Published in final edited form as:

Am Sociol Rev. 2010 August 11; 75(4): 534–562. doi:10.1177/0003122410374086.

Effects of Prenatal Poverty on Infant Health: State Earned Income Tax Credits and Birth Weight

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This study estimates the effects of prenatal poverty on birth weight using changes in state Earned Income Tax Credits (EITC) as a natural experiment. We seek to answer two questions about poverty and child wellbeing. First, are there associations between prenatal poverty and lower birth weights even after factoring out unmeasured potential confounders? Since birth weight predicts a range of outcomes across the life course, lower birth weights that result from poverty may have lasting consequences on children's life chances. Second, how have recent expansions of a work-based welfare program (i.e., the EITC) impacted maternal/infant health? In recent decades, U.S. poverty relief has become increasingly tied to earnings and labor markets, but the consequences for child wellbeing remain controversial. We find that state EITCs increase birth weights and reduce maternal smoking. However, results related to AFDC/TANF and varying EITC effects across maternal ages raise cautionary messages.

In life course models of stratification, early-life environment is crucially important. Exposure to poverty and negative environments during critical stages of early life can negatively affect children's future developmental trajectories (e.g., cognitive and physical development), which may have lasting negative effects on educational attainment and adult earnings (Duncan and Brooks-Gunn 1997; Wagmiller et al 2006). According to recent research, prenatal poverty and birth weight are important variables in life course processes of stratification (Conley et al. 2003; Cramer 1995). As a measure of health at the start of life, birth weight is a general indicator of a baby's in-utero environment and development, and maternal poverty during the prenatal period is a robust predictor of lower birth weights (Bennett 1997). Having been born low birth weight can in turn predict a range of negative outcomes across the life course, including increased infant mortality and poor childhood health, and lower educational attainment and earnings (Bennett 1997, Behrman and Rosenzweig 2004). Several authors have recently argued that early-childhood health (e.g., birth weight) plays an important role in life chances and, ultimately, the reproduction of inequality over generations (Case et al 2005; Haas 2006). Policies that increase birth weights by reducing poverty among pregnant women may, therefore, generate long-term benefits.

However, other authors challenge life course models of stratification by suggesting that early-life poverty does not have a real causal effect on child-wellbeing (Meyer 1997). Low family incomes are correlated with a range of other potentially confounding risk factors—such as, mothers' early-life exposures, preferences/attitudes, and genetic variation—all of

which may impact children and are difficult to properly adjust for in statistical models (Duncan 2005). If poverty does not actually affect birth weight, policies focused on increasing pregnant women's incomes may not confer expected benefits.

This article uses temporal variation in state Earned Income Tax Credits (EITCs) as a natural experiment to estimate the effects of prenatal poverty on infant health. The EITC is a refundable tax credit targeted at low-wage workers in the U.S. Enactments of state EITCs increase the incomes of disadvantaged single mothers by increasing labor market participation and wages. However, after adjusting for various additional factors, within-state variation in credits from one year to the next should be independent of potential confounders. We use 1980–2002 U.S. birth certificate data for single mothers with a high school degree or less. Employing a difference-in-difference modeling strategy with state fixed-effects, we consider how variation in state EITCs over time impacts birth weight. Positive correlations between state EITCs and birth weight will imply that reducing prenatal poverty improves in-utero development and infant health, net of unmeasured risk factors. We also examine possible pathways for EITC effects by testing whether changes in state EITCs affect maternal smoking during pregnancy, and assessing the extent to which mothers' smoking mediates effects of EITCs on birth weight.

Recent expansions of the EITC reflect a broader trend of “liberalizing” U.S. welfare policy and connecting cash assistance to the labor market (Danziger and Haveman 2001). The replacement of Aid to Families with Dependent Children (i.e., AFDC, an entitlement cash assistance program) with Temporary Assistance to Needy Families (i.e., TANF, which requires work/work-related activities) is another key example of this trend. What these policy shifts mean for maternal and child wellbeing remains controversial. Labor market entry following EITC expansions and/or welfare reform has increased incomes for single-mother households (Meyer and Rosenbaum 2001, Neumark and Wascher 2000). However, costs associated with employment (e.g., transportation, child care) and/or barriers to regular work (e.g., low skills, weak labor markets) leave many employed mothers more financially strapped than their counterparts on welfare (Corcoran et al. 2000, Edin and Lein 1997). If time constraints and stress associated with low-wage work make it harder for mothers to create healthy home or in utero environments, work-based welfare programs could harm child/infant wellbeing, perhaps in spite of increased incomes. The following analysis of state EITCs yields general insights in how recent expansions of a work-based welfare policy have impacted maternal/infant health. Comparing state EITC estimates to similar estimates for state variation in AFDC/TANF policies, which are adjusted for in all the following models, provides further suggestive evidence about consequences of different policy structures.

Pathways between Prenatal Poverty and Birth Weight

There are several pathways through which poverty may affect birth weight. Low-incomes may limit access to health necessities, such as an adequate diet. For families experiencing food insecurity, even small, short-term variations in income can impact mothers' nutritional intake (Tarasuk, McIntyre, and Li 2007). Poverty may also affect birth weight by increasing both exposure and vulnerability to psychosocial stressors. Living below the poverty line exposes one to a disproportionate share of environmental stressors (e.g., disadvantaged communities, crime, domestic violence [Taylor, Repetti, and Seeman 1997]). Chronic maternal distress may slow fetal growth rates and increase the risk of preterm delivery by altering the normal regulation of hormones during pregnancy (e.g. raising corticotrophin-releasing hormone and cortisol earlier than is typical) (Weinstock 2004). Furthermore, adults who experienced negative early-life exposures (e.g., in-utero distress, early childhood disease or trauma) have stronger than average hormonal and blood pressure responses to stimuli (Ladd et al. 2000). Since many poor adults were born into poverty, poor pregnant

women are disproportionately likely to have experienced poverty-related stressors during prenatal/early-life. This may make them particularly sensitive to stressors later in life.

Poverty may further impact birth weight by affecting health-related behaviors, particularly by making it more difficult for poor women to quit smoking when they become pregnant. Income is negatively correlated with smoking (Kanjilal et al. 2006), and stress frequently thwarts efforts to quit smoking (Kassel, Stroud, and Paronis 2003). Addictive behaviors (e.g., smoking and drinking) appear to play an important mediating role in the relationship between economic stress and lower birth weights (Sheehan 1998). In the following analysis, we test for effects of state EITCs on the addictive behavior of smoking, and assess the extent to which smoking during pregnancy mediates effects of EITCs on birth weight.

Although there are many potential pathways for prenatal poverty effects, there are also several potential confounders. Unobserved genetic variation may be a source of bias. Although shared environment is no doubt important, within-family (i.e., parent/child or sibling) correlations for birth weight and poverty raise the possibility that genes are joint determinants (Wang et al. 1995). Mothers' early life environments may also cause bias by simultaneously influencing poverty and birth weight. Early life disadvantage can increase the risk of adult poverty, and recent research shows that mothers who experienced less healthy environments when in utero have poorer birth outcomes (Almond and Chay 2006, Lumey and Stein 1997).

Finally, unmeasured differences in mothers' attitudes and time preferences may be partially responsible for birth weight-poverty associations. Since both socioeconomic attainment and health frequently require one to forego current pleasures in the interests of future returns, people who tend to consume in the present, rather than invest in the future, may end up both poorer and sicker (Fuchs 1982). If such a present-orientation makes it more difficult for a woman to stay in school in the interests of future earnings and to maintain good health habits in the interests of her fetus's future health, unobserved time preference could generate associations between prenatal poverty and birth weight. Although time preferences are often treated as given within the economics literature, they are not necessarily "innate" and likely reflect earlier environmental/social exposures.

