0. I find no other statistically significant effect of the EITC expansion on the probability of marrying among any other AFQT

z-score groups or during any other years. This finding is consistent with the theoretical predictions in Section 4, which show potentially substantial gains in EITC amount through marriage among low-earning individuals. Although imprecise in earlier years, the coefficient estimate among this subgroup grows over time, providing some evidence that the effects of taxes on the decision to marry may manifest years after marriage incentives have strengthened.

Among married parents who are more likely to be in the phase-out range of the EITC or ineligible, I estimate that the EITC expansion significantly decreased the probability of divorcing in 1994 by 6.0 percentage points for each standard deviation reduction in AFQT score. A standard deviation reduction in AFQT score among individuals in this range is more likely to be the difference between being eligible for the EITC rather than ineligible, which may lead to the large point estimate (139.5%). This finding is consistent with the theoretical predictions in Section 4: likely mid-earners divorce less frequently as a result of the EITC expansion because the substantial expansion of the one- and two-child EITC schedules provided additional income to families with children as the base of the credit schedule grew. This is sometimes referred to as the "stabilization effect," where additional family income stabilizes a marriage that may otherwise have been close to separating. In addition, the estimated effect of the EITC expansion on the decision to marry among this AFQT subgroup is positive in 1994, and drops to near 0 in subsequent years. Although imprecise, this pattern suggests that, in addition to a decreased propensity to divorce as a result of the EITC expansion among married parents, single parents who are more likely to be in the phase-out range of the EITC or ineligible faced stronger marriage incentives.

Finally, among married parents who are the most likely to be ineligible for the EITC, I find that the EITC expansion significantly increased the probability of divorcing between 1997–98 by 10.5 percentage points (172.1%) for each standard deviation reduction in AFQT score. Individuals with the highest z-scores are most likely ineligible for the EITC, but by divorcing and losing one source of income they stand to gain a larger EITC since they are more likely to become eligible for the credit due to the expansion. It is also unsurprising that the timing of this effect is delayed, since the highest earners would not have faced these incentives from the EITC until late in the expansion

period when the credit's base was largest.

Note, also, that the effects of the EITC expansion are often the same sign when comparing the probability of marrying to the probability of divorcing. Although many of these estimates are imprecise, their signs suggest that family structure incentives in the tax system create asymmetric responses along the marriage and divorce margins.

To relate the estimates to the size of the EITC expansion, I perform a back-of-the-envelope calculation to determine the effect of a $500 increase in the maximum EITC. I scale the estimates in Table 3 to represent a $500 increase in the maximum EITC based on the EITC schedules in Table 1. I calculate that, for each standard deviation reduction in AFQT score, an additional $500 in EITC increases the probability of marrying by 1.2–3.4 percentage points (11.0–31.2%) among single parents with the lowest AFQT z-scores, decreases the probability of divorcing by 2.5–5.7 percentage points (62.8–132.6%) among married parents with mid-range AFQT z-scores, and increases the probability of divorcing by 2.3–6.9 percentage points (37.7–113.1%) among married parents with the highest AFQT z-scores. These calculations suggest similar magnitudes across parents with low- to mid-range AFQT z-scores. Recall, however, that the timing differs, perhaps because the impact on the divorce decision is immediate, while it may take some time to find a potential spouse and/or decide to marry.

Lastly, there is some evidence of a negative effect of AFDC/TANF generosity on the probability of marrying. The estimate reveals that, all else equal, a $100 decrease in the maximum monthly attainable AFDC/TANF payment for a family of three increases the probability of marrying by 0.4 percentage points (4.5%) among single mothers who are the most likely to be eligible for AFDC/TANF benefits, relative to others.[37] This estimate is statistically significant at the 90% confidence level.

37. This is a $1,200 decrease in the maximum annual attainable AFDC/TANF payment for a family of three.

7.2 Comparing Risk Samples to Cross-Sections

Risk samples ensure that I estimate policy effects on individuals who can respond, say, by marrying (because they were previously unmarried). Cross-sections, on the other hand, blur the marriage and divorce response margins, pooling together individuals who can respond by marrying and by not divorcing, and analogously for divorce. This limitation biases the estimated effect of the tax and transfer systems toward zero due, for instance, to already married individuals appearing to not respond to the policy. I use the NLSY79 to create repeated cross-section samples in order to compare my empirical estimates with a similar repeated cross-section sample.

Table 4 displays estimates from the NLSY79 risk samples (reproduced from Table 3) and estimates from cross-section samples. The estimates from the cross-section samples are the effects of the policies on the probability of being married or being divorced.[38] The dependent variable in the marriage regressions is an indicator equal to 1 if the individual is married, and the dependent variable in the divorce regressions is an indicator equal to 1 if the individual is divorced or separated.

The cross-section samples in Table 4 generally display muted effects of the 1993–1996 EITC expansion on the probability of being married or divorced compared to the risk sample estimates, although some coefficient estimates using cross-sections are larger in absolute value than the risk sample estimates. Muted effects may occur because the sample includes individuals who are unable to respond to the policy by marrying because they were already married, and analogously for divorce. Larger coefficient estimates may occur because an individual needs to pass through marriage in order to divorce, meaning a cross-section sample that shows an increase in the probability of being married should also show a decrease in the probability of being divorced. This balancing out is evident among the cross-section estimates in Table 4, and blurs the line between the response marriage and divorce response margins. This feature highlights another weakness of using cross-section data to analyze family structure transitions.

38. Each cross-section sample uses all observations from both the marriage and divorce risk samples. Note that the total number of observations in the cross-section samples will not be equal to the simple sum of observations in the risk samples because a newly married individual is included in both the marriage and divorce risk sample.

7.3 Robustness and Alternative Specifications

One of the contributions of this paper is to use AFQT z-scores to distinguish who is most likely to have low earnings and be eligible for the EITC and AFDC/TANF, whereas earlier papers often use education instead. Table 6 compares the earlier estimates using z-scores to estimates using education group indicators. In these specifications, I replace the AFQT variable in Equation 1 with a vector of education group indicator variables. In the full specification the omitted education group is "college degree or more," and in the two subsequent sample restrictions the control group becomes "some college" and "exactly high school degree," respectively. In addition, in these specifications I replace the AFQT z-score interaction in the AFDC/TANF eligibility definition with an indicator variable equal to one if the individual has less than a high school degree.

I present the results of this alternative specification along with the original estimates in Table 5. The estimates using education corroborate the original estimates, revealing that single parents with less than a high school degree are more likely to marry as a result of the EITC expansion, and that married parents with exactly a high school degree are less likely to divorce as a result of the EITC expansion. These estimates also show that single mothers with less than a high school degree are more likely to marry as AFDC/TANF generosity decreases, which is consistent with my earlier findings. However, the precision of the estimates in this alternative specification is strongest using the full sample, in which the control group includes individuals with a college degree or more. Using very highly educated individuals as a control group for high school drop outs, however, may violate the parallel trends assumption between treatment and control groups, and reduces the reliability of the estimates in Table 5 that use education indicators. These results suggest that using education may lead to less reliable estimates about the impact of the EITC expansion.

In addition, much of the previous literature focuses on women alone, whereas my analysis includes both men and women. However, I would expect to see responses in a sample of men who are most likely to marry such women. Indeed, although the point estimates differ somewhat in Table 6, where I estimate the model separately for men and women, they tell a similar story as the main results in Table 3; namely, single parents with the lowest AFQT scores are more likely to

marry, married parents with mid-range AFQT scores are less likely to divorce, and married parents with the highest AFQT scores are more likely to divorce. When compared to the main results, the point estimates in Table 6 are larger in absolute value among women in the divorce sample, and smaller in absolute value among women in the marriage sample, while the opposite is true for men.

