# Do Pregnant Teens Respond to Improved Opportunities?

## An Evaluation of Title IX of the Educational Amendments of 1972 to the Civil Rights Act of 1964

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**Abstract:**
Title IX of the Educational Amendments of 1972 made it illegal for an institution receiving federal funding to exclude pregnant/parenting teens from the classroom. This decreased a pregnant teenager's opportunity cost of education. I examine the impact of this piece of legislation on educational outcomes of pregnant/parenting teens using data from the CPS, Census and Vital Statistics. The methodological design exploits the endowment of pre-1972 rates of teen motherhood across states to identify the causal impact of the policy on teen moms. In this framework, a larger effect of the policy is expected in areas with a larger portion of the population in the 'treatment' group, pregnant/parenting teens. Since most data sets covering the period considered do not indicate whether a teenager is pregnant, the percentage of teens who are mothers is used as a proxy for pregnant/parenting teens. For cohorts impacted by this law change, results suggest that in states with relatively higher pre-policy levels of teen motherhood, Title IX increased high school graduation by age 19.

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**"We can wait no longer. Equal education opportunity for women is the law of the land—and it will be enforced." –Caspar W. Weinberger[1]**

## I. Introduction

Teenage mothers are more likely to become single parents, live in poverty, and attain a low level of education. While these correlations exist, there is disagreement on whether giving birth as a teen 'causes' these girls to experience diminished economic and social outcomes in the long run.[2] Despite this disagreement, authors generally agree that in the short term having a teen birth has a negative impact on mothers' educational outcomes. Even if the impact is short term, it could still be costly to the mother and to society. In this paper, I explore whether decreasing a teen's opportunity cost of education while pregnant/parenting translates into improved educational outcomes in the short term.

Classic Beckerian models of human capital posit a utility maximizing agent choosing to invest in education based on the expected return (wages) and the opportunity cost of this investment. As wages rise or as the opportunity cost falls, the agent invests in more human capital.[3] Within a human capital framework, authors often focus on changes affecting higher education choices (Card and Lemieux, 2000; Charles and Luoh, 2003) or changes affecting the decision to drop out of high school (Angrist, Joshua and Alan Krueger ,1991; Black, Devereaux, and Salvanes, 2004; Pischke and von Wachter, 2005). This paper investigates a law change that altered the cost of staying in school for pregnant/parenting teenagers, a group vulnerable to dropping out of high school.

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[1] Statement by Caspar W. Weinberger released on June 3, 1975 by the U.S. Department of Health, Education and Welfare.
[2] See Hotz et al (1999), Bronars and Grogger (1994), and Geronimus and Korenman (1992) for examples.
[3] Becker (1993).

Persons at risk of becoming high school dropouts due to pregnancy and/or childbirth are an important group to study because on average they experience worse outcomes than those who graduate (as described below). Empirically, the key issue is that the same things which 'cause' a person to drop out of high school could also 'cause' other outcomes such as living in poverty as an adult, even if the individual were to finish high school. This unobserved component may also be what leads some teen moms to go back to school well after the birth. An exogenous drop in the cost of staying in school can be used to identify the causal impact of a reduction in opportunity cost on educational attainment. This paper focuses on establishing whether a change in educational policy affecting pregnant teenagers impacted school attendance and high school graduation.

Previous work examining whether adolescent childbearing is related educational attainment can be classified into four categories of study: simple regression; family fixed effect; instrumental variable; and quasi-experimental analysis. In most studies utilizing regression analysis, a strong, negative relationship between teen fertility and educational attainment, typically high school graduation, is documented (e.g. Moore and Waite, 1977; Mott and Maxwell 1981; Upchurch and McCarthy, 1989). Although these researchers control for number of socio-economic factors in their regressions, they cannot control for unobserved factors and do not address the potential endogeneity of teen fertility to teen education decisions.

To control for unobserved family characteristics when studying the relationship between early fertility and education, other authors have used family fixed effects. For example, Geronimus and Korenman (1992) look at how sisters who give birth at different ages faired. Within this framework, the authors are able to control for both observed and

unobserved family background characteristics. In most of their reported results a large, negative relationship between early fertility and educational outcomes becomes smaller (though still negative) once family fixed effects are included in the regression. There are econometric issues to contend with when estimating a family fixed effect model. Within family variation is identifying the effect; if unobserved individual variation also influences fertility and education decisions, the estimates from a family fixed model could be biased. Finally, as with the simple regression studies, this fixed effect model does not address the endogeneity of fertility to education decisions.

Subsequent authors have used an instrumental variable approach to address this endogeneity problem (e.g. Klepinger, Lundberg and Plotnick, 1995, 1999; Ribar, 1994). Instruments these authors identified to be correlated with fertility but not education include: age a first menarche, number of OB/GYN per 1000 residents, and local abortion rate. The results of these studies are mixed. For example, while Ribar (1994) finds no relationship between early (teen) fertility and completed education once the endogeneity of fertility is accounted for, Klepinger et. al (1995, 1999) find that there is a negative relationship between early fertility and completed education, which is much smaller than found by authors using simple regression.

Lastly, authors have utilized a quasi-experimental framework to study the relationship between fertility and education. In these studies, authors identify variation produced 'naturally' that can be used to identify the causal effect of fertility on education. For example, Grogger and Bronars (1993) compare teen mothers whose first teen birth resulted in twins to those with singletons. They find that there is a negative relationship between early fertility (having an additional child) and educational attainment, albeit

smaller than the magnitude of the effect found in simple regression analysis. Furthermore, they find that the negative consequences of a teen birth dissipate over time. Using a different experiment, Hotz, McElroy and Sanders (1999) relies on the variation produced by teens who miscarried (versus those who did not) to create an instrumental variable. They find that experiencing a teen birth reduces high school graduation, but that these teens appear to be obtain GEDs instead and that the negative effects of early childbearing diminishes over time.[4]

Based on this literature, evidence shows that teen fertility has a negative effect on educational attainment but that this drop may not persist in the long run. This may be because high school dropouts are able to return to school to complete their degrees or obtain a GED and that teen mothers may be more motivated to do so than the average dropout. Even so, in the intervening period, dropouts could be experiencing diminished outcomes. The interest in this paper is on whether altering a policy can increase the graduation rate at the usual graduating age, thereby decreasing the intervening period of worse outcomes.