Arguments about underlying preferences sometimes motivate concerns over "perverse" effects of income transfers and arguments for the elimination of cash transfers and/or their replacement with more "paternalistic" in-kind transfers (see, e.g., Murray 1984). If poor mothers have worse perinatal health outcomes because of present-oriented time preferences, raising their incomes could actually cause harm by increasing unhealthy habits or consumption. In the following analysis, we test for perverse income effects by modeling associations between state EITCs and maternal smoking during pregnancy. Positive associations between state EITCs and maternal smoking will suggest that income assistance, indeed, has perverse health effects and increases maternal smoking. Alternatively, negative associations will suggest that income assistance reduces maternal smoking (e.g., by decreasing income-related stressors, making it easier to quit).

The Earned Income Tax Credit

The EITC is a typically refundable tax credit which is designed to reduce the tax burden on, and supplement the incomes of, low-wage workers in the United States. In order to qualify for the EITC a person must have some earnings, but have an adjusted gross income below a threshold that varies by year and family size. As shown in Figure 1, the EITC has a phase-in range during which the credit increases with earnings, until reaching a plateau at the maximum credit value (\$4,716). Once earnings pass a certain limit (\$15,399), the phase-out range begins and the credit decreases with additional earnings until reaching zero at the

income threshold level (\$37,782). (Values are for the federal EITC for a family of two in 2007 [IRS 2007]).

The federal EITC was enacted in 1975 and is administered by the U.S. Internal Revenue Service (IRS). In addition, since the early 1980s, 16 states have enacted their own EITCs, which are administered at the state-level. Most states use the same eligibility criteria as the federal program and express their credit as a percentage of the federal credit. While the majority of state credits are refundable, Illinois, Iowa, Maine, Oregon, and Rhode Island offer non-refundable credits. Table 1 displays trends in the federal and state EITCs. For instance, in 1994, New York enacted a refundable credit equal to 7.5% of a filer's federal credit, and then expanded it to more than three times its original size so it reached 27.5% by 2002. Since state credits are expressed as percentages of the federal credit, they also grow when the federal credit increases.

The EITC increases poor mothers' incomes in two ways. First, as a tax credit, it reduces tax liability, which increases after-tax income. Second, the structure of the EITC generates employment incentives, particularly among single mothers with low-education, which will increase earnings. Since these two components are intertwined (earnings affect the credit and the credit affects earnings), it is extremely difficult to empirically separate out their effects, and the estimates from our analysis will reflect their combined impact. It is useful, however, to draw a conceptual distinction between these two exposures and consider how they each might impact birth weight.

The tax credit component of the EITC

Since the federal and most state EITCs are refundable, if tax filers owe less than their calculated credit they receive the difference as a cash transfer, typically as a lump sum payment after filing taxes (Hotz and Scholz 2003).¹ Evidence from a qualitative study of EITC recipients in Wisconsin suggests participants spend this refund money somewhat differently than regular paychecks, often investing in housing, cars/car repairs, paying off bills, child care and/or children's items (e.g., learning items, clothing, etc) (Romich and Weisner 2000). While these expenditures are unlikely to have direct benefits for birth weight, there may be indirect pathways. For instance, reducing logistical barriers to employment can have substantial returns. Danziger et al (1998) found that, among low-income welfare recipients, the marginal effects of car ownership on future earnings were equivalent to the marginal effects of completing high school.

Earnings and the employment incentives of the EITC

Beyond the credit itself, the incentive structure of the EITC can also raise income by increasing labor market participation and thus earnings. The EITC is explicitly designed to encourage low-wage employment by reducing taxes on wages below a certain level. This incentive structure is particularly effective among single mothers with low-education because they are more likely to fall in the EITC's phase-in range (see Figure 1). More-educated women or married couples, who are more likely to fall in the credit's plateau or phase-out ranges, are less sensitive to EITC employment incentives (Hotz and Scholz 2003). The EITC increases single mothers' labor market entry, but has little effect on the number of hours worked for those already employed (Eissa and Hoynes 2005). For many single mothers, potential earnings are so low that costs associated with working (e.g., child care, transportation) exceed the additional income they could get from employment. The EITC

¹While there is an EITC-advance option that allows filers to receive their credit incrementally throughout the year, only about one percent of filers make use of this option.

often raises effective wages above this threshold so that entering the labor market becomes a profitable option.

There is a considerable body of evidence showing that the EITC increases maternal employment and reduces poverty rates. Using 1984–1996 data from the March Current Population Surveys (CPS), Meyer and Rosenbaum (2001) find that a \$1,000 reduction in income taxes associated with federal and state EITCs increased annual employment among single mothers with less than 12 years of education by approximately nine percentage points. Neumark and Wascher (2000), using 1985–1994 CPS data on poor/near-poor households, find that a 4% increase in the phase-in rate of a state credit is associated with a 13% increase in the probability of labor market entry and a 6% increase in the probability of rising above the poverty line. To place this in context, about 21% of this study's sample transitions out of poverty during the observation period. A 6% increase in the probability of rising above the poverty line is, proportionately speaking, equivalent to an increase of about one-quarter to one-third of the average transition rate.

The direct effects of state EITCs on family income through reduced tax liability are not particularly large (see, e.g., the maximum credits in Table 1). However, evidence shows that the indirect effects of state EITCs, which operate through employment incentives and earnings, can be quite substantial. In the following analysis, we use 1980–2002 March CPS data to demonstrate these indirect effects and show how enactments of state EITCs impacted employment and earnings within our specific population of interest (i.e., single mothers with a high school degree or less).

Poverty Relief and Infant Health

Using natural experimental approaches, a handful of authors have tested associations between income assistance and birth weight. Currie and Cole (1993), using an instrumental variable strategy, find no effect of AFDC benefits on birth weights. However, Kehrer and Wolin's (1979) shows that a 1970s negative income tax (NIT) experiment increased birth weight between .3 and 1.2 additional pounds for African American women facing multiple risk factors. Focusing on county-level variation in the initiation of the Food Stamps program in the 1960s and 1970s, Almond, Hoynes, and Schanzenback (2008) find positive associations between Food Stamps and birth weight.

Each of these studies provides importance evidence. However, because they focus on programs that often have work disincentives, they do not address how work-based welfare programs, such as EITC, might influence maternal/infant health. Research on academic achievement suggests that the structure of work incentives is important. Experimental welfare programs that encouraged employment with earnings supplements have promoted young children's academic achievement; however, programs that mandated work, but did not support it financially, had few impacts on children (Morris et al. 2001). Dahl and Lochner (2009) have also found that expansions of the federal EITC were associated with improvements in children's math and reading scores.

To get a general sense of how different policies with varying employment incentives impact infant/maternal health, we compare the following EITC estimates to several AFDC/TANF estimates, which are included in the models as controls. In contrast to the EITC, AFDC/TANF benefits, which decline with additional earnings, are generally negatively associated with employment (Moffitt 2003). If both state EITCs and AFDC/TANF benefits improve birth weights, poverty relief may be generally beneficial despite differences in work incentives. Alternatively, finding that one program is beneficial while the other is not will provide preliminary evidence that health benefits depend on work incentives and/or other program structures. While the following AFDC/TANF estimates provide interesting points

of comparison, we focus our main interpretation on state EITCs because they provide cleaner natural experiments than AFDC/TANF.²

Examining the NIT and Food Stamps, Kehrner and Wolin (1979) and Almond, Hoynes, and Schanzenbach (2008) find larger improvements in birth weight among higher-risk groups, such as babies in lower weight ranges or African American mothers with additional risk factors (e.g., young age, no father at the birth). However, it seems equally likely that more advantaged individuals would be better able to translate income assistance into improved infant health. Mirowsky and Ross (1998) argue that socioeconomic advantages, such as higher education, give people an enhanced sense of personal control, which allows them to turn health-producing behaviors into long-term, coherent healthy lifestyles.

