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The Impact of Legalized Abortion on Teen Childbearing*

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ABSTRACT

After forty-one consecutive years of increase, out-of-wedlock teen childbearing unexpectedly reversed course in 1991 and by 2002 was 20 percent below its peak. Explanations for that reversal have proven elusive. In this paper, we present evidence that exposure to legalized abortion *in utero* for the cohort of women that became teenagers in the 1990s is one factor contributing to this decline. We estimate that the legalization of abortion in the 1970s changed the composition of women at risk of bearing children out of wedlock some 15 to 24 years later. This composition effect reduced out-of-wedlock teen birth rates by 6 percent, which accounts for roughly 25 percent of the observed decline in unmarried teen birth rates over this period. It also lowered rates of unmarried births for women aged 20-24. At the same time, it increased the number of married births to women 20-24, so that there is only a small reduction in total fertility over the ages 15-24. The detailed information available on birth certificates enables a more direct identification of *in utero* abortion exposure than prior studies looking at other outcomes such as crime.

I. Introduction

The rate of out-of-wedlock births to teenagers in the United States tripled between the years 1950 and 1990. Throughout the 1980s, both scholars and the popular press characterized teenage pregnancy as one of the nation's great social ills.[1] Analysts at the time expected the rate of unmarried births to teens to remain high or even increase. Seemingly without warning, however, the trend abruptly reversed in 1991, as shown in Figure 1. After 41 consecutive years of increase, the out-of-wedlock teen birth rate declined in 1992 and by 2002 was 20 percent below its peak. The total teen birth rate, including married teen births, began to decrease sharply in 1992, after a five-year increase. By 2002, it had dropped 30 percent off its high. In contrast, unmarried births to women in their late twenties and thirties rose over this time period.

Many explanations have been offered for these declines, including greater use of condoms as a consequence of the AIDS epidemic, the recent increased popularity of injected and implanted long-term contraceptives, decreased welfare generosity, and a strong economy. These factors, however, cannot fully account for the unprecedented drop in out-of-wedlock teen births in the 1990s. Gains from increased use of condoms and long-term contraceptives have been largely offset by decreased use of the pill.[2] Links between welfare generosity and teenage pregnancy have been found to be tenuous at best [Nathan et al. 1999]. Finally, while the increased job opportunities of a strong economy may alter teen behavior, the unmarried teen birth rate did not significantly decline at any

[1] See Hayes [1987] for a selection of scholarly literature on the issue from the late 1970s and early 1980s. See Luker [1996: 81-84] for a summary of the popular press coverage between 1978 and 1990.
[2] Using data from the National Survey of Family Growth, Abma and Sonenstein [2001] reported that among sexually active teen females between 1988 and 1995 pill use dropped from 43 percent to 25 percent. Although use of condoms, implants, and injectables rose, the net effect was a 9 percent *decrease* in contraceptive use. Piccinio and Mosher [1998] used the same data to analyze trends from 1982 to 1995 and found very similar results.

time between 1940 and 1990 in spite of numerous economic cycles. Thus, while each of these factors might plausibly account for some of the decline, their cumulative impact appears to fall short of a complete explanation.

In this article, we propose an additional explanation for the drop in teen births during the 1990s: the legalization of abortion two decades earlier. While the link between the current availability of abortion and teen childbearing is straightforward (since abortion is an alternative to carrying a baby to term), the relationship we focus on is far more subtle: legalized abortion in the 1970s led to fewer babies being born under circumstances in which their parents were less willing or able to provide nurturing environments. When these cohorts grew up to be teenagers, their improved childhood environment had the benign effect of reducing the frequency with which they themselves became teen mothers. Put differently, the legalization of abortion in the 1970s changed the composition of young women at risk of becoming teen mothers some 15 to 19 years later. The childhood backgrounds of young women at risk of teen childbearing in the early 1990s were generally more favorable than would have been the case in the absence of legalization.[3] This composition effect resulted in lower rates of teen childbearing.