Title IX of the Educational Amendments of 1972 (Title IX) made it illegal for an institution receiving federal funding to exclude pregnant/parenting teens from the classroom, decreasing a pregnant/parenting teen's opportunity cost of education. As a result of Title IX, some cohorts benefited from this legislation as teens while otherwise similar cohorts did not. In addition, there is state-level variation in the rate of teen motherhood prior to the law change. The methodological design used in this paper takes advantage of this 'natural' variation to identify the causal impact of the policy on teens'

[4] Completing a General Equivalence Degree (GED), as Cameron and Heckman (1993) have pointed out, does not offer the same return as a high school degree (at least for men).

educational outcomes. I argue that because different geographic areas were endowed with different levels of teen motherhood (a higher percentage of the population is in the 'treatment' group), a larger impact of the policy should be observed in these areas. In this study, the treatment group is pregnant or parenting teens (teen moms). Since most large data sets that span this time period and have geographic identifiers do not indicate whether a teenager is pregnant[5], it is impossible to directly study whether attendance by *pregnant* teens rose in response to the legislation. Instead, the percentage of teens who are mothers (measured in the pre-policy period) is used as a proxy for the percentage of teens who are pregnant/parenting in the pre-policy period. For cohorts impacted by this law change, results suggest that in states with relatively higher pre-policy levels of teen motherhood Title IX led to a relative increase in high school graduation by age 19. The impact of Title IX on school attendance, however, is not precisely measured. In most specifications, results do not show that the policy led to a relative rise in the teen birthrate.

No paper has examined the impact of Title IX on the human capital formation of pregnant teenagers. This paper adds to the literature by examining the impact of a policy which decreased the opportunity cost of staying in school and by focusing on those more likely to drop out of school. I find that Title IX increased high school graduation rates, which is consistent with the finding in the compulsory schooling literature that altering the incentives for those individuals on the margin of dropping out of school increases

[5] Most pertinent to this paper is the dearth of data collected on school attendance by pregnant teenagers. The only data set I am aware of that contains this information for pregnant teenagers is the Elementary and Secondary Compliance data for the years 1992-1998, which shows that some pregnant teens do attend school post-Title IX. These data show that in 1992, just under 60,000 students were pregnant students (0.21%). When compared to enrollment and birth figures available in the 1995 Statistical Abstract for 1992, this means that approximately one in six pregnant teens (using teens giving birth as a proxy for pregnant teens) attended public school (number of births to women less than age 20 divided by elementary and secondary public school enrollment). Figure 1 gives a visual representation of attendance by pregnant teens across states in 1992.

their educational attainment. Furthermore, this result suggests that policies targeting teens on the precipice of dropping out of school due to pregnancy/childbirth can keep teens in school, mitigating the reduced educational attainment that is expected due to early fertility. Finally, these findings contribute to our understanding of individuals' human capital investment choices and the role of policy designed to improve economic opportunities.

The remainder of the paper is organized as follows. Background information on Title IX is given in Section II. Sections III and IV present the data and econometric model, respectively. Section V discusses the results and Section VI concludes.

## II. Title IX of the Educational Amendments of 1972

On June 23, 1972, President Richard Nixon signed into law Title IX of the Educational Amendments of 1972 (Title IX). With this legislation, institutions receiving Federal funds were prohibited from engaging in sex discrimination in any educational program or activity. Reduction in equalities of funding for male and female sports is the most well known change initiated by this rule.[6] Another less well known piece of the legislation affected the educational opportunities of pregnant/parenting students.

Specifically, the legislation related to Marital or parental status, which I focus on in this paper states: [7]

[6] Stevenson (forthcoming) examines the impact of increases in female sports participation on educational attainment and labor force participation using male sports participation prior to the law change as an instrumental variable. In another article (2007), she provides dramatic evidence of the changes in female sports participation that occurred beginning in 1972, before the HEW regulations were in place. Combined, these articles provide a nice legal history as well as a review of the literature on the sports aspect of Title IX.

[7] § 106.40 Marital or parental status (Authority: Secs. 901, 902, Education Amendments of 1972, 86 Stat. 373, 374; 20 U.S.C. 1681, 1682) [45 FR 30955, May 9, 1980, as amended at 65 FR 68056, Nov. 13, 2000] http://www2.ed.gov/policy/rights/reg/ocr/edlite-34cfr106.html#S40

(a) Status generally. A recipient shall not apply any rule concerning a student's actual or potential parental, family, or marital status which treats students differently on the basis of sex.

(b) Pregnancy and related conditions. (1) A recipient shall not discriminate against any student, or exclude any student from its education program or activity, including any class or extracurricular activity, on the basis of such student's pregnancy, childbirth, false pregnancy, termination of pregnancy or recovery therefrom, unless the student requests voluntarily to participate in a separate portion of the program or activity of the recipient.

(2) A recipient may require such a student to obtain the certification of a physician that the student is physically and emotionally able to continue participation so long as such a certification is required of all students for other physical or emotional conditions requiring the attention of a physician.

(3) A recipient which operates a portion of its education program or activity separately for pregnant students, admittance to which is completely voluntary on the part of the student as provided in paragraph (b)(1) of this section shall ensure that the separate portion is comparable to that offered to non-pregnant students.

(4) A recipient shall treat pregnancy, childbirth, false pregnancy, termination of pregnancy and recovery therefrom in the same manner and under the same policies as any other temporary disability with respect to any medical or hospital benefit, service, plan or policy which such recipient administers, operates, offers, or participates in with respect to students admitted to the recipient's educational program or activity.

(5) In the case of a recipient which does not maintain a leave policy for its students, or in the case of a student who does not otherwise qualify for leave under such a policy, a recipient shall treat pregnancy, childbirth, false pregnancy, termination of pregnancy and recovery therefrom as a justification for a leave of absence for so long a period of time as is deemed medically necessary by the student's physician, at the conclusion of which the student shall be reinstated to the status which she held when the leave began.

In this paper, I focus on the part of the legislation dealing with pregnant/parenting teens' access to education. Because Title IX made it illegal to treat students differently on the basis of sex, its passing made illegal school policies that were overtly

discriminatory as well as policies that created disparate impacts (for example expulsion of pregnant teens but not the males who impregnated them). Because Title IX made expelling students or forcing them to attend separate (potentially inferior) classes illegal, it expanded the educational opportunities of a large number of pregnant teens.

*State legal landscape before Title IX legislation*

Prior to the sweeping national change in policy toward pregnant/parenting teens brought about by Title IX judicial, legislative and policy at the state level regulated a pregnant/parenting teen's access to education. Few states had specific laws or policies and treatment of pregnant/parenting teens was often left to a district's (or school's) discretion (Howard, 1972).

According to Childs (1972), pre-Title IX, seven states had statues regarding the education of pregnant teens: Arizona, Florida, Idaho, Illinois, Michigan, Oregon, and Texas. Table 1 gives the enactment dates and a general description of each state's statute. Only Michigan's and, to a lesser degree, Florida's laws provided access similar to that conferred by Title IX. Florida's statue allowed for a student to be involuntarily assigned to a special class (which would later have been considered a violation of Title IX). Furthermore, these state laws did not articulate what would happen to the schools if they did not comply and it is unclear whether and to what degree these laws were enforced. For example, a 1972 survey of Texas school districts (Berwick and Oppenheimer)[8] indicates that 46% of the districts forced pregnant students to withdraw from school without offering them any alternative education, which would have been a violation of the Texas statute.