In the following analysis, we test whether enactments of new state EITCs have varying effects for more or less advantaged individuals by comparing estimates across maternal age and education. Any interactions between maternal characteristics and state EITCs will reflect a combination of (i) differences in eligibility and/or take-up rates, which affect receipt of the EITC, and (ii) differences in the health benefits of EITC for those who receive the credit. When examining education, we compare women without high school degrees to those with only high school degrees (i.e., no education beyond high school). Mothers with high school degrees may be more likely to enter the labor market following a new EITC, and then file for the credit at tax time. Within the credit's phase-in range, higher average earnings will give more educated women access to larger credits. Skills and cognitive abilities associated with higher education may also make it easier for mothers to translate additional income from the EITC into better health habits (e.g., improved diet). Finding larger effects among mothers with high schools degrees would, therefore, suggest that state EITCs are more beneficial for the relatively more advantaged; while finding larger effects among those without a high school degree would suggest the opposite.

The relationship between birth weight and maternal age is generally curvilinear with lower birth weights found among mothers who are 18 or younger or older than 35. Lower birth weights among young mothers can reflect their high rates of poverty and disadvantage. Lower birth weights among older mothers, on the other hand, often result from age-related pregnancy complications (e.g., pre-eclampsia, gestational diabetes). Single mothers over 35 may be more likely to have higher earnings and access to larger credits within the EITC phase-in range. However, age-related pregnancy complications may reduce the birth weight benefits of an EITC-related income boost. In this case, we should see smaller effects among older mothers, particularly in comparison to 19–35 year old mothers who are socioeconomically advantaged relative to their younger counterparts. Mothers who are 18 or younger are likely to have weak labor market attachment, and some may not be eligible for the EITC if they are still dependents on their parents' taxes (although they could still benefit indirectly if state credits increase their parents' employment/income). We, therefore, expect young mothers to get comparatively small birth weight returns from the EITC, particularly in relation to 19–35 year old mothers who are at lower biological risk than mothers 35+. Indeed, finding very large EITC effects among very young mothers would raise concerns about confounding from unmeasured state time trends.

²While state AFDC/TANF programs vary along many different dimensions (e.g., time limits, work requirements, etc.), most state EITCs build directly on the federal credit, making state variation easier to measure and interpret. Also, since the EITC is operated through the IRS, eligibility is relatively independent of other social programs; eligibility for AFDC/TANF, on the other hand, is often coupled with various in-kind programs (e.g., food stamps, Medicaid, job training).

Research Methods and Data

We employ a difference-in-difference modeling strategy with state and year fixed effects, which can be written as:

$$Y = \beta_0 + \beta_1 \text{EITC}_{st} + \beta_2 \text{Individual}_{ist} + \beta_3 \text{State Econ/Policy}_{st} + \beta_4 \text{State}_t + \beta_5 \text{Year}_s + u$$

where the subscript *i* reflects individuals, *s* reflects states, and *t* reflects time (i.e., year). **EITC** reflects whether a woman gave birth in a state with an EITC, **Individual** reflects a set of individual-level control variables, and **State Econ/Policy** reflects a set of controls for state economic and social policy conditions. **State** includes dummy variables for each of the U.S. states and the District of Columbia (i.e., state fixed effects), while **Year** includes dummy variables for years (i.e., year fixed effects). The state fixed effects hold constant unmeasured time-invariant differences across states (e.g., stable state differences in policy, costs of living, population composition, etc). The year fixed effects hold constant any time trends that impact the entire nation (e.g., changes in the national economy or federal tax and welfare policies). Including state and year fixed effects means that β_1 can be interpreted as the effect of a change in (i.e., enactment of) a state credit. Conceptually, this difference-in-difference modeling strategy involves defining a treatment and control group and then comparing differences across these groups before and after the enactment of a state EITC. Our main treatment group is unmarried mothers with a high school degree or less living in a state with an EITC. The main control group is similarly unmarried mothers with a high school degree or less, but who are living in a state without an EITC.

As shown in Figure 2, the natural experimental logic of the difference-in-difference approach assumes that the enactment of a state EITC in year *Y* increase maternal income and employment, but has no direct effect on birth weight in year *Y*+1 (independent of the effects mediated by employment/income); and, after adjusting for potential confounders, the fact that one state enacts a credit in a given year and another does not should be uncorrelated with individual women's unmeasured characteristics. These assumptions will be violated if there are unmeasured state-specific time trends associated with both EITCs and birth weight. That is, our estimates could be biased if enactments of state EITCs coincide with other types of changes within the state that are correlated with birth weight and are not controlled for in our models. To address this, we include several control variables for states' economic circumstances and social policies. We also conduct the following two tests to check the validity of our natural experimental assumptions and bolster our causal interpretation.

Tests of the Natural Experiment Assumptions

First, we test for birth weight-EITC associations across the following three subgroups that should be relatively less sensitive to the EITC than our primary sample.

- i. Women with 16 or more years of education: Since college-educated women are relatively high earners, they should be largely unaffected by changes in EITC policy and we expect no EITC-birth weight association for this group.
- ii. Married women: As discussed above, the employment incentives of the EITC tend to be strongest among single mothers. While married women may be affected by EITC policies, depending on where their incomes fall in the credit's three-phase structure, household earnings are likely to be higher and thus the overall effect for this group should be notably weaker than for unmarried women.
- iii. Women giving birth to their first child: Since the federal EITC is much smaller for individuals without children, and a handful of states do not offer credits to childless

individuals, women who are pregnant with their first child will receive much smaller state EITCs or, in a handful of states, receive no credit. The overall effect on first births should therefore be substantially smaller than the effect for higher-order births.

Inappropriately strong EITC-birth weight associations for any of these subgroups will raise concerns about unmeasured state-level time trends.

Second, we compare descriptive statistics for births occurring in a given state the year immediately before and after the enactment of a new credit. Many have argued that taxation and income transfer policies affect marriage and fertility choices (Moffitt 2003). It is, therefore, conceivable that EITCs do not actually affect maternal/infant health, but rather change the composition of live births (e.g., if the EITC reduces marriage rates among mothers with a high school degree or less, the composition of the population we are analyzing is likely to change). Finding sizable changes in mothers' education, age, or marital status following a new state EITC will raise concerns about bias from composition effects.

Data

The primary data for this analysis come from the 1980 through 2002 U.S. Natality Detail File. These vital statistics contain records for virtually every birth occurring in the United States during the specified time period. Information is taken directly from birth certificates, which means that birth weight is recorded by medical professionals, rather than recalled by survey respondents. While birth certificate data do not provide all of the socioeconomic controls that are available in many national surveys, vital statistics are the only data that provide an adequate number of births in each state and year, and a sufficiently long time series for capturing the enactments of multiple state credits (NBER n.d.). In order to test the effects of state EITCs on mothers' earnings and employment, we use data from the 1980 through 2002 March demographic supplements to the Current Population Surveys (CPS). These annual data, collected by the U.S. Census Bureau, are based on a rotating national probability sample of approximately 58,000 households (IPUMS CPS n.d.).

Since the EITC is targeted at low-wage workers and tends to have the largest impact on single mother's employment, we limit our primary samples to unmarried mothers with a high school degree or less. In the natality data, we identify mothers as women who have already had at least one live birth, and we limit the sample to singleton births among U.S. residents who gave birth in their state of residence.³ In the March CPS, mothers are identified as women of child-bearing age (i.e., 15–44) who have at least one of their own children residing with them.

State-level Variables

EITC, the main predictor of interest, is a dummy variable coded one if a woman is living in a state that has a credit in a given year and coded zero otherwise. For instance, if a state enacted a credit in 1990, women living in this state prior to 1990 will be coded zero and women living in the state in 1990 and later will be coded one. Since all the models include state fixed effects, this variable can be interpreted as the effect of a change in (i.e., the enactment of) a state EITC. In order to allow state credits to have their complete effect (i.e., increase employment during a given tax year and then provide a refund when people file taxes the next year), the state EITC variable is lagged by one year (e.g., a new state credit in 1990 is predicting birth outcomes in 1991).⁴

³Information on mothers' educations was not available in California or Texas prior to 1989 and was not available in Washington prior to 1992, so births occurring in these states in earlier years are excluded from the analysis. Since all the models include state fixed effects and none of these states enacted EITCs, excluding them in earlier years should have relatively little impact on the results.