Differences in the point estimates for men and women may result from the types of spouses they choose. Table 7 reports some summary statistics of individuals in each sample who change family structure. On average, single fathers are more likely than single mothers to increase their number of children upon marriage. This can occur either due to marrying a single mother, or by having a new child with their new spouse. Thus, single fathers are more likely to move from the one-child EITC schedule to the two-child EITC schedule upon marriage, creating a greater incentive to marry. In addition, women are more likely to retain custody of their children upon divorce, creating a stronger incentive for women to divorce in response to the EITC expansion than it would for men. These patterns in the marriage and divorce samples help explain why point estimates among women in the marriage sample are smaller in absolute value than among men, and vice versa in the divorce sample.

In order to more explicitly quantify the effect of a higher EITC amount on the probability of marrying and divorcing, Table 8 presents estimates of an alternative specification of Equation 1 that parameterizes the effect of the EITC as linear in $MaxEITC_t$, the maximum credit available each year on the one-child schedule. Note, however, that this specification does not allow for gradual effects of the EITC expansion. I find that a $1,000 increase in the maximum EITC payment causes a 4.5 percentage point increase (51.1%) in the probability of marrying for each standard deviation reduction in AFQT score among single parents with the lowest AFQT z-scores relative to single childless individuals. This estimate is comparable in size to my back-of-the-envelope calculation using the main estimates in Table 3. The remaining coefficient estimates are also comparable to the back-of-the-envelope calculations, although they are not as precise in this specification. Finally, I also estimate that a $100 decrease in AFDC/TANF generosity increases the probability of marrying by 0.5 percentage points (5.7%) among single mothers who are likely eligible for AFDC/TANF

benefits, relative to others.

However, note that the maximum EITC available each year may not be an appropriate measure of an individual's actual or potential EITC because the range of family income within the plateau range is relatively narrow and because the majority of EITC recipients do not fall within the plateau range. Although the point estimates provide additional insight into the magnitude of the effect of the EITC expansion, this method may ignore much of the key variation in how the EITC creates differing incentives across the budget constraint.

7.4 Investigating the Parallel Trends Assumption

Finally, the identification assumption throughout is that marriage and divorce decisions of individuals with and without children would have evolved similarly in the absence of the EITC expansion and welfare reform. To investigate this assumption, I use the marriage and birth histories of women surveyed in the 1995 June Current Population Survey to create a panel back to 1987 in order to examine the parallel trends assumption before the EITC expansions in 1990 and 1993–1996.[39] I restrict the sample of women to the same birth cohorts in the NLSY79 and estimate Equation 1 using education indicator variables instead of the AFQT variables (as in Table 5). I plot in Figure 6 the coefficient estimates and 95% confidence intervals of the triple interactions, $EduGroup_i \times Year_t \times HasChild_{it}$. The coefficient estimates in the pre-policy years (1987–1993) are not statistically different from zero, with the exception of the 1992 coefficient among individuals with less than a high school education in the divorce sample, but this coefficient is barely statistically significant at the 95% level. Overall, this event study approach provides some evidence that the parallel trends assumption holds in both the marriage and divorce samples. Note, however, that precision of these estimates is an issue, especially in the marriage sample.

In addition, I use the panel of women from the 1995 June CPS to plot the overall rate of new marriages and divorces in each risk sample between individuals with and without children. Figure 7 shows that the trends in new marriages and divorces appear mostly parallel, providing further

39. The June CPS is helpful because it offers a substantially larger sample than the NLSY79, although the birth and marital histories are collected only for women.

supporting evidence in favor of the parallel trend assumption in both samples. Note, however, that the downward trend in new marriage rates, which likely reflects the aging of these cohorts, may be slightly steeper among women with children than among women without children.

8 Conclusion

The Earned Income Tax Credit and the Aid to Families with Dependent Children program generate a wide array of family structure incentives, some of them conflicting. Much of the literature on the EITC and AFDC/TANF focuses on labor supply responses, but marriage and divorce offer other avenues through which an individual can respond to the programs. For very low earning couples, the EITC provides an incentive to be married, but for couples outside this range the EITC provides an incentive to be single. These incentives apply regardless of whether we consider marriage responses or divorce responses. I use longitudinal data and a triple-difference approach with a flexible spline function to estimate the effect of the 1993–1996 EITC expansion on the probability of marrying and divorcing, which allows for non-constant effects as the expansion is implemented. In the main specification, the two dimensions of treatment are 1) the individual's AFQT z-score and 2) whether the individual had an EITC-eligible child in the previous period. Z-scores aid in circumventing the endogeneity issues associated with earnings in this context; namely, that changes to EITC and AFDC/TANF program parameters cause individuals to manipulate their earnings and, thus, their statuses as treated or non-treated individuals. Prior studies often use education to differentiate between low- and high-earning individuals, but z-scores offer greater estimating power than education and are unique to the NLSY.

In addition, I show that using a cross-section sample instead of a risk sample mutes the estimated effect of the 1993–1996 EITC expansion on the probability of marrying and divorcing using the triple-difference approach. This is because a cross-section sample limits the researcher's ability to distinguish between individuals who were previously unmarried from those who were already married, thereby grouping together individuals who are able and unable to respond the policy, respectively. In addition, cross-section estimates that show an increase in the probability of being

married should also show a decrease in the probability of being divorced, creating ambiguity as to which margin of behavior changes as a result of the policy. Finally, I compare estimates that use z-scores to differentiate between likely EITC-eligible and -ineligible individuals to those that use education instead. The results show that using education decreases the precision of the estimates, and provides weak evidence, at best, of any effects on the probability of marrying and divorcing.

I conclude that individuals do respond to the family structure incentives contained in the EITC and AFDC/TANF, and that the response to the 1993–1996 EITC expansion, in particular, was substantial. The main results show that the 1993–1996 EITC expansion increased the probability of marrying between 1997–1998 by 5.2 percentage points (47.7%) for each standard deviation reduction in AFQT score among unmarried parents who are most likely to be eligible for the EITC. In addition, I find that, all else equal, a $100 decrease in the maximum monthly attainable AFDC/TANF payment for a family of three increases the probability of marrying by 0.4–0.5 percentage points (4.5–5.7%) among single mothers who are likely eligible for AFDC/TANF benefits, relative to others. I also find that the EITC expansion decreased the probability of divorcing in 1994 by 6.0 percentage points (139.5) for each standard deviation reduction in AFQT score among married parents who are more likely to be in the phase-out range of the EITC or ineligible, but increased the probability of divorcing between 1997–1998 by 10.5 percentage points (172.1%) among married parents who are the most likely to be ineligible for the EITC. Finally, I find no evidence of an effect of AFDC/TANF generosity on the probability of divorcing. These estimates imply that, for each standard deviation reduction in AFQT score, a $500 decrease in tax liability causes a 1.2–3.4 percentage point (11.0–31.2%) increase in the probability of marrying among single parents who are most likely eligible for the EITC, a 2.7–5.7 percentage point (62.8–132.6%) decrease in the probability of divorcing among married parents who are more likely to be in the phase-out range of the EITC or ineligible, and a 2.3–6.9 percentage point (37.7–113.1%) increase in the probability of divorcing among married parents who are most likely ineligible for the EITC.

Future work in this field should continue to incorporate both tax and transfer system incentives into the analysis and utilize longitudinal data to study the flows into and out of marriages, which

decouples the response margin between marriage and divorce. Although the transfer system largely discourages marriage, the tax system can either encourage or discourage marriage. The interaction is important because individuals who are eligible for one program are often eligible for others, and thus face oftentimes conflicting incentives. The effects of these programs are likely different due to different take-up rates and, possibly, different methods of receipt. Thus, one dollar in tax relief is not necessarily the same as one dollar of welfare assistance.