[8] In their study, only 119 of approximately 700 Texas school districts responded. While those who did respond may not be a representative sample, it is still striking that 46% forced withdrawal.

Judicial action related to discrimination against unmarried pregnant/pareting teens in school occurred in two states prior to the 1972 Title IX amendments (detailed in Table 1). In 1969, a Federal District court in Mississippi ruled that expulsion of unwed mothers from school was a violation of a woman's constitutional right under the 14th Amendment. In 1971, a Federal District court ruling in Massachusetts interpreted the law to mean that pregnancy itself was not enough to segregate a student, the first ruling that dealt explicitly with pregnant teens.

Policies varied by state and within state by district and school. Table 1 gives an overview of state policies in the years leading up to Title IX. At least one state, Pennsylvania, interpreted the 1971 Massachusetts ruling to mean that changes in state policy related to pregnant teens were required. Despite this, some districts within a state may not have followed a state-level policy. For example, Maryland's Department of Education By-Laws dated 1967 made it clear that pregnant students should not be excluded from regular classes. Seemingly in violation of this policy, a 1971 Baltimore City Public Schools policy dictated that pregnant students were required to transfer to an alternative program.

Without clear rules and/or without enforcement and penalties that wielded a real threat to schools, it is unlikely that the majority of schools felt obliged to offer all pregnant students equal access to education. The Title IX amendments offered both: clear guidelines and a threat of losing Federal funding.

*Pregnant students and school enrollment before and after Title IX*

Prior to Title IX, it was common to observe school districts expelling pregnant students or forcing them to attend alternative classes (Childs, 1972; Mott and Maxwell,

1981; McNeeley, 2007; Pillow, 2004; UPenn Law Review, 1976). Only one third of 17,000 school districts surveyed in 1970 offered pregnant teens any education at all (Howard, 1972; UPenn Law Review, 1976, p. 832). Using the 1971 National Survey of Young Women (NSYW), I found that 42% of respondents aged 15 to 17 who dropped out of school reported doing so because of pregnancy. Although the survey does not ask whether the girls were forced to withdraw from school, the figure is compelling since the corresponding dropout figure for respondents without children is only 4.6%.

School enrollment by pregnant and parenting teens changed dramatically during the 1970s. Utilizing the National Longitudinal Survey of Young Women (NLS-YW), which sampled women 14 to 24 in 1968, and the National Longitudinal Survey of Youth (NLSY), which sampled women 14 to 22 in 1979, Mott and Maxwell (1981) show that enrollment rates of pregnant students (which they can measure utilizing the longitudinal nature of the data sets) increased dramatically.[9] For teen moms aged 15 to 17, data from the 1970 and 1980 censuses tell a similar story: the bottom panel of Table 2 shows that school attendance by teen moms increased over 13% while for teen non-moms, the change in attendance was less than 1.5%.

Anecdotal evidence also suggests that Title IX led to a change in treatment and school enrollment of pregnant students, at least in some schools. For example a principal from a Russellville, Arkansas school interviewed during the 1975-1976 school year stated, "Prior to Title IX we encouraged the pregnant girl to withdraw from school for the remainder of the semester. There is a pregnant girl currently attending school whom we

[9] These changes in attendance are not as apparent when looking at a narrower time period using cross sectional data. In 1971 NSYW 54% of respondents aged 15 to 17 who reported being currently pregnant were currently attending school. The corresponding percentage from the 1976 National Survey of Adolescent Female Sexual Behavior (NSAFSB) is 58%. This is perhaps not too surprising since Title IX was not effective until July of 1975.

had encouraged last fall to drop out, but after studying the Title IX law further, we encouraged her to return. Which she did."[10]

*Enforcement*

Although Nixon signed the bill in 1972, the HEW regulations were not finalized until 1975. Since July 21, 1975, Title IX has enabled individuals facing discrimination to either file a lawsuit against the school or file a complaint with the Office of Civil Rights (OCR) within HEW (or after 1980 within the U.S. Department of Education).[11] Schools were given one additional year to perform a voluntary compliance review;[12] one could have lodged a complaint against the school during this year.[13] Prior to 1975, it is unclear whether schools felt obligated to comply and anecdotal accounts suggest that some schools did not do so before then.[14] However, when examining schools response to the athletic portion of the act, Stevenson (2007) shows that schools started to respond in 1972.

Complaints that are filed with the OCR are investigated and if there is evidence of discrimination after the initial investigation, the OCR will first attempt to get the school to voluntarily comply with Title IX regulations.[15] If it does not voluntarily comply, then the OCR issues a letter of findings which describes the factual and legal basis of the violation(s). If the school still fails to comply then the OCR can refer the case to the Department of Justice. If the Department of Justice finds the school in violation, the school would potentially lose Federal funding. The loss of Federal funding is a much

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[10] American Friends Service Committee (p. 84).
[11] Prior to 1980, the Department of Health, Education and Welfare (HEW) regulated and enforced Title IX. Since then, the OCR within the Department of Education has been in charge of enforcement. See http://www2.ed.gov/policy/rights/reg/ocr/index.html.
[12] This is articulated in the Weinberger statement released by HEW on June 3, 1975.
[13] American Friends Service Committee (p.116).
[14] American Friends Service Committee (p. 9)
[15] The description of the OCR complaint process in this paragraph is based on Kuznick and Ryan's (2008, p.384) overview.

larger threat than what a school faced (essentially no penalty) under state law prior to Title IX.

The number of complaints filed with the OCR is not easily accessible because the OCR does not maintain a statistical database on complaints. Based on information obtained using a Freedom of Information Act (FOIA) request to the Department of Education, I determined that among schools deemed non-compliant (11 in total) as a result of complaints filed during the late 1970s and 1980s, all of these schools became *voluntarily* became compliant as a result of the OCR review prior to losing Federal funding. Therefore, the perceived threat of losing Federal funding or the wish to avoid further legal or OCR complaints may be large enough to force schools to comply with Title IX. Some scholars suggests that schools do not view the threat as valid and hence do not respond (McNeeley, 2007; Pillow, 2004). Their logic is slightly flawed. Even if not every school has responded to the legislation perfectly, if some schools have become more accommodating to pregnant teens after Title IX then students on the margin of dropping out of school due to pregnancy may have benefitted.

A private law suit affords the possibility of monetary compensation. However, the time and financial costs involved in a private lawsuit are substantial, and individuals may be more likely choose to file a complaint with the OCR (Rosenfeld, 2008). The small number of cases that have been litigated involve denial of access to or termination of membership in a high school's National Honor Society and there have been no fully litigated cases dealing with expulsion of pregnant students from school or denial of access to regular classes (Brake, 1994; McNeeley, 2007; Pillow, 2004).