The timing of the unexpected break in the national time series data on teen and unmarried births is consistent with such a composition effect. In 1991, the first cohort affected by the 1973 Supreme Court decision in *Roe v. Wade* would have been approximately 17 years old. Young women from this cohort would just be entering the peak years of teenage childbearing (births to women aged 17-19 account for roughly 80

[3] The psychoanalyst Erik Erikson has written, "The most deadly of all possible sins is the mutilation of a child's spirit. There can be nothing more destructive to a child's spirit than being unwanted, and there are few things more disruptive to a woman's spirit than being forced without love or need into motherhood."

percent of all teen births). The subsequent decade-long decline is further consistent with our theory. Figure 2 shows national average annual estimates of the *in utero* abortion exposure for women 15-19 years of age. Abortion exposure began to rise sharply around 1990, increased through the decade of the 1990s, and since that time has leveled off.

Previous empirical evidence supports the plausibility of the argument. First, Levine et al. [1999] found that teen childbearing fell by 12 percent in the early 1970s with the introduction of legalized abortion, compared to a decline of only 5 percent for non-teens. To the extent that several studies have offered evidence that teen childbearing is correlated across generations, one would expect a decrease in teen fertility, induced by rising rates of abortion in the 1970s, to have an echo-effect a generation later [Newcomer and Udry 1984; Card 1981; Kahn and Anderson 1992; An et al. 1993]. Second, Gruber et al. [1999] found that children born before legalized abortion were substantially more prone to poverty. Numerous studies have confirmed that teen fertility rates are higher among the poor.[4] Third, Dagg [1991] found that children of parents who were denied the right to an abortion were substantially more likely to engage in delinquent behavior. Finally, Donohue and Levitt [2001] present evidence linking the legalization of abortion to a decline in crime rates one generation later.

There are strong parallels between criminal activity among young males and out-of-wedlock births among teenage girls. For instance, the aggregate time series trends for juvenile crime and unmarried teen births follow similar patterns. Furthermore, the factors

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The Right to Abortion: A Psychiatric View 218-219 (Group for the Advancement of Psychiatry, Vol. 7, P. b. No. 75, 1969).

[4] The first report to address this issue, 11 Million Teenagers: What Can Be Done about the Epidemic of Adolescent Pregnancies in the United States, was published by the Alan Guttmacher Institute in 1976 (now out of print). Subsequently, Klerman [1991] and Moore et al. [1993] have confirmed that poverty induces teen birth.

such as poverty, poor academic performance, unstable households, and drug-use, which put young men at increased risk for criminal justice involvement, have also been shown to predict teen births [Miller and Moore 1990; Visher and Roth 1986]. From the perspective of identifying a causal link to abortion legalization, however, teen childbearing has an important advantage over crime. Birth certificate data report the year and state of birth, allowing a precise link to the prevalence of abortion in the time and place the teenager herself was born. With crime data, in contrast, the criminal's state of birth is unavailable, and the age of the offender is known only when an arrest is made. These data limitations have led some to question the causal link between abortion legalization and crime [Joyce 2004]. Relative to Donohue and Levitt [2001], therefore, the identification strategy available in this paper is far more direct.

We find that the historical abortion rate -- that is, the abortion rate *in the state and year of a teenager's own birth* -- is negatively correlated with teen fertility, even after controlling for age-year interactions, state-age interactions, and state-year interactions. State-year interactions are particularly important, since they absorb any environmental factors that are common to a state at a point in time, including the current abortion rate, state laws regarding abortion access, state economic factors, and welfare generosity. We estimate that, 15 to 19 years later, when these cohorts reach childbearing age, *in utero* abortion exposure is associated with a 6 percent reduction in unmarried teen births, but has little impact on married teen births. Among women aged 20-24, we see similar reductions in unmarried births as for teenagers, but an increase in births to married women. Overall, the increase in married births to women aged 20-24 almost compensates for the decline in teen and unmarried births, leaving the total fertility rate

over the ages 15-24 less than one percent lower as a result of having been exposed to abortion when *in utero*. Based on our point estimates, legalized abortion in the 1970s appears to explain about 25 percent of the observed decline in teen out-of-wedlock childbearing between 1991 and 2002. Our findings complement those of Ozbeklik [2006], who, in parallel research on the impact of legalized abortion that relies on a different source of identification, finds similar, but even larger, effects than these.[5]

Our basic results are robust to a wide range of alternative specifications, such as excluding the District of Columbia and the five early legalizing states, limiting the sample to the cohorts born between 1971 and 1975, and instrumenting for the abortion statistics we use with an alternative source of abortion data. Black teen birth rates fall by four times as much as white teen births in response to abortion exposure. Fertility reductions appear to be limited to the subset of women who remain in their state of birth. Among cross-state movers, we find no consistent effects.