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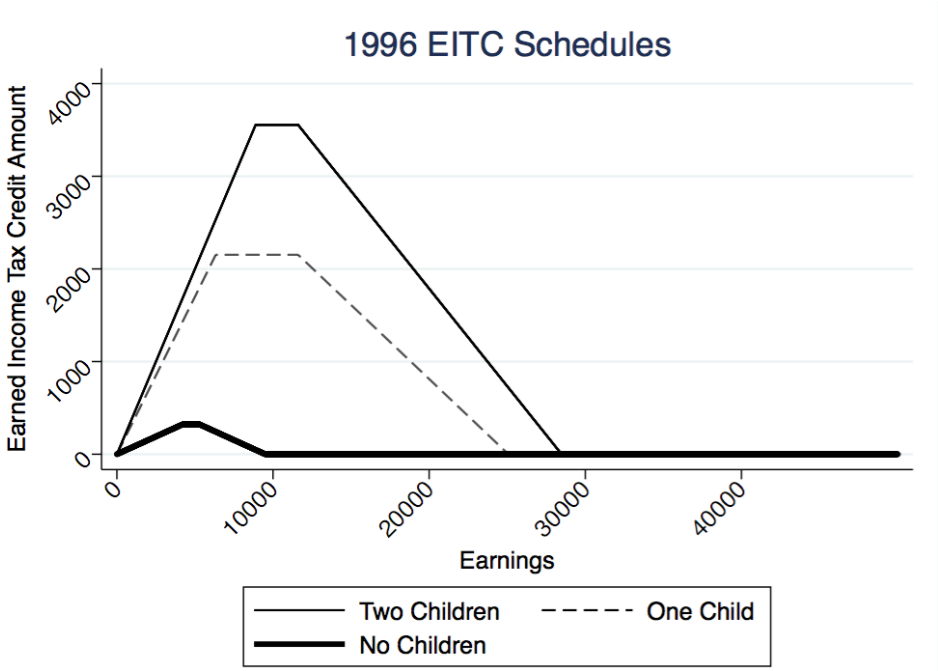
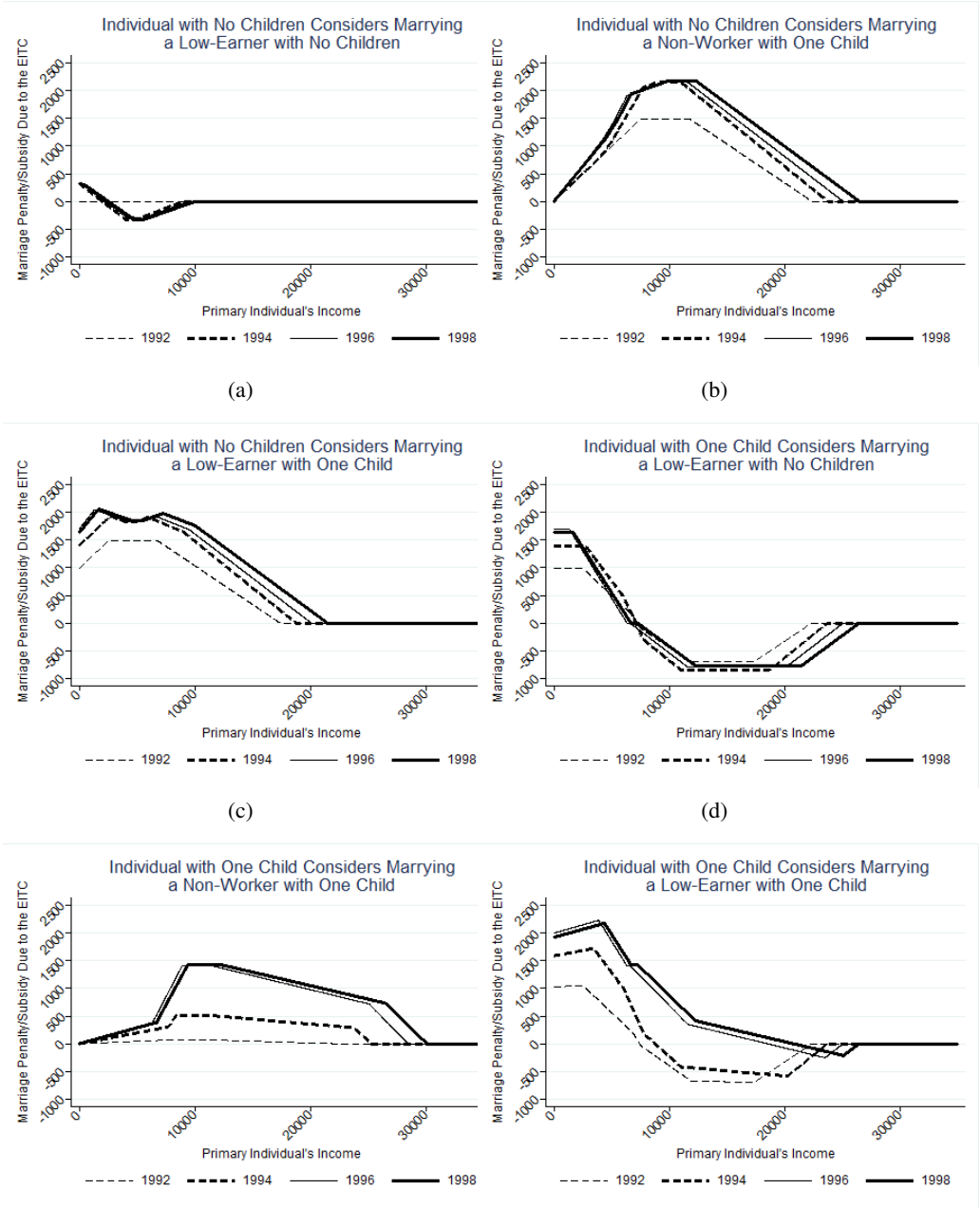
Figure 1: 1996 EITC Schedules



Notes: The data come from the EITC parameters presented in Table 1 and are taken from the U.S. Congress Joint Committee on Taxation's 2004 Green Book. All dollar values have been converted to real values using 1996 as the base year.