Although the legislation was signed into law in 1972, it took three years for the Department of Health, Education, and Welfare (HEW) to develop regulations for institutions to follow (1972-1975) and it was not until 1975 that these regulations were enacted (HEW Statement, June 1975).[16] In this paper, I assume that institutions started adjusting their behavior regarding pregnant school girls beginning with the 1972-1973 school year. Assuming that schools began adjusting their policies related to pregnant teenagers in 1972, one would expect that cohorts of high school age after this change might have dropped out less frequently than older cohorts. The difference across cohorts and the endowment of pre-policy teen motherhood are used to identify the impact of Title IX on educational outcomes.

*Social stigma*

Title IX could have also decreased the 'cost' of becoming a teen mother by altering the social stigma of being a teen mother, which may have increased the number of teens becoming mothers. The top panel of Table 2 shows that teen motherhood increased by less than 0.15% from 1970 to 1980 for teens aged 15, 16, and 17. Despite the small change in the percentage of teens becoming mothers, examining the teen birthrate as an outcome is important. Assuming that the relationship between Title IX and high school graduation exists, it is possible that the mechanism by which Title IX increases education is via a decrease in the stigma (cost) associated with a teen birth. If teens who are not pregnant observe that the 'cost' associated with being pregnant falls, then this could increase the number and/or change the composition of teens giving birth. The new group of teens giving birth may have higher educational preferences (and hence

[16] Although not the focus of this paper, it took an additional four years (1975-1979) for HEW to develop policy interpretations regarding athletic programs.

higher educational attainment) than the group already giving birth. If this is the case, then even in the absence of the policy change, had they become mothers they would have increased the average education level of the group of teen mothers.

There are other ways the composition of the group of individuals who became teen mothers over this period may have changed dramatically even if the proportion of teens who are mothers did not change that much. Two important factors affecting fertility changed over this period: increased legal access to abortion and the birth control pill (the Pill). Recent literature has shown that during this period, women who gained access to abortion and the Pill experienced a drop in birthrates and that better ability to control the timing of births improved career outcomes (Bailey, 2006; Goldin and Katz, 2002; Guldi, 2008; Levine et al, 1999). In Figure 2, comparing dropout rates in 1970 with those in 1980 for same-aged individuals reveals that for every age, the dropout rate is lower in 1980. If gaining access to abortion and the Pill is what is driving the decline in the female high school dropout rate from 1970 to 1980, then we may see a rise in school attendance and/or graduation for women choosing not to become mothers as well as among teen mothers. For this to be true we assume that the group choosing to avert or terminate a pregnancy places a higher value on time allocated toward education than time spent on rearing a child. If true, even in absence of Title IX we would see the dropout rate fall as a result of access to abortion and the Pill. Alternatively, access to abortion and the Pill may alter *who* becomes pregnant (and gives birth). If the group of teens giving birth post- versus pre- pill/abortion law changes places a higher value on education, we could also see the attendance/high school graduation rate of pregnant/mothering teens rise.

If Title IX is one mechanism that decreased female high school dropout rates during the 1970s, then we might expect to see an increase in school attendance by teen mothers that is not present for other teen non-mothers. As mentioned previously, the bottom panel of Table 2 shows that school attendance increased dramatically (over 13% rise) for teen mothers while for female teen non-mothers, the change in attendance was less than 1.5%. Given the observed differences in attendance by teen mothers, and the possibility that the individual who is a teen mother in 1970 may have very different characteristics than one who is a teen mother in 1980, it is important to consider whether Title IX impacted teen birthrates, perhaps via reducing the stigma of a teen birth while also controlling for abortion and pill access.

**III. Data**

Data used in this paper come from the Current Population Series October Survey (CPS), the Vital Statistics Natality Detail files, the Decennial Census, and population estimates published by the Census. The data consist of only women. As described below in Section IV, I examine the outcomes of school attendance, high school graduation, and birth rates. In this section I describe the data sources used to construct these outcome variables.

When examining school attendance, data from the October Survey of the CPS and include females aged 15 to 17 from 1968 to 1980. An individual is coded as attending school if the individual is currently attending school or if the individual has already graduated from high school. I also use the CPS when examining high school graduation and limit the sample to women aged 19. Although the education codes in the CPS do not allow me to differentiate a GED certificate from a high school diploma, by limiting the

sample to age 19, I avoid the issue of educational attainment increasing with age, even if actual attainment has not changed.

Data from the 5% sample of the 1980 Decennial Census (Form 1), downloaded from IPUMS, are used to perform a cross sectional examination of high school graduation rates. Cohorts born in 1950-1960 comprise the sample. The unit of observation is an individual *i* in cohort *c* born in state *s*. Each individual is assigned her birth state, under the assumption that this is the state where she resided as a teen. Persons born or currently living outside of the 50 states and DC are excluded from the sample. Persons whose number of children has been imputed or hot-decked have been dropped from the sample.

Teen birthrates are constructed using two data sources. First, the Vital Statistics Natality Detail data from 1968 to 1979 are used to compute the number of births by females aged 15 to 17 each year in each state. Census population estimates for each state for each year are used to construct the state population aged 15 to 17 for each year. The number of births is then divided by the population aged 15 to 17 (in thousands) in each state in each year to obtain the birthrate. The variable used in the regression is the natural log of the birthrate. Further details on this data are given in Guldi (2008).

The approach taken in this paper, and described in further detail in Section IV below, requires a measure of the percentage of teens who give birth (or who are mothers) in a period prior to the law change, which I define as $PRE\%_s$. The $PRE\%_s$ variable represents the percentage of teens aged 15 to 17 in 1970 who are mothers.[17] The 15% sample of the 1970 Census (Form 2) obtained from the Integrated Public Use Micro

[17] This is not an ideal measure since a mother whose biological children are living apart from her will be coded as a non-mother.

Sample (IPUMS), is used to compute the percentage of teens aged 15 to 17 who are mothers. The IPUMS variable chborn is used to code persons who have had children as teens as "mothers". When chborn has been allocated or hot-decked, the individual is omitted from the sample.

For the CPS, race is defined in the following categories: White; Black/Negro; and Other. For the Census, race is defined in the following categories: White; Black; American Indian or Alaskan Native; Chinese; Japanese; Other Asian or Pacific Islander; Other race, not elsewhere classified.

**IV. Econometric Model**

Title IX is a national policy. Therefore, it is not possible to use policy variation across states to identify the model. Clearly, looking at the simple difference in high school graduation rates across cohorts would yield biased estimates for a number of reasons. For instance, a positive trend in education would lead to a prediction that younger cohorts obtain higher levels of education even in the absence of a 'true' impact from the policy. I construct two types of models to identify the impact of Title IX on education. The first model uses a synthetic panel of females aged 15 to 17 constructed from repeated cross sectional data to explore whether Title IX influenced school attendance, high school graduation, and the teen birth rate. The second model uses cross sectional data of women aged 20 to 30 in 1980 to analyze high school graduation as an outcome.