The remainder of this paper is organized as follows. Section II overviews abortion legalization in the 1970s and then presents the theoretical link between abortion, unwanted children, and later teen childbearing. Section III describes our identification strategy and presents the basic empirical results. Section IV assesses the empirical evidence regarding the effects of legalized abortion on later fertility. Section V concludes. A data appendix provides the sources of all variables used in the analysis.

[5] Ozbeklik [2006] follows the lead of Levine et al. [1996] and Gruber et al. [1999], using the differential timing of law changes across states to identify the impact of legalized abortion. In contrast, we use the variation in measured abortion rates. For a discussion of the pros and cons of these two approaches, see Ananat et al. [2006].

II. The Causal Pathway Between Legalized Abortion and Fewer Teen Births

Under English common law, abortion was legal if performed before "quickening" (when the first movements of the fetus could be felt, usually around the fourth month of pregnancy). In 1828, New York became the first state to outlaw abortion, and, by the end of the century, every state had followed New York's lead.[6] In the late 1960s, the pendulum began to swing toward partial liberalization of abortion law in a number of states, culminating with full legalization in five states in 1970—New York, Washington, Alaska, Hawaii, and California.[7] The United States Supreme Court ruling in *Roe v. Wade* brought legalized abortion to the entire nation on January 22, 1973. After legalization, the number of abortions performed annually rose steadily each year until stabilizing around 1980. While there is little data on the number of illegal abortions performed before the decision in *Roe*, it is clear that in its aftermath the number of abortions performed in the United States grew sharply [Michael 1999].[8]

The theoretical argument as to why the legalization of abortion in the 1970s led to a reduction in teen births in the 1990s parallels that of Donohue and Levitt [2001] for the effect of abortion on crime. Legalized abortion can reduce future teen births in two ways. First, legalized abortion reduces the sheer number of future teens, which reduces the number of teen mothers (a cohort size effect). Second, legalized abortion changes the

composition of cohorts by reducing the frequency of births of individuals who are more likely to become teen mothers (a composition effect).

Our focus is on the composition effect, because the impact of legalized abortion via the cohort size effect is by now well established.[9] Consequently, in all of our specifications, the dependent variable we use is births per 1,000 women in the cohort, which captures only the composition effect.

Numerous studies show that abortion is more heavily utilized in households that are less capable of providing a nurturing environment for children. Hayes [1987: 58] reported that 30 percent of abortions in the years after legalization were performed on teenagers. Furthermore, women in poverty are significantly more likely to utilize abortion than the general population [Alan Guttmacher Institute 1994]. Consistent with these facts, Levine et al. [1999] show that the percentage drop in births post-*Roe* was roughly twice as high for nonwhite and teen mothers than for the non-teen, white population.

Research on children born as a result of a denied abortion has consistently suggested the presence of adverse life circumstances. David et al. [1988] cite several Swedish studies showing that the children of mothers who were denied abortion were significantly more likely to receive governmental economic assistance, suffer from

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[6] See Mohr [1978] for a thorough history of abortion law in the United States prior to 1900.

[7] See Merz, Jackson, and Klerman [1995] for a review of state abortion laws in the years prior to *Roe*. Joyce [2004] breaks the trend of earlier research by adding Washington D.C. to this list of early legalizers. He cites *United States v. Vuitch,* 305 F. Supp. 1032 (DC 1969*)*, which overturned the District's antiabortion statute. Lader [1973: 113], however, comments, "The medical profession generally ignored the Federal Court. [Hospital] abortion committees rejected most applicants." In mid-1971, the Supreme Court overturned the 1969 district court decision, thereby reinstating the prohibition of all abortions not undertaken to protect the health of the mother. Regardless, we show that our results are robust to the inclusion or exclusion of the District.