Figure 2: Difference Between EITC Under Marriage and EITC Under Single Status



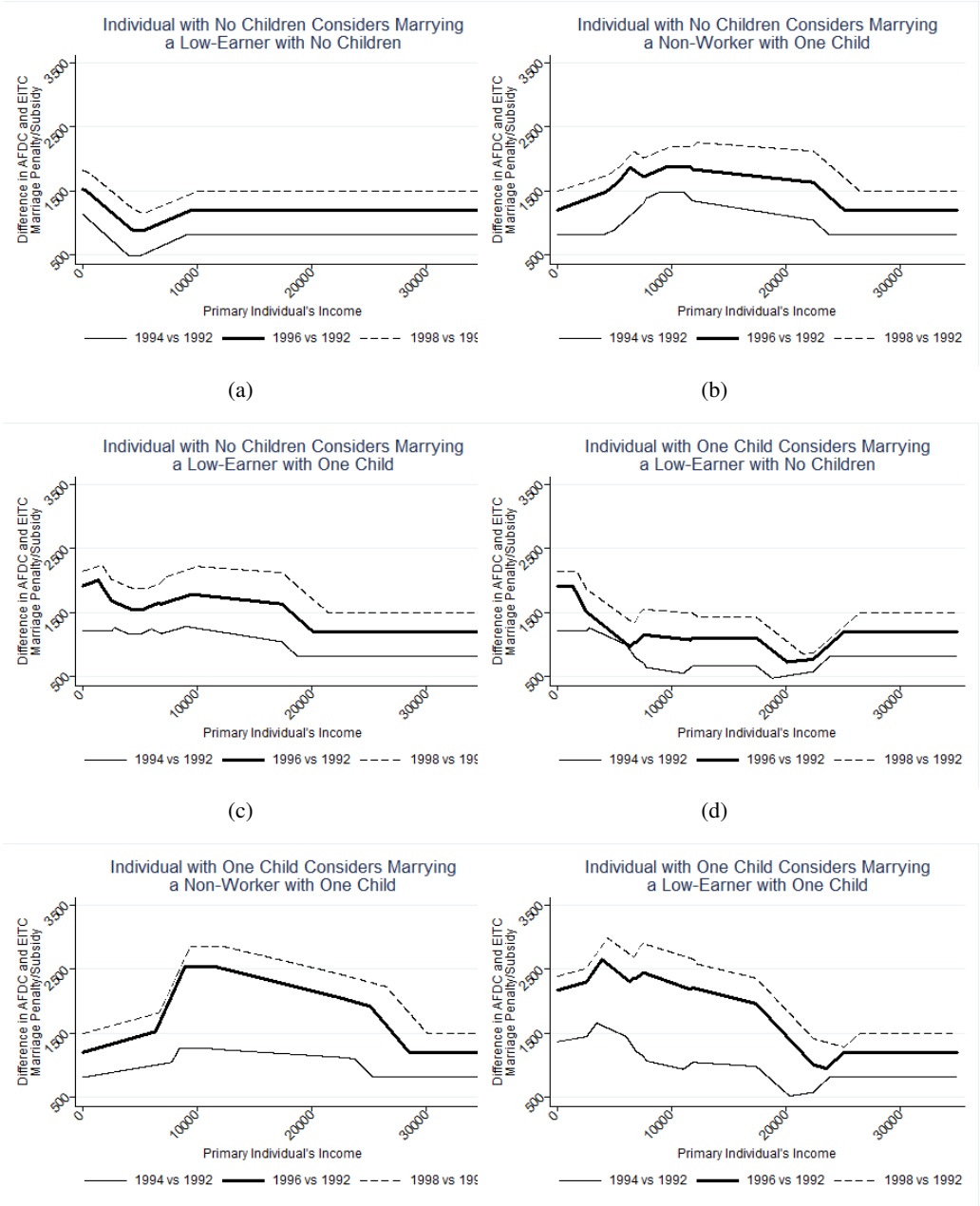
(a) (b)

(c) (d)

(e) (f)

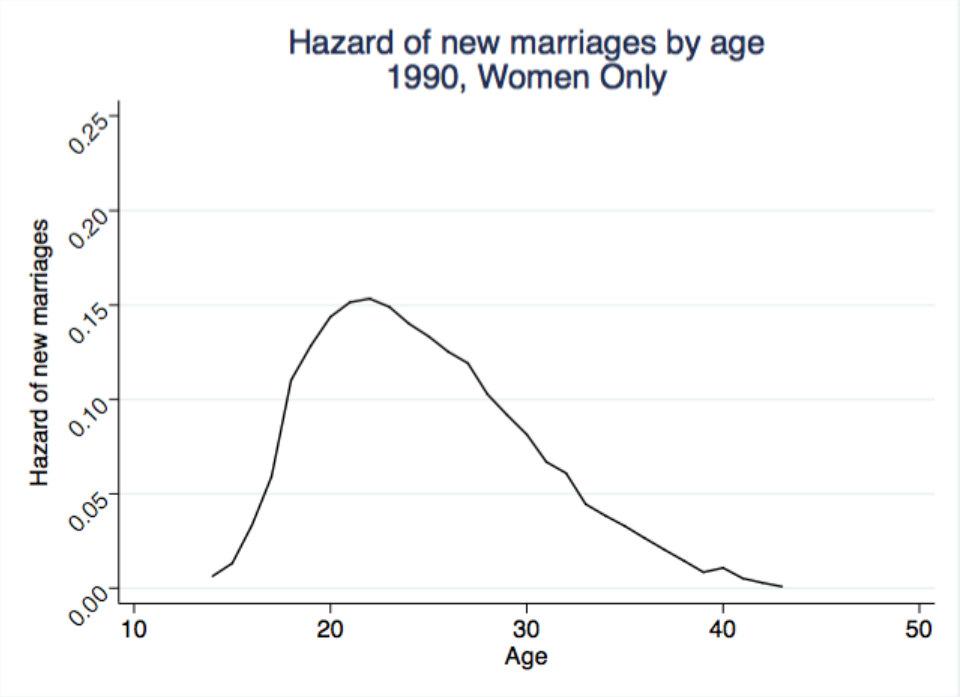
Notes: The data come from the EITC parameters presented in Table 1 and are taken from the U.S. Congress Joint Committee on Taxation's 2004 Green Book. All dollar values have been converted to real values using 1996 as the base year. As an example, the 1994 difference plots $(EITC_{married,1994} - EITC_{single,1994})$ for each situation. A "low-earner" is assumed to earn $5,000 per year. These situations are meant to be representative of the incentives faced by low-income individuals. Some situations result in zero effects, such as when an individual with no children considers marrying a non-worker with no children or when an individual with one child considers marrying a non-worker with no children.

Figure 3: Difference Between AFDC and EITC While Married and AFDC and EITC Under While Single



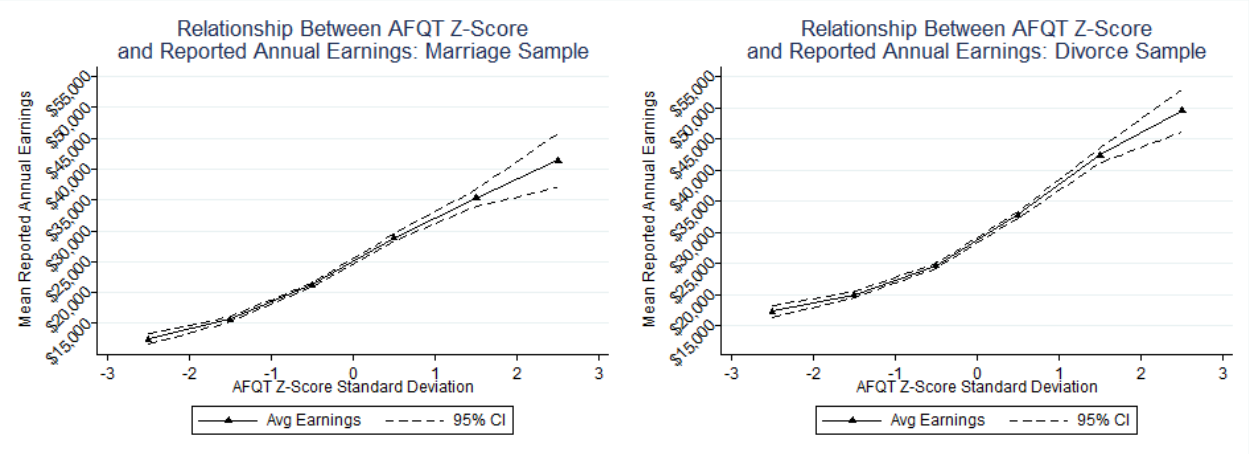
Notes: The data come from the EITC parameters presented in Table 1 and taken from the U.S. Congress Joint Committee on Taxation's 2004 Green Book. All dollar values have been converted to real values using 1996 as the base year. As an example, the 1994 to 1992 difference plots $(EITC_{married,1994} - EITC_{single,1994} - AFDC_{1994}) - (EITC_{married,1992} - EITC_{single,1992} - AFDC_{1992})$ for each situation. A "low-earner" is assumed to earn $5,000 per year. These situations are meant to be representative of the incentives faced by low-income individuals. Some situations result in zero effects, such as when an individual with no children considers marrying a non-worker with no children or when an individual with one child considers marrying a non-worker with no children.