In these analyses, we cannot know whether particular women filed for and received an EITC, rather we are examining whether a change in this policy impacted the population that was most likely to be affected (i.e., unmarried mothers with a high school degree or less). This is often referred to as an “intent-to-treat” analysis—women who are likely to be eligible for, but may not have actually received, a credit are included in the “treatment” group (Montori and Guyatt 2001). This is a relatively conservative modeling strategy, which avoids upward bias that could occur if healthier, more advantaged women are more likely to claim the EITC. Because it necessarily involves some measurement error (i.e., some women who did not actually receive the credit are coded one on the EITC variable), it may generate downwardly biased estimates depending on how many eligible women do not actually claim the credit. We are not aware of any published estimates of what percentage of eligible individuals file for state EITCs, but estimates for the federal EITC in the early 1990s are between 80 and 90 percent, depending on the source of data (Scholz 1994).

In order to adjust for state-level time trends that may co-vary with changes in state EITCs, we include several control variables at the state level. Like the EITC variable, all of these are time varying and lagged by one year (e.g., a state-level control measure in 1990 is predicting birth outcomes in 1991).

State AFDC/TANF benefit size quartile is modeled with dichotomous variables indicating whether the respondent gave birth in a state with AFDC/TANF benefits that fell in the 1st (reference category), 2nd, 3rd, or 4th quartiles of the distribution in a given year. All benefits are based on values for a three-person family (University of Kentucky, Center for Poverty Research n.d.).

Differences in TANF policy are captured with two composite variables based on De Jong et al.’s (2005) factor analysis. *TANF Work Requirements* measures the types of situations that may exempt a person from work requirements (e.g., a lack of activities programs in the geographic area or spending significant time on volunteer activities). This variable is coded from lenient to stringent, with higher values reflecting more limited exemption options. *TANF Activities Requirements* measures the types of activities that may fulfill work requirements. This variable is also coded from lenient to stringent, with lenient states accepting a range of activities (e.g., community service, child care), and more stringent states accepting only work or school activities. In both these variables, higher values reflect more “work-centered” TANF programs. Since TANF was not enacted until 1996, all births occurring before 1996 are coded zero for these variables. Births occurring in 1996 and later are coded as the appropriate factor analysis score for their state in that year.

State Medicaid Spending is a continuous variable for the state’s total Medicaid expenditures for personal health care in a given year measured in tens of millions of dollars (U.S. Department of Health and Human Services n.d.). 5

WIC Participation is a continuous variable for the number of women in the state participating in the Special Supplemental Nutrition Program for Women, Infants, and Children in a given year measured in thousands (Food Research and Action Center 2005).

⁴The duration of EITC exposure during a pregnancy will depend on the timing of conception/birth. However, we found no evidence that state EITC effects differ by season of birth, suggesting that these small variation in EITC exposure do not alter the results. We also tested a contemporaneous and a two-year lagged version of the EITC variable and found only slight differences in the point estimates.

⁵Medicaid expenditures are coded according to the state of provider, rather than the state of residence because data coded by state of residence are only available beginning in 1991.

Minimum Wage is a continuous measure of the dollar value of the minimum wage in the state in a given year (University of Kentucky, Center for Poverty Research n.d.).

Number Poor is a continuous variable for the number of people in the state living below the poverty line in a given year measured in tens of thousands (University of Kentucky, Center for Poverty Research n.d.).

Gross State Product is a continuous variable for the economic output of the state in a given year measured in thousands of dollars (University of Kentucky, Center for Poverty Research n.d.).

State Unemployment Rate is a continuous measure of the percentage of the state population unemployed in a given year (University of Kentucky, Center for Poverty Research n.d.).

Individual-level Variables

Birth Weight, a continuous variable measured in grams, is the primary outcome for the analysis.

Any Employment is a dichotomous indicator coded one if a mother worked for at least one week in the last year. This measure serves as the first dependent variable in the CPS analysis.

Logged Wages/Salary is a continuous measure of a woman's total pre-tax income from wages and salary in the last year. This measure serves as the second dependent variable in the CPS analysis. This variable is logged to account for the diminishing returns of the EITC among higher earners falling in the credit's plateau and phase-out ranges.

Maternal Smoking is both a dependent variable and a covariate in the analysis of natality data. It is a dichotomous variable coded one if the mother reports smoking while pregnant. Questions about smoking are only available in the natality data after 1989, and they are not asked in all states in all years. States that do not report maternal smoking in at least some of the years after 1988 are: California, Indiana, Louisiana, Nebraska, New York, Oklahoma, South Dakota, and Washington. Results regarding maternal smoking need to be interpreted with some caution since these models include a more limited subset of the cases.

In order to adjust for individual-level characteristics that might jointly determine EITC eligibility/size and birth weight, we also include several variables at the individual-level.

Maternal race is measured with dichotomous indicators for white (reference category), *Black* and *Other*.⁶

Birth-Order is specified with three groupings: one previous birth (reference category), *Two Previous Births*, and *Three or More Previous Births*. In the CPS models, we use parallel indicators for the number of the mother's own children in the household (i.e., *Two Children* and *Three or More Children*; one child is the reference category).

Maternal education is a dichotomous indicator coded one if a woman has a *High School Degree*. We test for interactions between maternal education and state EITCs by distinguishing mothers based on high school degrees and state credits. This generates the four categories: Mother has no high school/No State EITC (reference category), *Mother has*

⁶This coding schema does not distinguish between Hispanics and non-Hispanics since Hispanic origin is not reported in the natality data in all years and states.

no high school/State has EITC, Mother has high school/No State EITC, Mother has high school/State has EITC.

Maternal age is specified with three categories: *18 or younger*, *19 to 34* (reference category), and *35 or older*. We test for interactions between maternal age and state EITCs by distinguishing mothers based on their age category and state credits. This generates the following six categories: *Mother ≤18/No State EITC* (reference category), *Mother ≤18/State has EITC*, *Mother 19–34/No State EITC*, *Mother 19–34/State has EITC*, *Mother 35+/No State EITC*, *Mother 35+/State has EITC*.

Table 2 presents means and standard deviations for the 8,762,028 live births to unmarried mothers with a high school degree or less documented in the 1980–2002 Detailed Natality File. Descriptive statistics for a parallel sample of 66,542 from the 1980–2002 March CPS are also shown. In this relatively disadvantaged population, the mean birth weight of 3,215gm falls below the national average of approximately 3,350gm. African Americans are overrepresented, delivering about 40 percent of the births in the file. About half of mothers have a high school degree, and 29 percent smoked while pregnant.

Table 3 presents a pairwise correlation matrix for all the state-level variables. EITCs are more likely in states with stronger economies. The unemployment rate and number poor in the state are negatively associated with state EITCs, while the gross state product is positively associated. This fits with the general logic that states increase social spending when they have more revenue, and with more specific evidence showing that higher gross state products predicted state EITCs in the 1980s and 1990s (Leigh 2004). State EITCs are also positively correlated with more generous AFDC/TANF benefits, minimum wages, and Medicaid programs. On the other hand, state EITCs are negatively correlated with the number of women participating in WIC. This is most likely because WIC participation is partially reflecting economic hardship and need for nutritional assistance, as well as program generosity. These correlations demonstrate the various relationships between economic and policy circumstances within states. It should be noted, however, that these correlations are means capturing time-invariant aspects of these state characteristics that will be factored out in the following state-fixed-effects models.