The models in this paper rely on variation in the geographic distribution of teen motherhood prior to the policy change and a larger policy impact is expected in geographic areas where a larger proportion of the population is treated. This approach

has been used in recent work by Black, Daniel and Sanders (2002), Bleakley (2006), and most related to this paper, Stevenson (forthcoming). One critical assumption of this approach is that the density of the population in the 'treatment' group is exogenous. For instance, it is reasonable to believe that 'nature' assigns the amount of coal deposits in a given area (Black et al., 2002). In this paper, the assumption is that 'nature' assigns the pre-policy rate of teen motherhood.

The identification of the models below rests critically on the exogeneity of pre-policy rates of teen motherhood. If these rates are not exogenous to the intensity of the policy implementation, then identification of the model is threatened. If this occurs, how vigorously the policy was implemented would be expected to predict the pre-policy rates. In 1980, the OCR's Elementary and Secondary School District Compliance Report asked school districts questions related to their compliance with specific provisions of Title IX. Table 3 shows that most districts were complying with these provisions, though some were not. In a regression, I found no relationship between future compliance and pre-policy rates of motherhood.

The introduction of Title IX affected the opportunity costs associated with staying in school for a larger proportion of the teen population in areas where teen pregnancy was highest prior to the law change. Both models described below test whether persons living (or born) in states with higher rates of teen motherhood experienced a larger change in an outcome after the policy change relative to teens in other states. In addition, both models include all females rather than the subset of females who were teen mothers. Constructing the sample in this way avoids potential sample selection bias that would be present if a fertility outcome is used to construct the

sample analyzed and the fertility outcome also changes due to a change in behavior resulting from Title IX (eg becoming a teen mother).

**A. Model I— Synthetic Panel of Individuals Aged 15 to 17**

The first outcome examined using a synthetic panel is school attendance. The data used in this model comes from the Current Population Survey (CPS), which is described in more detail in the Section III above. The model is:

$$ATTEND_{icst} = \beta_0 + \beta_1 PRE\%_s * TITLEIX_t + \beta_2 X_i + \delta_s + \tau_t + \varsigma_c + ST_YR_TREND_{st} + \varepsilon_{icst} \quad (1)$$

Where $ATTEND_{icst}$ is a binary indicator equal to one if individual *i* in cohort *c* in state *s*, observed at time *t*, attended school. $PRE\%_s$ is the percentage of 15-17 year-old females who gave birth or were mothers in 1970 (or 1968) in state *s*. $TITLEIX_t$ equals one for individuals observed in 1972 through 1980 and zero otherwise, because the policy is assumed to change with the 1972-1973 school year. $X_i$ is a vector of indicators for difference race categories. $\delta_s$ , $\tau_t$ , and $\zeta_c$ are state, year, and cohort fixed effects. These fixed effects are included to control for fixed differences across these dimensions which may be correlated with the policy and outcome of interest. Since $PRE\%_s$ varies across states but not over time, the main effect is omitted since its impact is controlled for with the state fixed effect. Similarly, since $TITLEIX_t$ varies over time but not across states, the main effect is omitted since its impact is controlled for with the year fixed effect. $ST_YR_TREND_{st}$ is a state-specific time trend (linear and/or quadratic), which accounts for different time trends across states.

Because the opportunity cost of staying in school decreases with Title IX and because areas with the highest rates of teen motherhood are expected to be most responsive to the legislation $\beta_1$, which is the additional impact for females in high-teen

fertility states due to Title IX, is expected to be positive. The identification results from variation across states in pre-policy rates of teen motherhood.

The second outcome considered using a synthetic panel is high school graduation by age 19. Again, the data used in this model comes from the CPS. The model is almost the same as that reported in equation (1) except that the outcome is high school graduation and there is no cohort component for the model since only one age is observed each year. The sign of $\beta_1$ is still expected to be positive.

**B. Model II—Cross Sectional Analysis using cohorts aged 20 to 30**

$$HSGRAD_{ics} = \beta_0 + \beta_1 PRE\%_s * TITLEIX_c + \beta_2 X_i + \delta_s + \varsigma_c + ST_COHORT_TREND_{sc} + \varepsilon_{ics} \quad (2)$$

$HSGRAD_{isc}$ is and indicator equal to one if the individual reports 12 or more years of education. $PRE\%_s$ is the percentage of 15-17 year-old females who were mothers in 1970 in state *s*. $TITLEIX_c$ equals one for cohorts who are age 17 or younger in 1972 (Those born in 1955 or later). $X_i$ is a vector of indicators for difference race categories. $\delta_s$, and $\zeta_c$ are state and cohort fixed effects. These fixed effects are included to control for fixed differences across these dimensions which may be correlated with the policy and outcome of interest. Since $PRE\%_s$ varies across states but not across cohorts, the main effect is omitted since its impact is controlled for with the state fixed effect. Similarly, since $TITLEIX_c$ varies across cohort but not across states, the main effect is omitted since its impact is controlled for with the cohort fixed effect. $ST_COHORT_TREND_{sc}$ is a state-specific cohort trend, which accounts for different cohort trends across states. As above, $\beta_1$, which is the additional impact for females in high-teen fertility states due to Title IX, is expected to be positive

**V. Results**

The results show that for cohorts of high school age (15 to 17), evidence suggests that Title IX increased high school graduation, but no statistical evidence that Title IX increased school attendance. In addition, there is little evidence that Title IX increased the teen birthrate.

**A. School Attendance**

The results in Table 4 report the results with female teens' school attendance as the outcome variable. Each column in Table 4 represents a separate regression. $PRE\%_s$ is the percentage of teens who are moms in 1970. All coefficient estimates are negative, the opposite sign of what is expected if Title IX increases school attendance in states with higher teen fertility prior to the policy change. No estimate is even close to being statistically significant, however, meaning that we cannot reject the null that there is no difference in school attendance after the policy in high fertility states relative to other states. In addition, the estimates are quite small. Every estimate implies a change less than 0.003[18] percentage points in response a one percentage point increase in $PRE\%_s$.

**B. High School Graduation**

Whether an individual graduated from high school is another outcome that can be used to gauge the impact of Title IX on an individual's investment in education. The results for regressions with high school graduation by age 19 as the outcome variable are reported in Table 5. In contrast to the school attendance results, these results are all positive meaning that teens living in states with higher teen fertility prior to Title IX graduated from high school relatively more after the policy change. Though not all coefficients are statistically significant by conventional standards, they are suggestive. Although controlling for state-specific time trends made little difference in the attendance

[18] This is -0.233*.01 =-0.0023.

regression, here the estimates at least double after controlling for the trends. After taking account of state-specific time trends, the smallest estimates imply a change of 0.009 percentage points as a result of a one percentage point increase in $PRE\%_s$, which is much larger than the estimates for school attendance. This translates into an increase in high school graduation from 84.5% to 85.5%.