Figure 4: Hazard of New Marriages By Age Among Women Ages 27–43 in 1990



Notes: The data come from the June 1990 Current Population Survey and represent the author's own calculations.

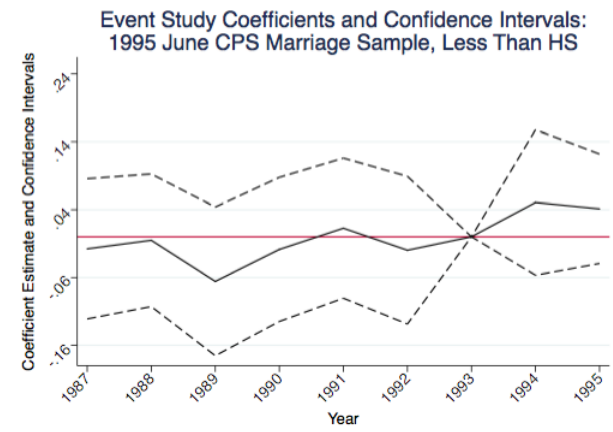
Figure 5: The Relationship Between AFQT Z-Score and Average Annual Earnings



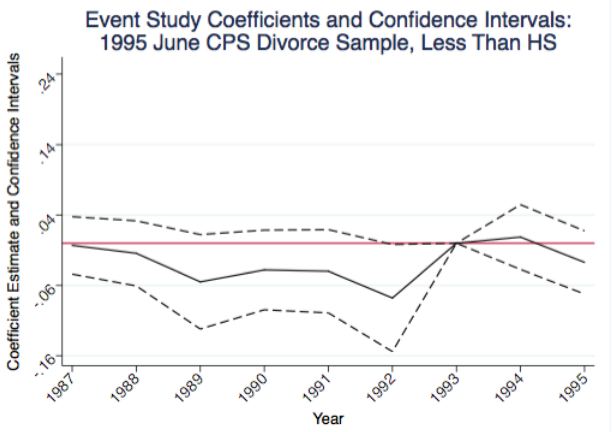
(a) (b)

Notes: The data come from the 1991–1998 waves of the NLSY79. The y-axis displays the average annual earnings of individuals in the marriage and divorce risk samples within a one standard deviation bin. The x-axis displays their AFQT z-score bin.

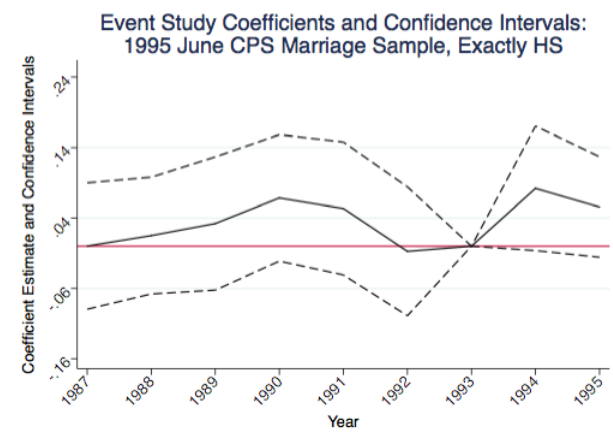
Figure 6: Event Study Coefficients and Confidence Intervals: 1995 June CPS



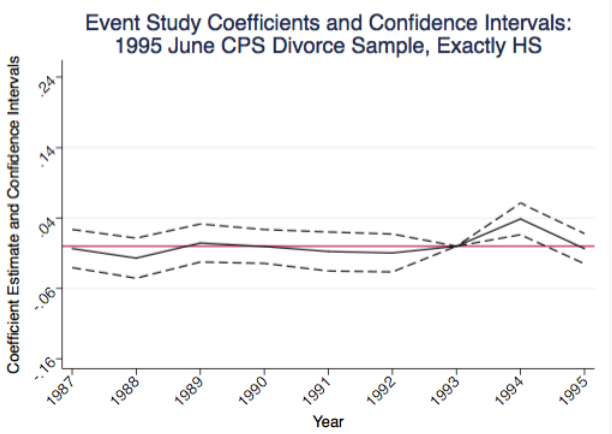
(a) Marriage Sample: 1995 June CPS



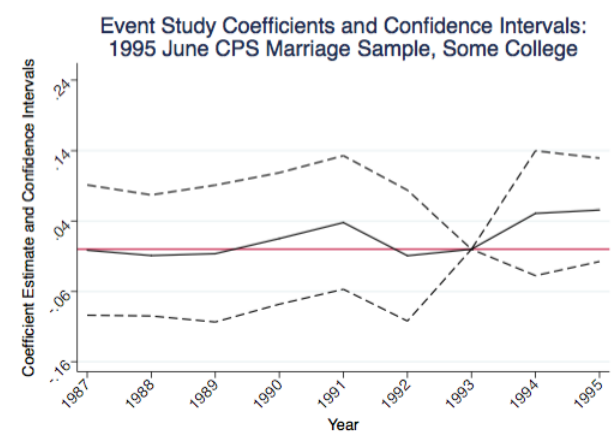
(b) Divorce Sample: 1995 June CPS



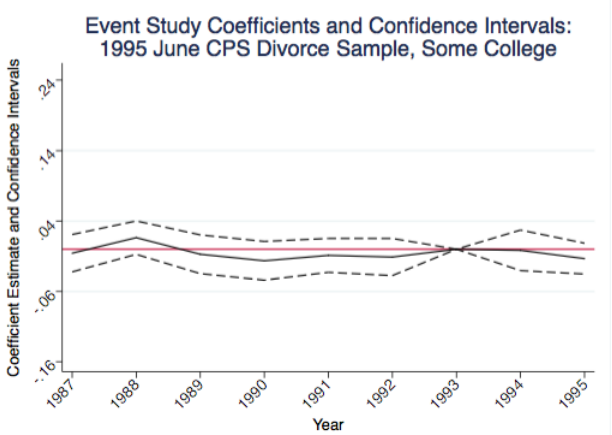
(c) Marriage Sample: 1995 June CPS



(d) Divorce Sample: 1995 June CPS



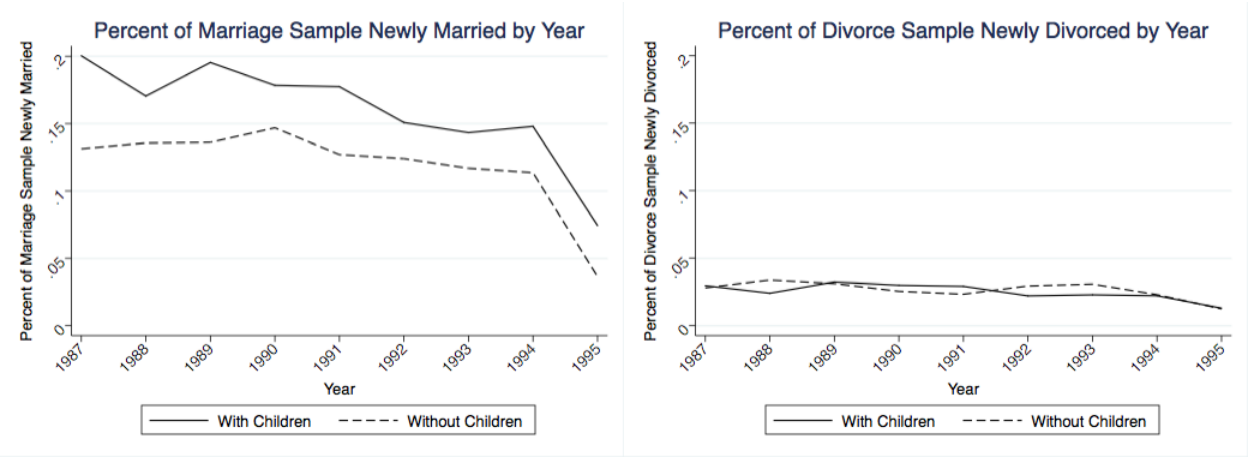
(e) Marriage Sample: 1995 June CPS



(f) Divorce Sample: 1995 June CPS

Notes: The data come from the 1995 June Current Population Survey, which collects marital and birth histories of women. Each panel plots the coefficient estimates and 95% confidence intervals of the $EduGroup_i \times Year_t \times HasChild_{it}$ variable from the specification of Equation 1 that uses education group indicator variables instead of the AFQT z-score variables.