Models

When predicting birth weight and logged wages/salary, we use OLS models. When predicting the dichotomous outcomes of maternal smoking and any employment, we use logistic regression and present odds ratios. Although they are not shown in the tables in the interests of space, all models include dichotomous indicators for year and state of residence. While it is not possible to identify sibling pairs within natality files, these data contain virtually all births occurring within the U.S. and, therefore, will inevitably include multiple births to the same woman. To adjust for this un-measurable clustering, standard errors were estimated using the Huber-White procedure for robust standard errors. The March CPS data are weighted to adjust for sampling design.

Results

Table 4 presents associations between state EITCs and mothers' employment and earnings based on 1980–2002 March CPS. According to odds ratios from Model 1, living in a state with an EITC increases mothers' odds of working for at least one week by 19%. In Model 2, state EITCs increase mothers' wages/salary by 32%.⁷ These results confirm that state EITCs

⁷Since wages/salary has been logged, these coefficients can be interpreted as semi-elasticities or percentage changes.

should raise mothers' incomes in two ways: (i) reducing taxes by the amounts displayed in Table 1, and (ii) increasing employment and wages as shown in Table 4.

AFDC/TANF, however, appears to discourage maternal employment/earnings, but only in the lower quartiles. A state increasing its AFDC/TANF benefits from the first quartile to the second reduces the chances of labor market participation by 14% and reduces logged wages/salary by approximately 21%. Being in a state with more limited TANF work exemptions is positively associated with employment and wages. But, being in a state with stricter activities requirements has no significant association with either outcome.

Table 5 presents associations between state EITCs, birth weight, and maternal smoking based on 1980–2002 U.S. Natality data. According to Model 1, state EITCs increase birth weights by, on average, 16gm. It is useful to gauge this estimate in terms of another covariate that is widely known to be associated with, and likely affect, birth weight—namely, maternal education. In Model 1, having a high school degree is associated with a 47gm increase in birth weight. This implies that the average effect of state EITCs is equal to about 34% of the magnitude of the association between birth weight and having a high school degree.⁸

When looking at all states and years in Model 1, living in a state with AFDC/TANF benefits in the top quartile, rather than the bottom, increases birth weights by approximately 8gm. Despite different policy structures and work incentives, both EITCs and AFDC/TANF generosity appear to benefit infant health in Model 1. Living in states with higher minimum wages and Medicaid spending is positively associated with birth weight. Living in states in which more women require nutritional assistance and enroll in WIC has a small negative association with birth weight. State unemployment rates and the number of poor residents in the state are positively associated with birth weight. This may seem counterintuitive since individual-level hardship is associated with lower birth weights. However, Ruhm (2000 and 2004) find that national recessions are associated with lower infant mortality rates and reductions in negative health behaviors such as smoking.

In Model 2 of Table 5, we test whether maternal smoking is sensitive to state EITCs. Living in a state with an EITC reduces the odds of maternal smoking by about 5%. However, living in states with the most generous AFDC/TANF benefits increases the odds of maternal smoking by 9.5%. Mothers in states with higher unemployment rates and/or a larger number of poor residents appear less likely to smoke, which corresponds with the negative associations between these variables and birth weight in Model 1.

The remaining Models 3, 4, and 5 in Table 5 test whether maternal smoking is a mechanism of EITC effects on birth weight. As mentioned, information on smoking was only collected after 1988 and was not collected by all states in all years. Before adjusting for maternal smoking, we test whether the results are robust to the exclusion of the years and states without smoking data. Model 3 excludes all years after 1988, and Model 4 further excludes all states without smoking data. EITC estimates in these models are very similar to (within about a gram of) the Model 1 estimate based on all states and years. Model 5 includes the control variable for maternal smoking while pregnant. Compared to Model 4, this reduces the EITC-birth weight association by about 3gm.

⁸In alternative models, where state EITC was specified as the maximum state credits shown in Table 1, each \$100 increase in a state's maximum credit was associated with about a 2gm increase in birth weight. This shows that positive associations between state EITCs and birth weight are replicated with more continuous measures of credit generosity. However, we choose not to focus on these results because the effects of credit size on birth weight may depend on where women's earnings fall in the credit's three-phase structure, and assuming a linear effect of maximum credits may be misleading. Since natality data do not provide information on earnings with which to estimate women's credits, we prefer not make specific statements about the birth weight effects of credit sizes/structures.

While Model 1 containing all years and states revealed a positive association between AFDC/TANF benefits and birth weight, Models 3 through 5 reveal negative associations, particularly for the second quartile relative to the first. These negative associations may make some sense given that there was a positive correlation between high AFDC/TANF benefits and maternal smoking in Model 2. However, they also suggest that associations between AFDC/TANF and birth weight are more sensitive to exclusions and less stable than the EITC estimates. This is not surprising given that, relative to EITC, the structure of AFDC/TANF is more complex and variable across time and states.

Models 3 through 5 reveal positive associations between stricter TANF work exemption policies and birth weight. After adjusting for maternal smoking in Model 5, there is a negative association between birth weight and stricter TANF activities requirement. Since stricter work exemptions and activities requirements will both encourage maternal employment, the underlying reasons for these opposite signs are not clear, and we are hesitant to attribute too much meaning to these results.

In Table 6, we use a series of dichotomous variables to test whether the effect of living in a state with an EITC differs depending on mothers' ages and education levels. Model 1 reveals statistically significant differences by maternal age. The largest state EITC estimate—approximately 19gm—is found among the lowest-risk group of mothers who are 19–34 years old. The effect of a state EITC among mothers who are 18 or younger is substantially smaller at around 8gm. Finally, among older mothers who tend to face the most significant biological risk factors, the effect of a state EITC is actually negative, decreasing birth weight by an average of about 12gm. In Model 2, differences in EITC effects by maternal education are small and not statistically significant.

Tests of the Natural Experiment Assumptions

In Table 7, we present tests of the natural experimental assumptions. For efficiency of space, we only show the EITC estimates, but all models include the control variables discussed above and state and year dummies. In Model 1, we present EITC-birth weight associations for mothers with a college degree or higher. Given their generally high earnings, these mothers should be unaffected by changes in the EITC, and there is indeed no association between state EITCs and birth weights for this population. In Model 2, we present results for married mothers with a high school degree or less. Relative to unmarried households, the EITC has more modest effects on the employment/earnings of married households, and we expect effects to be smaller for married women. For married mothers, a state EITC is associated with an approximately 8gm increase in birth weight, which is about half of the 16gm reduction among unmarried mothers in Model 1 of Table 4. In Model 3, we present results for unmarried women who are having their first child. Since these women will receive smaller state credits (and in a handful of states receive no credit), we expect relatively modest effects for this group. Among first births, a state EITC is associated with an approximately 5gm increase in birth weight, which is less than half the magnitude of the 16gm estimate for the primary sample.

Table 8 tests for potential bias from population composition changes following the implementation of a state EITC. The top panel of Table 8 contains descriptive statistics for all live births occurring in the years immediately before and after the enactment of a state EITC. While there are increases in the percentage of mothers who are unmarried, who are African American, or who have less than a high school degree, these differences are quite slight, all less than one percentage point. In the bottom panel, we calculate weighted birth weight averages based on the distribution of each maternal characteristic in the years before and after enactments. The changes in these weighted averages are quite slight and generally

decrease, making it seem unlikely that changes in population composition are driving positive associations between state EITCs and birth weight.

Discussion/Conclusion

This study addressed two sets of questions about poverty and child wellbeing. First, are there associations between prenatal poverty and lower birth weights after factoring out unmeasured potential confounders (e.g., mothers' early life exposures, preferences/attitudes, etc)? Second, how have recent expansions of a large work-based welfare program—the EITC— impacted maternal and infant health in the U.S.?