If high school graduation increased in response to Title IX legislation, then we would expect to see similar estimates when examining the impact of the policy using different datasets. However, the exact measurement will vary depending on the sample of the population surveyed (as shown in Figure 3 for the CPS).

Table 6 reports the estimates of a cross sectional analysis (equation 2) examining whether Title IX influenced the high school graduation of women observed in 1980 at ages 20 to 30 (who would have been 12 to 22 in 1972). Without controlling for state specific trends across cohorts, it seems that there is a very large, statistically significant impact of Title IX. However, after controlling for these trends, the estimates fall dramatically and become statistically insignificant. One reason that this may occur is that we are not observing all of the different cohorts at the same age. If women are obtaining more education as they age, then this would bias the estimated policy impact downward. Upon examining Figure 2, this appears to be a valid concern when comparing women age 20 in 1970 (with a dropout rate of around 0.20) to the same cohort of women age 30 in 1970 (who have a dropout rate of approximately 0.14). Because of the potential for persons to obtain more education as they age, measuring education by age 19 (as in Table 5) is preferred over measuring completed education at different ages at the same point in time (as in Table 6) when examining the impact of Title IX on high school graduation.

**C. Teen Birth rate**

Assuming that the relationship between Title IX and high school graduation presented in Table 5 (using CPS data) exists, it is possible that the mechanism by which education increases is via a decrease in the stigma (cost) associated with a teen birth as explained in Section II above. The third outcome considered is the teen birthrate. This model is also similar to equation (1). However, for this outcome Vital Statistics and Census population data (described above) are aggregated to the state-year level to examine the birthrate of 15 to 17 year olds as an outcome. Since this is a state-year panel, there is no cohort fixed effect in this model. In addition, this model controls for abortion legalization since other research has shown it had a profound effect on the teen birthrate. The prediction for $\beta_1$ is now ambiguous. If Title IX decreased the cost of becoming pregnant by decreasing the associated stigma, then we expect the sign to be positive. However, if Title IX had no impact on teen choices relating to birth, then we expect $\beta_1$ to be zero. Results are presented in Table 7. The coefficient is negative when state-specific time trends are omitted and positive when these trends are included. In only one specification is the coefficient estimated with statistical significance and it indicates an negative relationship—meaning the policy could have acted to reduce the teen birth rate. When considering abortion the importance of controlling for state-specific trends has been documented in Levine et. al (1999). Consequently, the results in column 6 are most believable and these do not show a relationship between Title IX and teen birth rates. Even if the results in column 6 indicating a positive relationship were believable, the estimates imply that after the policy change, if the pre-policy% of teens giving birth is one percentage point higher, then the teen birthrate rises by about 0.6%, or about 1 birth

for every 5000 female teens,[19] relative to the birthrate in other states. For the education result to be operating via the teen birthrate channel, the small increase in the number of teens giving birth would have to be responsible for the relatively large increase in high school graduation presented above, which does not appear plausible.

## VI. Conclusion

Human Capital models posit that either increasing the return education (human capital) or decreasing the opportunity cost of education should increase the level of schooling an individual chooses. This paper explores the impact of altering opportunity costs of education on the schooling outcomes of individuals exposed to Title IX legislation. The results presented in this paper suggest that Title IX increased the female high school graduation rate over the period more in states with higher levels of teen childbearing before any law change. This is an important area of research because it could aid in understanding the mechanisms that influence human capital formation, and intergenerational transmission of human capital and inform debate on policy topics such as education reform.

[19] This is 0.6002*.01 = .006, which is 0.6%. And the mean value of birthrate is 34.99*0.6% is 0.21 births per thousand.

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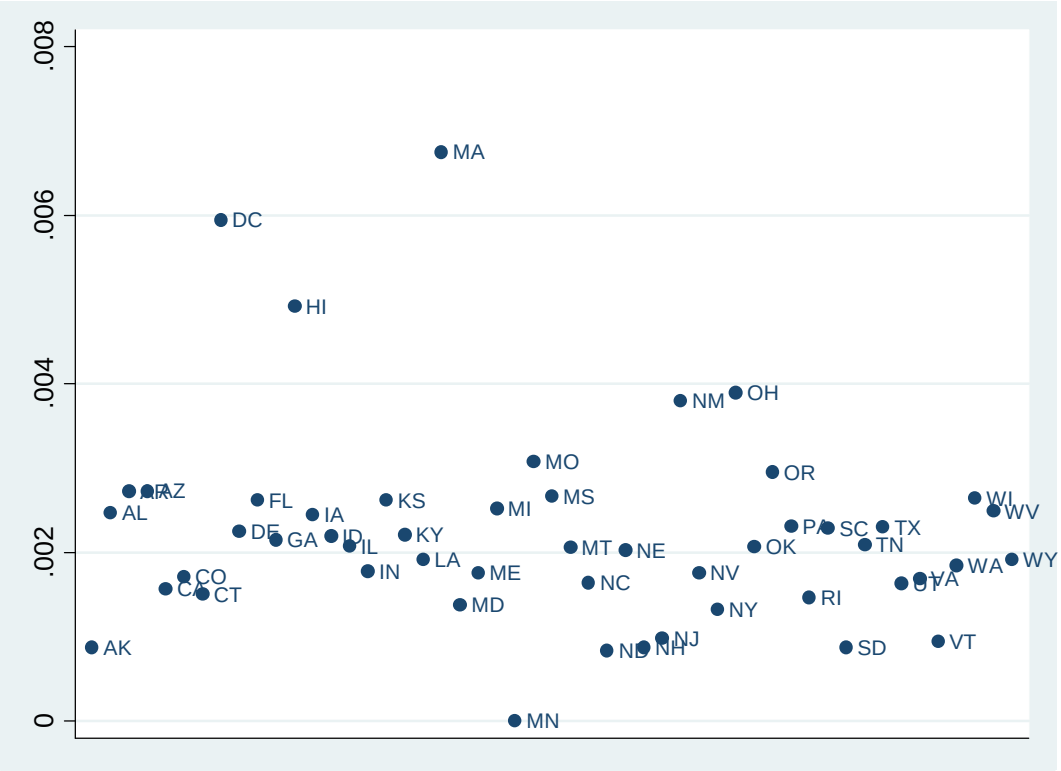
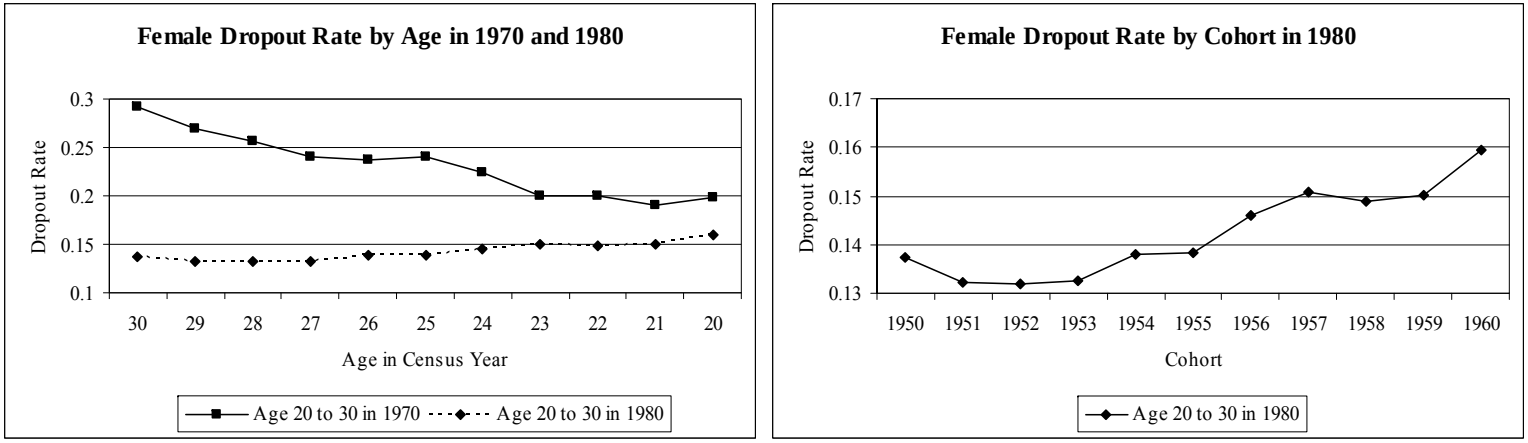
Figure 1: Percentage of Students Attending School Who are Pregnant, 1992