[8] See Donohue and Levitt [2001] for a more complete discussion.

mental illness, and experience higher rates of criminality (among boys) and depression (among girls). Even when controlling for socioeconomic factors, Dagg [1991] found that these children were substantially more prone to adverse circumstances. Moreover, Gruber et al. [1999] estimated that children in the United States who were *not* born due to abortion legalization would have been 40 to 60 percent more likely to live in single-parent families, to live in poverty, and to live in a household receiving welfare than the average child of the time. The literature strongly supports the view that denying abortion access increases the share of children who grow up under adverse circumstances.

A large body of research has focused on the link between unfavorable childhood circumstances and teenage birth. Over 80 percent of women who give birth as teens grow up in poverty, as compared with 38 percent of the general teen female population [Alan Guttmacher Institute 1994]. Moore and Waite [1977] found a strong association between low levels of education and teen pregnancy. Using data from the University of Michigan's Panel Study of Income Dynamics, An et al. [1993] showed that daughters of mothers on welfare were significantly more likely to experience early childbearing. In a long-term study of black women in New Haven, Horwitz et al. [1991] found that children who experience emotional loss are more likely to seek security through early sexual activity and pregnancy. Moreover, demographic groups that are disproportionately affected by poverty and poor social conditions consistently experience higher teen birth rates. Blacks and Hispanics have teen birth rates that are twice as high as those of whites [Alan Guttmacher Institute 1994].

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[9] See, for instance, Levine et al. [1999], which reports a 5 percent drop in cohort sizes following legalized abortion.

III. Data Sources

The data on which we rely come from two primary sources. Fertility data come from the United States Vital Statistics Natality files, a micro-level dataset. These data are based on information drawn from birth certificates and include information about the date of birth, the age of the mother (although not her own birth date), the current state of residence, and the mother's state of birth. In the early part of the sample, a substantial number of states did not reliably measure the mother's marital status. We exclude these state-year observations in most of our analysis, but report results including these observations in a sensitivity analysis.

The natality data allow one to measure the number of births to women of a particular age in a given state and year. In order to compute a *birth rate*, however, one also needs information on the population of women by state, year, and age. For these numbers, we rely on annual estimates of population by state, year, and single year of age from the U.S. Census Department.

Our primary measure of a woman's *in utero* abortion exposure is the Alan Guttmacher Institute's (AGI) estimate of the number of abortions performed per 1,000 live births for residents of the state in which the woman was born during the time period when she was *in utero*.[10] Because the natality data do not contain the precise date of birth *of the mother* (only her age in years at the time she gives birth) there is a 24-month interval over which the woman may have herself been born. To compute *in utero* abortion exposure for a woman born in month m, we assume that abortions occur six months prior to month m and take an unweighted average of the relevant abortion rates

[10] In our sensitivity analysis, we also report results instrumenting for the AGI abortion measure using the Centers for Disease Control (CDC) abortion measure.

corresponding to the 24-month window in which the woman may have been born. We refer to this measure interchangeably as the *in utero*, or *historical*, abortion rate.

Because of cross-state mobility, many women of childbearing age reside in a state other than the one in which they were born. The state of birth is reported in the birth certificate data. Thus, using Census data on cross-state mobility by age, we compute the historical abortion rate for a given state, year, and age as a weighted average of the abortion rates that prevailed in the state and year of birth for the women currently residing in this state.

Our data set covers the period 1982-2002. We restrict the sample to women aged 15-24. There are very few births to women younger than 15. Because our data end in 2002, relatively few women older than 24 have been exposed to legalized abortion in our sample. Throughout the analysis, we limit the sample to women born in the United States.

Table 1 presents summary statistics on birth rates and abortion rates. Standard deviations for the raw data are presented, as are standard deviations after removing year-age, state-age, and state-year interactions. The latter standard deviations are relevant since they reflect the variation actually used in identifying our parameters.