Using a natural experimental strategy, we find that state EITCs increase birth weights. Since the enactment of a state EITC increases poor women's incomes, but should be uncorrelated with unmeasured characteristics, this supports a causal effect of prenatal poverty. The answer to question one appears to be yes. Cognitive and physical development in utero sets the stage for later-life progress, and low birth weight is predictive of various negative outcomes across the life course (e.g., infant mortality, poor child health, and low educational attainment and earnings) (Case et al. 2005, Salsberry and Reagan 2005, Wilkinson and Marmot 2003). Lower birth weights that result from poverty may, therefore, have lasting consequences, which ultimately contribute to the reproduction of inequality over generations. However, our results show that relieving poverty during the prenatal period can increase birth weights, which may reduce the later negative outcomes associated with lower birth weight. At the same time, mixed results for AFDC/TANF generosity and across maternal ages show that the relationship between poverty relief and infant health is neither simple nor uniform.

We find that state EITCs increase maternal employment and earnings. We further find that state EITCs are associated with reductions in maternal smoking during pregnancy, and adjusting for maternal smoking partially accounts for state EITC-birth weight associations. While poverty relief may work through many different pathways, these results suggest that mechanisms related to employment and reductions in negative health behaviors may be important. The smoking results should be interpreted with some caution, though, because they are based on a subset of cases (smoking information was only collected after 1988 and not for all states in all years).

We also tested whether the consequences of living in a state with an EITC are moderated by maternal education or age. We found no evidence of varying effects for mothers with and without high school degrees. This null result does not support claims that higher education makes it easier to translate resources into improved health outcomes (e.g., Mirowsky and Ross 1998). We did, however, find differences by maternal age. Living in a state with an EITC conferred the largest benefit for the lowest-risk group of mothers who were 19–34, conferred notably smaller benefits for mothers who were 18 or younger, and actually had negative effects for mothers who were 35 or older. As mentioned before, these interactions reflect a combination of (i) differences in receipt of the EITC (i.e., eligibility and take-up), and (ii) differences in individual-level benefits for those receiving the credit. Smaller effects among women who are 18 or younger was expected given that this group is likely to have weak labor market attachment and lower levels of eligibility. Finding negative effects of state EITCs for mothers who are 35 or older is troubling and the underlying reasons are not clear. One possible explanation is that age-related pregnancy complications among older women receiving the EITC may reduce the health benefits of additional income and/or heighten any health risks associated with low-wage employment.

These results across maternal age suggest that enactments of state EITCs are more beneficial for women 19–35 who are at lower risk both socioeconomically and biologically. This contrasts with Kehrner and Wolin's (1979) and Almond, Hoynes, and Schanzenbach's (2008) analyses of the NIT and Food Stamps, which both show larger program benefits for those with more risk factors. More research is needed to understand why interaction effects differ across these studies and programs, but the pro-work incentives of the EITC, which are not part of NIT or Food Stamps, may be important.

The second set of questions addressed in this study has to do with the consequences of recent “liberalization” of U.S. welfare policy. As the EITC has been expanded, and 1996 welfare reform replaced AFDC with TANF, poverty relief in the U.S. has become increasingly tied to labor markets and earnings. Citing lower poverty rates following EITC expansions and welfare reform, some authors argue that these policy changes have benefited poor children. Citing barriers to regular employment, costs associated with working, and the strain of low-wage work, other authors argue they have been harmful. Finding positive associations between state EITCs and birth weight suggests that recent expansions of a pro-work policy have been beneficial for this indicator of infant health. When looking at all states and years, we find that higher AFDC/TANF benefits are associated with higher birth weights. However, when focusing on cases from 1989 and later, we find negative associations. These differences across time period may partially reflect varying consequences of pre- and post-1996 reform (i.e., AFDC versus TANF) policy structure.

Our analysis of smoking also revealed different effects across EITC and AFDC/TANF. While enactments of state EITCs reduced the odds of maternal smoking, larger AFDC/TANF benefits increased the odds. Arguments that underlying preferences drive associations between poverty and poor health behaviors have raised concerns that income transfers could have perverse effects (e.g., leading to the purchase of more cigarettes). The AFDC/TANF results suggest that perverse effects are possible, but the EITC results suggest they are by no means inevitable. Causes of health behaviors, particularly an addictive one like smoking, are likely to be multi-faceted and complex, so it is reasonable that different policy structures could have contrasting effects.

Looking across the results, we find consistently beneficial effects of state EITCs, but effects of state AFDC/TANF benefits are more mixed. This is not surprising since state differences in AFDC/TANF are more complex and variable over time, relative to state differences in EITC. The overarching message, however, is that, while relieving poverty during the prenatal period can generate significant birth weight benefits, the policy structure of that poverty relief matters. To understand the consequences of a more “liberalized” welfare state, we need a more nuanced picture of how particular policies shape behavior and health.

Our employment/earnings analysis of the CPS fits within a much broader economics literature on the labor supply effects of the EITC. Our estimates of state EITC effects on employment probability appear to fall roughly in between estimates offered by Meyer and Rosenbaum (2001) and Neumark and Wascher (2000). Rerunning our logistic regression from Table 4 as a probit model (to fit with Meyer and Rosenbaum) and as a linear probability model (to fit with Neumark and Wascher), associations between state EITCs and the probability of employment were slightly larger than Meyer and Rosenbaum's estimates, but considerably smaller than Neumark and Wascher's estimates (models available by request). These studies measure EITC generosity differently than we do and work with different populations, so comparisons of point estimates must be interpreted cautiously. However, our results based on enactments of state EITCs appear to fall within the general range of previously published estimates.

The internal validity of our natural experimental strategy depended on there being no unmeasured state-specific time trends associated with birth weight and state EITCs, and tests of the natural experiment strategy provided no evidence of such trends. An important drawback to natural experimental research designs is often external validity. Natural income experiments typically involve unique situations, such as winning the lottery (Lindahl 2005) or receiving income from the opening of a casino on tribal land (Costello et al. 2003). Such unique income experiences may have different effects than acquiring the same amount of money through a more common route (e.g., regular employment or government transfers). As a natural experiment, state EITCs are likely to have relatively strong external validity because the main pathways through which they increase income—a tax credit and wages—are very common methods for acquiring income.

We conclude with some final caveats and cautions. First, we have treated birth weight as a general proxy for overall infant health/wellbeing. However, birth weight *per se* may not be the causal factor behind certain outcomes. For instance, in-utero stressors, which are difficult to observe and are associated with birth weight, could be the real cause of infant mortality. Policies that increase birth weight are likely to improve many related risk factors (e.g., in-utero stressors). However, if they do not, increasing birth weights by reducing prenatal poverty may not confer broader benefits (e.g., reducing infant mortality, increasing education, etc). Second, using dichotomous indicators for larger and smaller maximum state credits, we found no evidence of a dose-response effect on birth weight. Therefore, while enactments of state credits improved birth weight, we have no evidence that the sizes of credits mattered. However, it should be highlighted that maximum credits are relatively crude measures of credit size, which could be significantly improved upon with data containing earnings information in addition to birth weight. Finally, the above EITC estimates reflect the average treatment effect across many states and over many years. These estimates may not apply to particular cases (i.e., not all states enacting an EITC will see these results). We would be well-served by future research into how the effects of EITCs (or any state policy) are modified by other state characteristics.

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Figure 1.
The Federal EITC for a Family with Two Children (2007)

Figure 2.
State EITCs as a Natural Experiment

Table 1

Trends in Federal and State EITCs 1983–2002

[illegible]

	Max Federal Credit	NJ	NY	OK	OR	RI	VT	WI	
	\$	%	\$	%	\$	%	\$	%	\$
1983	500								150
1984	500								150
1985	550								165
1986	550								
1987	851								
1988	874								
1989	910								
1990	953								
1991 ¹	1,235								
1992	1,384								
1993	1,511								
1994	2,528		7.5						
1995	3,110		10						
1996	3,556		20						
1997	3,656		20						
1998	3,756		20						
1999	3,816		20						
2000	3,888	10	22.5						
2001	4,008	15	25						
2002	4,140	17.5	27.5						
Refundable?	Y	Y	Y	Y	N	N	Y	Y	Y

Sources: *Andrew Leigh (2003) and Holz and Scholz (2003)*

¹ In 1991, the federal credit began varying with family size. The values depicted here are for families with more than one qualifying child. Values for families with only one child are slightly smaller.