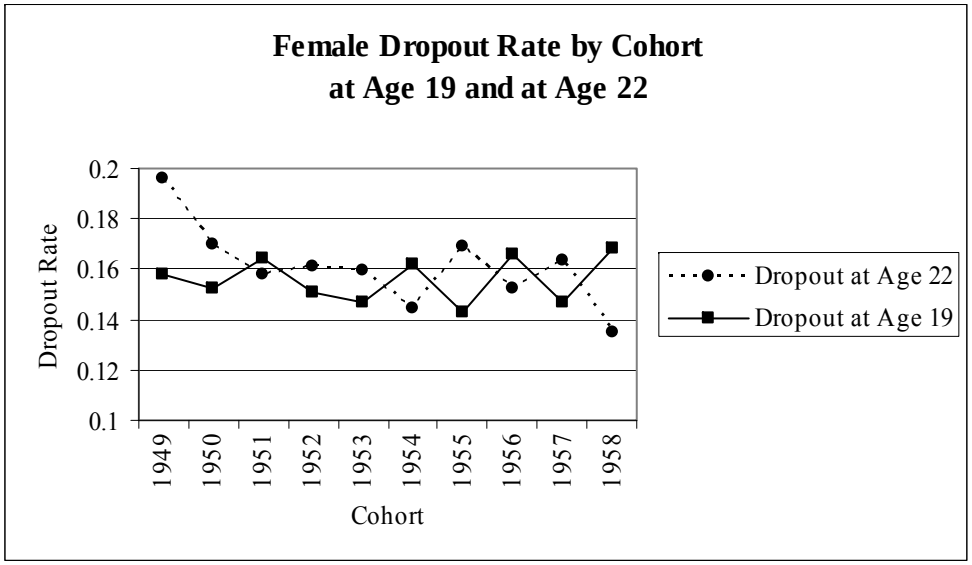

Source: Elementary and Secondary School District Compliance Report (1968-1998 Time Series File)
Note: Each point in the figure represents the average percentage of students who are pregnant in the corresponding state using information provided in the referenced data.

Figure 2: Differences Across Cohorts in the High School Dropout Rates for Females Aged 20 to 30 at time of the Census




Source: Author's computation of dropout rates using the 1970 Census (Form 1) and the 1980 Census (Form 1).

Figure 3: Female Dropout Rate Computed at Age 19 and Age 22 for Cohorts born in 1949-1958




Source: Author's computation of dropout rates using the 1968-1977 CPS.

Table 1: State Judicial, Legislative and Policy related to pregnant teens' education prior to Title IX

| State | Type | Date | Description |
|---|---|---|---|
| Arizona | Statute | 8/11/1970 | Pregnant students are eligible for homebound education equivalent to that given in regular education classes. |
| California | Policy (Administrative Code-Education) | pre-1972 | Pregnant students should be assigned to an alternative program. After delivery date, student can be discharged from the alternative program and re-enroll in the regular program. |
| Florida | Statute | 7/1/1971 | Pregnant students should be given education equivalent to that given in regular education classes, but may be assigned to special classes. |
| Idaho | Statute | 7/1/1963 | Districts with system of care for pregnant/parenting teens should provide accredited courses. |
| Illinois | Statute | 7/20/1967 | Requires districts to provide homebound instruction to pregnant students unable to attend due to pregnancy. |
| Maryland | Policy (Board of Education By-laws) | 7/26/1967 | Pregnant students may elect to remain in regular school program. No involuntary explusion from regular program, though student may voluntarily participate in alternative program. |
| Maryland | Policy (Baltimore City Public Schools Memo) | 4/23/1971 | Pregnant students must transfer to an alternative program no later than her 6th month of pregnancy. If a student refuses the alternative program, the school can force her to permanently withdraw. After delivery, students can transfer back to the regular program. |

| | | | |
|---|---|---|---|
| Massachusetts | Judicial (Federal) | 1971 | Ordway v. Hargraves; First Federal case to rule that pregnant students had a right to remain in school while pregnant. |
| Michigan | Statute | 12/30/1970 | Districts cannot exclude pregnant students from class. Pregnant students can voluntarily choose alternative programs or to withdraw from school. |
| Mississippi | Judicial (Federal) | 1969 | Perry v. Grenada Municipal Separate School District; Enabled teens who had had children out of wedlock to return to school. |
| Oregon | Statute | Summer 1965 | Requires special education be given to pregnant/parenting students. |
| Pennsylvania | Policy (School Administrator's Memorandum) | 9/27/1971 | References Department of Justice instruction that expulsion of pregnant students violates pupil's constitutional rights. (Presumably due to Ordway v. Hargraves) Therefore, pregnant students should not be excluded from school unless physician indicates attendance would be detrimental to pregnancy. View homebound or other part-time programs as violating student's rights. |
| Texas | Statute | 7/21/1969 | Requires special education be given to pregnant/parenting students. |

Sources: Childs, 1972; Howard, 1972; McNeeley, 1997;University of Pennsylvania Law Review, 1976.