Figure 7: Family Structure Changes in the Marriage and Divorce Samples: 1995 June CPS



(a) 1995 June CPS Marriage Sample

(b) 1995 June CPS Divorce Sample

Notes: The data come from the June 1995 Current Population Survey, which collects marital and birth histories of women. Panels a and b plot the percent of new marriages and divorces occurring in the marriage and divorce risk samples, respectively.

Table 1: EITC Parameters

Calendar Year	Phase-In Rate (%)	Min Income For Max Credit	Max Credit	Phase-Out Rate (%)	Phase-Out Range	
					Beginning Income	Ending Income
1991						
One child	16.7	7,140	1,192	11.93	11,250	21,250
Two children	17.3	7,140	1,235	12.36	11,250	21,250
1992						
One child	17.6	7,520	1,324	12.57	11,840	22,370
Two children	18.4	7,520	1,384	13.14	11,840	22,370
1993						
One child	18.5	7,750	1,434	13.21	12,200	23,050
Two children	19.5	7,750	1,511	13.93	12,200	23,050
1994						
No children	7.65	4,000	306	7.65	5,000	9,000
One child	26.3	7,750	2,038	15.98	11,000	23,755
Two children	30	8,425	2,528	17.68	11,000	25,296
1995						
No children	7.65	4,100	314	7.65	5,130	9,230
One child	34	6,160	2,094	15.98	11,290	24,396
Two children	36	8,640	3,110	20.22	11,290	26,673
1996						
No children	7.65	4,220	323	7.65	5,280	9,500
One child	34	6,330	2,152	15.98	11,610	25,078
Two children	40	8,890	3,556	21.06	11,610	28,495
1997						
No children	7.65	4,340	332	7.65	5,430	9,770
One child	34	6,500	2,210	15.98	11,930	25,750
Two children	40	9,140	3,656	21.06	11,930	29,290
1998						
No children	7.65	4,460	341	7.65	5,570	10,030
One child	34	6,680	2,271	15.98	12,260	26,473
Two children	40	9,390	3,756	21.06	12,260	30,095

Notes: The data come from the U.S. Congress Joint Committee on Taxation's 2004 Green Book.

Table 2: Initial Summary Statistics

	Marriage sample			Divorce Sample		
Variable	Mean	Min	Max	Mean	Min	Max
Age	30.6	27	41	31.0	27	41
Any Children	0.3	0	1	0.5	0	1
Number of Children	0.5	0	8	1.2	0	8
AFQT Z-Score	-0.4	-3.2	3.1	-0.2	-3.1	3.2
	Frequency	AFQT Z-Score		Frequency	AFQT Z-Score	
Education						
Less than HS	22.9%	-1.1		17.3%	-1.0	
HS Degree	34.9%	-0.6		39.3%	-0.4	
Some College	22.4%	-0.1		22.1%	0.1	
College Degree	12.0%	0.5		12.9%	0.7	
More than College	7.8%	0.6		8.3%	0.8	
Gender						
Male	54.9%	-0.4		48.9%	-0.1	
Female	45.1%	-0.4		51.1%	-0.2	
Race						
Hispanic	17.7%	-0.6		20.1%	-0.6	
Black	39.1%	-0.9		19.7%	-0.7	
Other	43.2%	0.1		60.2%	0.2	
Number of Individuals	3,939			4,762		

Notes: The data come from the National Longitudinal Survey of Youth 1979. The statistics are for individuals who are included in the indicated sample in the first year they are observed. The statistics do not include individuals who enter the marriage sample via divorce or who enter the divorce sample via marriage. Hence, these summary statistics may not be representative of the full panel of individuals in the marriage and divorce samples. Naturally, individuals who enter the marriage sample via divorce will alter the composition of the sample, and analogously for individuals who enter the divorce sample via marriage.

Table 3: All Individuals: Triple–Difference Effects of the EITC and AFDC/TANF on Marriage and Divorce

	Outcome: Married		Outcome: Divorced	
	Mean of dependent variable		Mean of dependent variable	
HasChild × 1994×				
1(AFQT Z-Score ≤ 0)	0.076	-0.004	0.043	0.022
		(0.023)		(0.019)
1(0 < AFQT Z-Score ≤ 1)		0.058		-0.060**
		(0.062)		(0.029)
1(1 < AFQT Z-Score)		0.169		0.037
		(0.116)		(0.041)
HasChild × 1996×				
1(AFQT Z-Score ≤ 0)	0.111	0.028	0.061	0.017
		(0.024)		(0.023)
1(0 < AFQT Z-Score ≤ 1)		-0.008		0.006
		(0.066)		(0.035)
1(1 < AFQT Z-Score)		-0.018		-0.023
		(0.109)		(0.036)
HasChild × 1998×				
1(AFQT Z-Score ≤ 0)	0.109	0.052**	0.061	0.029
		(0.026)		(0.024)
1(0 < AFQT Z-Score ≤ 1)		-0.007		-0.060
		(0.066)		(0.037)
1(1 < AFQT Z-Score)		0.034		0.105**
		(0.089)		(0.050)
Maximum AFDC/TANF for Family of Three	0.088	-0.004*	0.048	0.000
		(0.002)		(0.001)
Number of Observations		16474		23335
Number of Individuals		4500		5640
R^2		0.058		0.102

Notes: Standard errors are in parentheses and are clustered at the individual level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The data come from the National Longitudinal Survey of Youth 1979 and cover survey years 1991 through 1998. The dependent variable is equal to one if the individual is married (divorced) and zero if he is not. The definitions of AFDC eligibility and *TreatChild* are explained in the text. Other control variables included in all regressions, but whose coefficients are not reported, are dummies for educational level group, dummies for age group, race, gender, current, one-period, and two-period lagged number of children, state dummies, year dummies, and pairwise interactions of the treatment variables and year dummies. An individual is included in the marriage sample if he is not currently married, but is included in his first year of marriage. An individual is included in the divorce sample if he is currently married, but is included in the first year of divorce. If an individual marries and divorces during the sample, he re-enters the marriage sample.