² % reflects the state credit as a percentage of the federal credit; \$ reflect the maximum size of the state credit (i.e., Max Fed Credit * (%/100))

Table 2Variable Means for Single Mothers with a High School Degree or Less^a

	1980–2002 Natality Data	1980–2002 March CPS
Birth Weight	3215.979 (609.331)	-----
Any Employment	-----	.662
Logged Wages/Salary	-----	6.058 (4.592)
State has EITC	.083	.077
State AFDC/TANF Benefits for 3-person Family		
Benefits in Second Quartile	.245	.257
Benefits in Third Quartile	.241	.245
Benefits in Fourth Quartile	.248	.247
More Stringent State TANF Work Exemption Policy	-.075 (.647)	-.050 (.549)
More Stringent State TANF Activities Requirement	.027 (.530)	.014 (.473)
State WIC Participation	63.485 (75.020)	42.634 (57.226)
State Minimum Wage	4.200 (.795)	3.956 (.840)
State Medicaid Spending	523.851 (607.204)	384.839 (540.669)
Number Poor Residents in State	167.982 (149.036)	135.167 (129.033)
State Unemployment Rate	6.147 (1.934)	6.435 (2.079)
Gross State Product	315.627 (299.840)	233.473 (246.483)
Baby Female	.491	-----
Mother's Race/Ethnicity		
Black	.417	.285
Other	.035	.039
Mother's Age		
18 or Younger	.080	.028
35 or Older	.064	.380
Mother has High School Degree	.490	.636
Previous Births/Children		
2 Previous Births/Children	.274	.327
3 or More Previous Births/Children	.223	.246
Mother Smoked	.287	-----
EITC-Age Interactions		
Mother <=18 State has EITC	.005	-----
Mother 19–34 No State EITC	.785	-----
Mother 19–34	.070	-----

	1980–2002 Natality Data	1980–2002 March CPS
State has EITC		
Mother 35+ No Sate EITC	.057	-----
Mother 35+ State EITC	.008	-----
EITC-Education Interactions		
No High School State has EITC	.039	-----
High School Degree No State EITC	.456	-----
High School Degree State has EITC	.044	-----
N	8,762,028	66,542

^aStandard deviations for continuous variables in parentheses.

Table 3

Correlation Matrix for State-Level Variables, 1980–2002 Detailed Natality Files*

	EITC	AFDC/TANF (2nd quartile)	AFDC/TANF (3rd quartile)	AFDC/TANF (4th quartile)	TANF Work Exempt	TANF Activities Req	WIC Participation	Minimum Wage	Medicaid Spending	Number Poor	Unemployment Rate
EITC											
AFDC/TANF benefits (2st quarti	–0.171										
AFDC/TANF benefits (3rd quart	0.047	–0.321									
AFDC/TANF benefits (4th quarti	0.308	–0.327	–0.324								
TANF Work Exemption Policy	0.057	0.041	–0.007	0.015							
TANF Activities Requirements	–0.16	0.061	–0.093	0.034	–0.526						
WIC Participation	–0.041	–0.222	–0.257	0.592	–0.168	0.179					
Minimum Wage	0.243	–0.089	0.007	0.266	0.048	–0.07	0.387				
Medicaid Spending	0.334	–0.250	–0.147	0.642	–0.074	0.024	0.738	0.439			
Number Poor	–0.046	–0.225	–0.242	0.616	–0.144	0.149	0.917	0.182	0.715		
Unemployment Rate	–0.194	–0.108	–0.085	0.04	–0.004	0.025	0.053	–0.487	–0.039	0.237	
Gross State Product	0.058	–0.234	–0.178	0.658	–0.115	0.112	0.950	0.421	0.841	0.918	0.000
N=8,762,028											

* All correlations are statistically significant at the .05 level, with the exception of the correlation between Unemployment Rate and Gross State Product

Table 4

The Effect of State EITCs on Labor Market Participation and Wages/Salary, 1980–2002 March Current Population Surveys ^a

	(1) Any Employment	(2) Logged Wages/Salary
	Logistic Regression (odds ratios)	OLS Regression
State EITC	1.187 ^{***} (0.075)	0.318 ^{***} (0.110)
State AFDC/TANF Benefits for a 3-person Family		
Benefits in the Second Quartile	0.863 ^{***} (0.048)	−0.212 ^{**} (0.093)
Benefits in the Third Quartile	1.037 (0.083)	0.124 (0.141)
Benefits in the Fourth Quartile	0.969 (0.099)	0.007 (0.183)
More Stringent State TANF Work Exemption Policy	1.081 ^{***} (0.030)	0.128 ^{***} (0.048)
More Stringent State TANF Work Activities Requirements	0.980 (0.032)	−0.058 (0.053)
State WIC Participation	1.001 (0.001)	0.004 (0.002)
State Minimum Wage	0.978 (0.040)	−0.062 (0.072)
State Medicaid Spending	1.000 (0.000)	0.000 (0.000)
Number Poor Residents in State	0.998 ^{**} (0.001)	−0.004 ^{***} (0.001)
State Unemployment Rate	0.934 ^{***} (0.010)	−0.122 ^{***} (0.020)
State Gross Product	1.000 (0.000)	0.000 (0.001)
Black	0.604 ^{***} (0.015)	−0.876 ^{***} (0.045)
Other	0.702 ^{***} (0.043)	−0.653 ^{***} (0.119)
Mother's Age		
18 or Younger	0.372 ^{***} (0.023)	−2.351 ^{***} (0.110)
35 or Older	1.621 ^{***} (0.035)	1.065 ^{***} (0.039)
Mother has High School Degree	2.960 ^{***} (0.063)	2.386 ^{***} (0.042)
2 Children in Home	0.774 ^{***} (0.019)	−0.480 ^{***} (0.044)
3 or more Children in Home	0.524 ^{***} (0.014)	−1.310 ^{***} (0.050)
Constant		7.339 ^{***} (0.425)

	(1) Any Employment	(2) Logged Wages/Salary
	Logistic Regression (odds ratios)	OLS Regression
N	66542	66542

* significant at 5%;

** significant at 1%;

*** significant at .1%

^a Robust standard error in parentheses. All models include dummy variable controls for state and year.

Table 5

The Effect of State EITCs on Birth Weight and Maternal Smoking^a

	(1) Birth Weight	(2) Maternal Smoking	(3) Birth Weight (Post-1988)	(4) Birth Weight (States w Smoking data)	(5) Birth Weight (Adjusts for smoking)
	OLS	Logistic (Odds Ratios)	OLS	OLS	OLS
State EITC	15.704*** (1.211)	0.949*** (0.006)	16.138*** (1.365)	15.662*** (1.500)	12.510*** (1.471)
State AFDC/TANF Benefits for a 3-person Family					
Benefits in the Second Quartile	0.406 (1.205)	1.013 (0.011)	-7.891*** (2.812)	-7.196* (2.857)	-5.629** (2.815)
Benefits in the Third Quartile	3.403 (1.766)	1.004 (0.013)	-2.766 (3.176)	-203 (2.234)	1.655 (3.188)
Benefits in the Fourth Quartile	8.415*** (2.641)	1.096*** (0.016)	-7.861* (3.776)	-2.770 (3.879)	1.567 (3.823)
Mother Smoked					-220.216*** (0.598)
More Stringent State TANF Exemption Policies	0.610 (0.464)	1.004 (0.002)	1.180** (0.482)	2.683*** (0.573)	3.085*** (0.566)
More Stringent State TANF Activities Requirements	-0.520 (0.532)	0.994** (0.002)	-0.624 (0.565)	-1.005 (0.612)	-1.357** (0.604)
State WIC Participation	-0.209*** (0.023)	1.001*** (0.000)	-0.123*** (0.027)	-0.014 (0.051)	0.093* (0.051)
State Minimum Wage	3.106*** (0.818)	0.928*** (0.005)	-0.261 (0.978)	3.683** (1.181)	0.655 (1.171)
State Medicaid Spending	0.024*** (0.002)	1.001*** (0.000)	0.029*** (0.002)	0.015*** (0.004)	0.043*** (0.004)
Number Poor Residents In State	0.069*** (0.015)	0.998*** (0.000)	-0.004 (0.018)	-0.041 (0.026)	-0.107*** (0.026)
State Unemployment Rate	2.975*** (0.276)	0.980*** (0.002)	3.476*** (0.427)	2.932*** (0.484)	2.085*** (0.477)
State Gross Product	0.051*** (0.009)	0.997*** (0.000)	0.011 (0.011)	0.054** (0.017)	-0.029* (0.017)
Female	-116.542*** (0.402)	0.997 (0.002)	-114.992*** (0.452)	-115.893*** (0.516)	-116.022*** (0.510)