Table 2: Teenage Motherhood and School Attendance Percentages for Females Aged 15 to 17

Percentage Teens (Age 15-17) Who Are Moms

| | Age 15 | Age 16 | Age 17 |
|---|---|---|---|
| 1970 | 1.07% | 2.92% | 6.47% |
| 1980 | 1.11% | 2.99% | 6.59% |

Percentage of Teen Moms Who Are Attending School

| | Age 15 | | Age 16 | | Age 17 | |
|---|---|---|---|---|---|---|
| | Not Moms | Moms | Not Moms | Moms | Not Moms | Moms |
| 1970 | 96.16% | 34.07% | 92.42% | 30.57% | 85.50% | 23.58% |
| 1980 | 97.42% | 57.64% | 92.88% | 47.93% | 84.92% | 36.77% |

Source: Author's Tabulation using 1970 (Form 2) and 1980 (Form 1) Census Data from IPUMS.

Table 3: Elementary and Secondary School District Compliance in 1980

| | Yes | No | N/A |
|---|---|---|---|
| Policy of Restricted Participation | 11.41 | 88.51 | 0.08 |
| Medical Certificate Required | 10.68 | 0.73 | 88.59 |
| Separate Programs Offered | 54.73 | 45.2 | 0.08 |
| Mandatory Participation in a Separate Program | 2.49 | 52.25 | 45.26 |

Source: Elementary and Secondary School District Compliance Report (1968-1998 Time Series File)
Note: Numbers represent percentage of districts reporting each answer
N/A corresponds to Not Available or Not Applicable

Table 4: The Impact of Title IX on School Attendance by Females aged 15-17 Using 1968-1980 CPS

Mean of School Attendance (Dependent Variable): 0.9166592

| | | | |
|---|---|---|---|
| Title IX * | -0.124 | -0.191 | -0.233 |
| (1970 % Teen moms by State) | (0.216) | (0.494) | (0.645) |
| State-Specific Linear Time Trend | | x | x |
| State-Specific Quadratic Time Trend | | | x |
| Observations | 56285 | 56285 | 56285 |

Robust standard errors taking account of clustering of errors by cohort are reported in parentheses. Each column represents a separate OLS regression, weighted by the person weight provided in the 1968-1980 October Supplement to the CPS. The dependent variable, School Attendance is a binary variable equal to one if the individual reports that she is still attending school, or has already graduated from high school. When using the CPS for the period considered, only 21 unique state groups can be identified. Title IX Cohort is a binary variable equal to one if the individual is observed in 1972 or later (age 17 or younger in 1972). 1970 % Teens moms by state is the state group's number of teens aged 15-17 who are mothers in 1970 divided by the state group's population of females age 15-17 in 1970, computed from the 1970 Census (Form 2). Each regression includes race, state, and year fixed effects.

Table 5: The Impact of Title IX on Female High School Graduation by Age 19 Using 1968-1980 CPS

Mean of High School Graduate (Dependent Variable): 0.8454875

| | | | |
|---|---|---|---|
| Title IX * | 0.938* | 1.873 | 1.910 |
| (1970 % Teen moms by State) | (0.456) | (1.116) | (1.190) |
| State-Specific Linear Time Trend | | x | x |
| State-Specific Quadratic Time Trend | | | x |
| Observations | 17044 | 17044 | 17044 |

Robust standard errors taking account of clustering of errors by cohort are reported in parentheses. * indicates significance at the 10% level. Each column represents a separate OLS regression, weighted by the person weight provided in the 1968-1980 October Supplement to the CPS. The dependent variable, High School Graduate is a binary variable equal to one if the individual reports 12 years of education or is still attending school. When using the CPS for the period considered, only 21 unique state groups can be identified. Title IX is a binary variable equal to one if the individual is observed in 1972 or later (age 17 or younger in 1972). 1970 % Teens moms by state is the state group's number of teens aged 15-17 who are mothers in 1970 divided by the state group's population of females age 15-17 in 1970, computed from the 1970 Census (Form 2). Each regression includes race, state, and year fixed effects.

Table 6: The Impact of Title IX on Female High School Graduation Using 1980 Census Data

Mean of High School Graduate (Dependent Variable): 0.8572

| | | | |
|---|---|---|---|
| Title IX Cohort * | 0.391*** | 0.013 | 0.010 |
| (1970 % Teen moms by State) | (0.087) | (0.129) | (0.126) |
| State-Specific Linear Cohort Trend | | x | x |
| State-Specific Quadratic Cohort Trend | | | x |
| Observations | 982417 | 982417 | 982417 |

Robust standard errors taking account of clustering of errors by cohort are reported in parentheses. *** significant at the 1% level. Each column represents a separate OLS regression, weighted by the person weight provided in the Census data. The dependent variable, High School Graduate is a binary variable equal to one if the individual reports 12 years of education. Title IX Cohort is a binary variable equal to one if the individual's cohort is born in 1955 or later (age 17 or younger in 1972). 1970 % Teen moms by state is the state's number of teens aged 15-17 who are mothers in 1970 divided by the state's population of females age 15-17 in 1970, computed from the 1970 Census (Form 2). Each regression includes race, state, and cohort fixed effects.

Table 7: The Impact of Title IX on Teen (Age 15-17) Birthrates Using 1968-1980 Vital Statistics Data

Mean of Teen Birth Rate : 34.99 births per 1000 females aged 15 to 17

| | | | | | | |
|---|---|---|---|---|---|---|
| Title IX * | -1.4765 | 0.7052 | | | -1.9767 | 0.6002 |
| (1970 % Teen moms by State) | (0.962) | (0.610) | | | (0.826)** | (0.574) |
| Repeal*Year is 1971-1973 | | | -0.1738 | -0.1428 | -0.1816 | -0.1425 |
| | | | (0.023)*** | (0.016)*** | (0.018)*** | (0.016)*** |
| Repeal*Year is 1974-1975 | | | -0.1635 | -0.1234 | -0.1751 | -0.1231 |
| | | | (0.030)*** | (0.026)*** | (0.024)*** | (0.026)*** |
| Repeal*Year is 1976-1979 | | | -0.1193 | -0.0901 | -0.1309 | -0.0906 |
| | | | (0.024)*** | (0.034)** | (0.020)*** | (0.034)** |
| State-Specific Quadradic Time Trend | | x | | x | | x |
| Observations | 612 | 612 | 612 | 612 | 612 | 612 |

Note: Dependent Variable is LN (Teen birth rate)
Robust standard errors taking account of clustering of errors by cohort are reported in parentheses** significant at 5%; *** significant at 1%. Teen birth rate is derived from the 1968-1979 Vital Statistics Natality Detail and State Population Estimates from the Census. Each column represents a separate OLS regression, weighted by the state population of women ages 15 to 17. Title IX is a binary variable equal to one if the individual is observed in 1972 or later (age 17 or younger in 1972). 1970 % Teens moms by state is the state's number of teens aged 15-17 who are mothers in 1970 divided by the state's population of females age 15-17 in 1970, computed from the 1970 Census (Form 2). Each regression includes state and year fixed effects.