Table 4: Comparing Risk Samples to Cross-Section Samples: Triple–Difference Effects of the EITC and AFDC/TANF on Marriage and Divorce

	Outcome: Married				Outcome: Divorced			
	Mean of dependent variable				Mean of dependent variable			
	Risk sample	Cross-section	Risk sample	Cross-section	Risk sample	Cross-section	Risk sample	Cross-section
$HasChild \times 1994 \times$								
$1(\text{AFQT Z-Score} \leq 0)$	0.076	0.592	-0.004	-0.018	0.043	0.148	0.022	-0.001
			(0.023)	(0.018)			(0.019)	(0.016)
$1(0 < \text{AFQT Z-Score} \leq 1)$			0.058	0.026			-0.060**	-0.023
			(0.062)	(0.033)			(0.029)	(0.026)
$1(1 < \text{AFQT Z-Score})$			0.169	0.035			0.037	0.004
			(0.116)	(0.051)			(0.041)	(0.033)
$HasChild \times 1996 \times$								
$1(\text{AFQT Z-Score} \leq 0)$	0.111	0.604	0.028	-0.002	0.061	0.162	0.017	0.010
			(0.024)	(0.021)			(0.023)	(0.018)
$1(0 < \text{AFQT Z-Score} \leq 1)$			-0.008	-0.036			0.006	0.025
			(0.066)	(0.040)			(0.035)	(0.031)
$1(1 < \text{AFQT Z-Score})$			-0.018	0.099*			-0.023	-0.029
			(0.109)	(0.056)			(0.036)	(0.040)
$HasChild \times 1998 \times$								
$1(\text{AFQT Z-Score} \leq 0)$	0.109	0.618	0.052**	-0.002	0.061	0.175	0.029	0.014
			(0.026)	(0.025)			(0.024)	(0.021)
$1(0 < \text{AFQT Z-Score} \leq 1)$			-0.007	-0.016			-0.060	-0.014
			(0.066)	(0.046)			(0.037)	(0.036)
$1(1 < \text{AFQT Z-Score})$			0.034	-0.017			0.105**	0.010
			(0.089)	(0.062)			(0.050)	(0.046)
Maximum AFDC/TANF for	0.088	0.586	-0.004*	-0.012***	0.048	0.145	0.000	0.002
Family of Three			(0.002)	(0.002)			(0.001)	(0.002)
Number of Observations			16474	37903			23335	37903
Number of Individuals			4500				5640	
R^2			0.058	0.285			0.102	0.065

Notes: Standard errors are in parentheses and are clustered at the individual level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The data come from the National Longitudinal Survey of Youth 1979 and cover survey years 1991 through 1998. The dependent variable is equal to one if the individual is married (divorced) and zero if he is not. The definitions of AFDC eligibility and *TreatChild* are explained in the text. Other control variables included in all regressions, but whose coefficients are not reported, are dummies for educational level group, dummies for age group, race, gender, current, one-period, and two-period lagged number of children, state dummies, year dummies, and pairwise interactions of the treatment variables and year dummies. An individual is included in the marriage sample if he is not currently married, but is included in his first year of marriage. An individual is included in the divorce sample if he is currently married, but is included in the first year of divorce. If an individual marries and divorces during the sample, he re-enters the marriage sample.

Table 5: Comparing the Use of AFQT and Education Groups as Methods for Differentiating Likely Low- and High-Earning Families

	Outcome: Married					Outcome: Divorced				
	Mean of dependent variable	Full risk sample		Edu $\leq$ some college risk sample	Edu $\leq$ exactly HS risk sample	Mean of dependent variable	Full risk sample		Edu $\leq$ some college risk sample	Edu $\leq$ exactly HS risk sample
		AFQT	Education				AFQT	Education		
HasChild $\times$ 1994$\times$										
LessThanHS	0.076	-0.004	0.009	-0.014	-0.053*	0.043	0.022	-0.014	-0.034	-0.028
		(0.023)	(0.051)	(0.032)	(0.030)		(0.019)	(0.036)	(0.039)	(0.037)
ExactlyHS		0.058	0.065	0.041			-0.060**	0.013	-0.005	
		(0.062)	(0.050)	(0.031)			(0.029)	(0.019)	(0.025)	
SomeCollege		0.169	0.024				0.037	0.017		
		(0.116)	(0.052)				(0.041)	(0.023)		
HasChild $\times$ 1996$\times$										
LessThanHS	0.111	0.028	0.106**	0.040	0.045	0.061	0.017	0.068**	0.050	0.115***
		(0.024)	(0.053)	(0.039)	(0.034)		(0.023)	(0.029)	(0.034)	(0.034)
ExactlyHS		-0.008	0.054	-0.006			0.006	-0.047*	-0.066**	
		(0.066)	(0.050)	(0.034)			(0.035)	(0.025)	(0.030)	
SomeCollege		-0.018	0.061				-0.023	0.020		
		(0.109)	(0.053)				(0.036)	(0.025)		
HasChild $\times$ 1998$\times$										
LessThanHS	0.109	0.052**	0.101**	0.040	0.065*	0.061	0.029	-0.009	-0.033	-0.037
		(0.026)	(0.050)	(0.040)	(0.037)		(0.024)	(0.039)	(0.043)	(0.041)
ExactlyHS		-0.007	0.037	-0.023			-0.060	0.025	0.002	
		(0.066)	(0.046)	(0.036)			(0.037)	(0.024)	(0.029)	
SomeCollege		0.034	0.059				0.105**	0.025		
		(0.089)	(0.049)				(0.050)	(0.027)		
Maximum AFDC/TANF for Family of Three	0.088	-0.004*	-0.014***	-0.014***	-0.015***	0.048	0.000	0.001	0.002	0.001
		(0.002)	(0.004)	(0.004)	(0.004)		(0.001)	(0.002)	(0.002)	(0.003)
Number of Observations		16474	17165	13790	9669		23335	24404	18602	13022
Number of Individuals		4500	4710	3880	2816		5640	5931	4674	3361
R^2		0.058	0.059	0.058	0.065		0.102	0.104	0.114	0.125

Notes:Standard errors are in parentheses and are clustered at the individual level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The data come from the National Longitudinal Survey of Youth 1979 and cover survey years 1991 through 1998. The dependent variable is equal to one if the individual is married (divorced) and zero if he is not. Columns labeled "AFQT" estimate models following Equation 1, and columns labeled "Education" replace the AFQT variable with a vector of education level indicator variables. The definitions of AFDC eligibility and *TreatChild* are explained in the text. Other control variables included in all regressions, but whose coefficients are not reported, are dummies for educational level group, dummies for age group, race, gender, current, one-period, and two-period lagged number of children, state dummies, year dummies, and pairwise interactions of the treatment variables and year dummies. An individual is included in the marriage sample if he is not currently married, but is included in his first year of marriage. An individual is included in the divorce sample if he is currently married, but is included in the first year of divorce. If an individual marries and divorces during the sample, he re-enters the marriage sample.

Table 6: Men and Women Separately: Triple–Difference Effects of the EITC and AFDC/TANF on Marriage and Divorce

	Outcome: Married				Outcome: Divorced			
	Women only		Men only		Women only		Men only	
	Mean of dependent variable		Mean of dependent variable		Mean of dependent variable		Mean of dependent variable	
$HasChild \times 1994 \times$								
$1(\text{AFQT Z-Score} \leq 0)$	0.075	0.001	0.076	0.023	0.046	0.045	0.041	0.007
		(0.033)		(0.046)		(0.028)		(0.024)
$1(0 < \text{AFQT Z-Score} \leq 1)$		0.011		0.056		-0.087**		-0.037
		(0.077)		(0.128)		(0.041)		(0.040)
$1(1 < \text{AFQT Z-Score})$		0.144		0.323		0.004		0.046
		(0.120)		(0.345)		(0.054)		(0.056)
$HasChild \times 1996 \times$								
$1(\text{AFQT Z-Score} \leq 0)$	0.119	0.015	0.104	0.037	0.068	-0.041	0.054	0.048*
		(0.039)		(0.039)		(0.043)		(0.026)
$1(0 < \text{AFQT Z-Score} \leq 1)$		-0.007		0.021		0.012		-0.001
		(0.087)		(0.136)		(0.051)		(0.047)
$1(1 < \text{AFQT Z-Score})$		0.007		-0.085		-0.014		-0.028
		(0.118)		(0.282)		(0.059)		(0.044)
$HasChild \times 1998 \times$								
$1(\text{AFQT Z-Score} \leq 0)$	0.107	0.025	0.111	0.071	0.062	0.040	0.060	0.023
		(0.041)		(0.051)		(0.034)		(0.032)
$1(0 < \text{AFQT Z-Score} \leq 1)$		-0.090		0.109		-0.096*		-0.040
		(0.089)		(0.127)		(0.050)		(0.052)
$1(1 < \text{AFQT Z-Score})$		0.028		0.175		0.165**		0.053
		(0.105)		(0.238)		(0.082)		(0.057)
Maximum AFDC/TANF for Family of Three	0.090	0.004	0.086	-0.002	0.051	-0.004*	0.046	0.000
		(0.004)		(0.005)		(0.002)		(0.002)
Number of Observations		7577		8897		11293		12042
Number of Individuals		2108		2392		2868		2772
R^2		0.045		0.090		0.040		0.195