	(1) Birth Weight	(2) Maternal Smoking	(3) Birth Weight (Post-1988)	(4) Birth Weight (States w Smoking data)	(5) Birth Weight (Adjusts for smoking)
	OLS	Logistic (Odds Ratios)	OLS	OLS	OLS
Black	-199.009*** (0.479)	0.417*** (0.001)	-199.718** (0.545)	-189.352*** (0.612)	-225.017*** (0.597)
Other	5.855*** (1.192)	0.467*** (0.003)	-5.734*** (1.313)	18.614*** (1.525)	-12.163*** (1.522)
Mother's Age					
18 or Younger	-46.622*** (0.772)	0.575*** (0.003)	-49.745*** (0.886)	-46.232*** (.993)	-66.262*** (0.990)
35 or Older	-34.352*** (0.942)	1.222*** (0.005)	-45.428*** (1.024)	-57.878*** (1.212)	-49.343*** (1.186)
High School Degree	47.269*** (0.421)	0.727*** (0.002)	42.115*** (0.474)	50.179*** (0.540)	37.462*** (0.533)
2 Previous Births	-3.347*** (0.480)	1.203*** (0.003)	-5.005*** (0.540)	-7.424*** (0.616)	-0.082 (0.609)
3 or More Previous Births	-20.619*** (0.557)	1.539*** (0.004)	-28.002*** (0.623)	-33.394*** (0.720)	-15.786*** (0.710)
Constant	3,298.063*** (4,942)		3304.656*** (4,769)	3,285.904*** (7,371)	3,375.813*** (7,300)
Observations	8,762,028	5,260,202	6,831,732	5,254,652	5,254,652

* significant at 5%;

** significant at 1%;

*** significant at .1%

^a Robust standard error in parentheses. All models include dummy variable controls for state and year.

Table 6The Effect of State EITCs on Birth Weight, by Maternal Age and Education^a

	(1) Maternal Age ^b	(2) Maternal Education ^c
Mother <= 18		
No State EITC [Reference group]	-----	} Change associated with EITC= 7.630gm
State has EITC	7.630** (3.155)	
Mother 19–34		
No State EITC	45.895*** (0.794)	} Change associated with EITC = 18.968gm
State has EITC	64.863*** (1.447)	
Mother 35+		
No State EITC	15.109*** (1.263)	} Change associated with EITC = -12.479gm
State EITC	2.630 (2.935)	
No High School		
No State EITC [Reference group]	-----	} Change associated w EITC = 19.890gm
State has EITC	19.890*** (1.442)	
High School Degree		
No State EITC	47.141*** (0.439)	} Change associated w EITC = 16.399gm
State has EITC	63.540*** (1.400)	
State AFDC/TANF Benefits for 3-person Family		
Benefits in Second Quartile	0.451 (1.205)	0.407 (1.205)
Benefits in Third Quartile	3.403* (1.766)	3.406* (1.766)
Benefits in Fourth Quartile	8.325*** (2.641)	8.406*** (2.641)
More Stringent State TANF Work Exemption Policy	0.589 (0.464)	0.610 (0.464)
More Stringent State TANF Activities Requirements	-0.505 (0.532)	-0.519 (0.532)
State WIC Participation	-0.212*** (0.023)	-0.209*** (0.023)
State Minimum Wage	3.090*** (0.818)	3.108*** (0.818)

	(1) Maternal Age ^b	(2) Maternal Education ^c
State Medicaid Spending	0.024 *** (0.002)	0.024 *** (0.002)
Number Poor Residents in State	0.070 *** (0.015)	0.069 *** (0.015)
State Unemployment Rate	2.965 *** (0.276)	2.974 *** (0.276)
State Gross Product	0.050 *** (0.009)	0.051 *** (0.009)
Female	-116.544 *** (0.402)	-116.542 *** (0.402)
Black	-198.954 *** (0.479)	-198.999 *** (0.479)
Other	5.878 *** (1.192)	5.863 *** (1.192)
Mother's Age		
18 or Younger		-46.637 *** (0.772)
35 or Older		-34.361 *** (0.942)
High School Degree	47.288 *** (0.421)	
2 Previous Births	-3.338 *** (0.480)	-3.349 *** (0.480)
3 or More Previous Births	-20.656 *** (0.557)	-20.623 *** (0.557)
Constant	3,252.010 *** (4.987)	3,298.109 *** (4.942)
N	8,762,028	8,762,028

* significant at 5%;

** significant at 1%;

*** significant at .1%

^a Robust standard error in parentheses. All models include dummy variable controls for state and year.

^b Interactions between state EITCs and maternal age groups are significant at the .05 level or lower.

^c There are no statistically significant interactions between state EITCs and maternal education.

Table 7

Tests of Natural Experiment Assumptions: The Effect of State EITCs on Birth Weight for Alternative Samples^a

	(1) High Education Sample ^a	(2) Married Sample ^b	(3) First Births Sample ^c
State has EITC	-7.867 (5.939)	7.727*** (.826)	5.267*** (1.178)
N	283,889	17,104,823	8,592,601

* significant at 5%;

** significant at 1%;

*** significant at .1%

^a Robust standard error in parentheses. Models include all the control variables listed in previous tables as well as dummy indicators for state and year. Complete models available by request.

^a This sample includes women with 16 or more years of education who are unmarried and have had at least one previous live birth.

^b This sample includes women with a high school degree or less who are married and have had at least one previous live birth.

^c This sample includes women with a high school degree or less who are unmarried and have had no previous live births.

Table 8

Test of Natural Experimental Assumptions: Maternal Characteristics and Weighted Averages of Birth Weight in the Year Immediately Before and After the Enactment of a State EITC.

	Percentage Year before Enactment	Percentage Year after Enactment	Percentage Point Change
Maternal Characteristics			
Unmarried	27.26	28.22	0.96
Black	15.00	15.37	0.37
Younger than 18	2.24	2.13	-0.11
Less than High School Degree	22.85	23.34	0.49
N	505,440	506,017	
<hr/>			
Average Birth Weight (gm)			Change in Average Birth Weight (gm)
Unmarried = 3219			
Married = 3441			
Weighted avg given marital status ¹ distribution in year before enactment 3380.39		Weighted avg given marital status distribution in year after enactment 3378.40	-2.00
Black = 3142			
Non-Black = 3432			
Weighted avg given race distribution in year before enactment 3388.50		Weighted avg given race distribution in year after enactment 3387.34	-1.16
Younger than 18 = 3171			
18 or Older = 3391			
Weighted avg given age distribution in year before enactment 3386.07		Weighted avg given age distribution in year after enactment 3386.31	0.24
Less than High School = 3281			
High School or Higher = 3422			
Weighted avg given education distribution in year before enactment 3389.71		Weighted avg given education distribution in year after enactment 3389.15	-0.56

¹ Weighted averages are based on the following formula: $avg = (p)(R_1) + (1-p)(R_2)$ where p = the proportions depicted in the top panel of the table and R_1 and R_2 = the average birth weights for the appropriate subgroup (e.g., unmarried and married)