Notes: Standard errors are in parentheses and are clustered at the individual level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The data come from the National Longitudinal Survey of Youth 1979 and cover survey years 1991 through 1998. The dependent variable is equal to one if the individual is married (divorced) and zero if he is not. The definitions of AFDC eligibility and *TreatChild* are explained in the text. Other control variables included in all regressions, but whose coefficients are not reported, are dummies for educational level group, dummies for age group, race, current, one-period, and two-period lagged number of children, state dummies, year dummies, and pairwise interactions of the treatment variables and year dummies. An individual is included in the marriage sample if he is not currently married, but is included in his first year of marriage. An individual is included in the divorce sample if he is currently married, but is included in the first year of divorce. If an individual marries and divorces during the sample, he re-enters the marriage sample.

Table 7: Summary Statistics of Men and Women who Change Family Structure

Variable	Mean
Men who marry	
# of children (current period)	1.918
# of children (last period)	1.630
Age of youngest child (current period)	4.972
Age of youngest child (last period)	4.822
Women who marry	
# of children (current period)	1.971
# of children (last period)	1.824
Age of youngest child (current period)	7.824
Age of youngest child (last period)	7.433
Men who divorce	
# of children (current period)	0.639
# of children (last period)	2.103
Women who divorce	
# of children (current period)	1.968
# of children (last period)	2.169

Notes: The data come from the National Longitudinal Survey of Youth 1979 and cover survey years 1991 through 1998.

Table 8: The Effects of Taxes and Transfers: Using EITC Generosity as a Continuous Variable

	Outcome: Married		Outcome: Divorced	
	Mean of dependent variable		Mean of dependent variable	
$HasChild \times MaxEITC_t \times$ (AFQT Z-Score$_i \leq 0$)	0.088	0.045**	0.048	0.022
		(0.020)		(0.018)
$HasChild \times MaxEITC_t \times$ ($0 <$ AFQT Z-Score$_i \leq 1$)		-0.010		-0.021
		(0.054)		(0.028)
$HasChild \times MaxEITC_t \times$ ($1 <$ AFQT Z-Score$_i$)		0.016		0.027
		(0.084)		(0.035)
Maximum AFDC/TANF for Family of Three		-0.005**		0.001
		(0.002)		(0.001)
Number of Observations		16474		23335
Number of Individuals		4500		5640
R^2		0.055		0.097

Notes: Standard errors are in parentheses and are clustered at the individual level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The data come from the National Longitudinal Survey of Youth 1979 and cover survey years 1991 through 1998. The dependent variable is equal to one if the individual is married (divorced) and zero if he is not. The definitions of AFDC eligibility and *TreatChild* are explained in the text. Other control variables included in all regressions, but whose coefficients are not reported, are dummies for educational level group, dummies for age group, race, current and one-period lagged number of children, state dummies, year dummies, and pairwise interactions of the treatment variables and year dummies. An individual is included in the marriage sample if he is not currently married, but is included in his first year of marriage. An individual is included in the divorce sample if he is currently married, but is included in the first year of divorce. If an individual marries and divorces during the sample, he re-enters the marriage sample.

9 Appendix: Theoretical Model of Dynamic Selection

The model considers a single individual who has a "propensity to marry" (θ) that is randomly drawn from a uniform distribution between $[0,1]$.[40] Each period an unmarried individual is randomly matched with a potential partner and receives a match quality shock (ε), where $\varepsilon \sim$ i.i.d. $N(0,1)$. When deciding whether to marry, the individual compares his utility while single (U^s) to his utility while married ($U^m + \varepsilon$). If $U^m + \varepsilon > U^s$ then he marries, and if $U^m + \varepsilon < U^s$ then he remains single. I assume that U^s is strictly decreasing in θ and that U^m is strictly increasing in θ. In other words, utility of being single decreases as one's propensity to marry increases, and utility of being married increases as one's propensity to marry increases. I illustrate this relationship as well as a hypothetical increase in marriage incentives in Figure 8.

These assumptions imply that there is some threshold level of $\hat{\theta}$, where individuals with $\theta > \hat{\theta}$ will marry and individuals with $\theta < \hat{\theta}$ will remain single, but the i.i.d. match quality shock will provide some heterogeneity in the decision. Specifically:

$$\begin{aligned} Pr[marry] = & \quad Pr[U^m + \varepsilon > U^s] \\ = & \quad Pr[\varepsilon > -(U^m - U^s)] \\ = & \quad 1 - \Phi(-(U^m - U^s)) \end{aligned}$$

Without any change in marriage incentives, the differential probability of marrying along the distribution of θ will skew the sample of unmarried individuals over time to contain relatively more individuals with low levels of θ. I illustrate this effect in Figure 9, which displays the density of θ within the unmarried population over time. In Period 0 everyone is unmarried, so the distribution of θ is the uniform distribution. Each period the random match quality shock causes more people with higher values of θ to marry than it does people with lower values of θ, creating a sample that, over time, will contain a larger proportion of individuals with low levels of θ even without any changes in marriage incentives.

An increase in marriage incentives will shift the U^m line up to $U^{m'}$ and create a new threshold

40. θ could also be described as a "desire to marry" or a "desire to start a family."

level of theta ($\hat{\theta}'$). Combined with the already existing trend of the sample, this change in marriage incentives will exacerbate the issue of dynamic selection due to an even larger probability of marrying among individuals with higher levels of θ. Therefore, the distribution skews even more heavily to the left as marriage incentives increase.

This dynamic selection into single status creates important implications for the sample of unmarried individuals in my empirical analysis and may introduce bias to the estimates in later years. If this dynamic selection story is true then we would expect to see decreases in the probability of marrying in later sample years due to the policy. This is because the sample of unmarried individuals in later years contains relatively more individuals with low levels of θ relative to the sample of unmarried individuals in earlier years. The policy encouraged marginal individuals to marry, leaving behind a population of unmarried individuals who are less likely to marry compared to the earlier sample.

Figure 8: Illustrated Theoretical Model

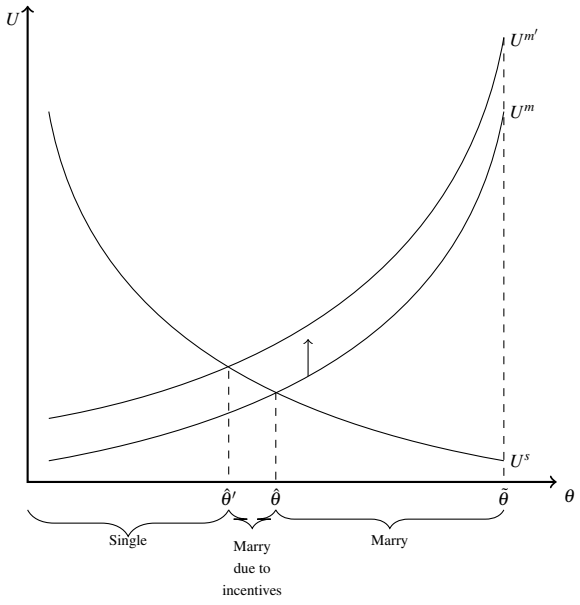


Figure 9: Distribution of Theta Over Time