Overall birth rates are shown in the table, as are breakdowns by marital status and by age groups (15-19 year olds and 20-24 year olds). Women aged 15-24 in our sample have annual birth rates of 0.082, implying an average of 0.82 births per woman over the ten years of age included in our sample. Fertility rates are roughly twice as high for 20-24 year olds as for teens. Among teenagers, more than 70 percent of births in the sample are to unmarried women. Marital births to teens account for a small share of teen births

because marriage among teenagers has become rare. In contrast, for 20-24 year olds, less than 40 percent of births are to unmarried women. There is a substantial degree of variability across ages, states, and time in our data, as evidenced by the large standard deviations in column (2). This variation is greatly reduced after we remove year-age, state-age, and state-year interactions in column (3), as would be expected.

Table 1 also presents estimates of the historical abortion rate. The historical abortion rate for women of a certain age is not the current abortion rate for women of that age, but the abortion rate that prevailed in the months before these women were born (that is, when they were *in utero*).[11] This is the abortion rate measure that is the focus of the paper. The mean historical abortion rate, computed as abortions per 1,000 live births, is approximately 159.[12] This number reflects the fact that many of the cohorts included in our analysis were born prior to the legalization of abortion (and thus are assigned a value of zero for the historical abortion rate).[13] Additionally, abortion rates steadily increased for a number of years after legalization and have remained high since. As a result, the average historical abortion rate is higher for teens in our sample than for 20-24 year olds (since the teens were born later at a time of higher abortion rates).

IV. Empirical Evidence on Legalized Abortion Affecting Later Fertility

To identify the impact of *in utero* abortion exposure, we exploit two sources of variation: (1) whether a woman was born before or after abortion was legalized, and (2)

[11] In other words, when looking at the childbearing of 17 year olds, we do not focus on the *contemporaneous* abortion rates of 17 year olds, but rather we focus on the *historical* rate of abortion that prevailed when the 17 year old was *in utero*.
[12] The current abortion rate is over 320 per 1,000 live births.
[13] This ignores the fact that illegal abortions were being performed. To the extent that the states with the highest legal abortion rates after *Roe v. Wade* also had the highest rate of illegal abortions, the measurement

the abortion rate (measured as abortions per 1,000 live births) in the state and year that a woman was conceived. To the extent that variation across states in abortion rates after *de jure* legalization reflects differences in costs (both financial and in terms of social stigma), higher abortion exposure is likely to be associated with fewer unwanted births.

The empirical specifications we estimate take the form

$$(1) \qquad Fertility_{sya} = \beta\ H\_Abort_{s,y-a,a} + \lambda Parent_{sya} + \delta_{sa} + \lambda_{ya} + \gamma_{sy} + \varepsilon_{sya}$$

where *s, y,* and *a* correspond to state, year, and age, respectively. *Fertility* is the annual birth rate per 1,000 women of age *a* residing in state *s* in year *y*. In some specifications, we differentiate between married and unmarried births. *H_Abort* is the historical abortion rate defined above, i.e., the abortion rate in year *y-a*, when the woman was herself *in utero*. *Parent* identifies the existence of various parental notification laws.

The unit of analysis in this study is the fertility rate by state, year, and age. Because we have variation in the outcome measure across ages within a particular state and year, we are able to include state-year interactions in our empirical specifications.[14] Almost all of the control variables relevant to explaining fertility that are available to us (e.g., welfare generosity, state economic factors, laws concerning parental notification, etc.) vary only by state and year and, consequently, are of no value in the estimation because all of the variation is absorbed by state-year interactions. Thus, we rely almost exclusively on indicator variables and interactions as control variables. The one exception involves laws concerning parental consent. These laws vary by state and year,

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error associated with not observing illegal abortions will bias the results *against* finding an effect of abortion on fertility.

[14] In contrast, Donohue and Levitt [2001] do not observe age-specific crime rates in their analysis and thus cannot include state-year interactions, except in the specifications focusing on arrests. The birth certificate data used in this paper have three important advantages over arrest data: (1) the precise date of arrest is not

but they apply to different age groups in different states. We include the variable *Parent* in the regression, which is a dummy equal to one for age groups within state-year cells to which such laws apply and equal to zero otherwise. Like the other available controls, state-year interactions absorb all of the observed variation in the current abortion rate.[15]

The coefficient β measures the effect on fertility of a one-unit change in the historical abortion rate. The interpretation of this coefficient merits some discussion. If $\beta < 0$, then an increase in the abortion rate in year y-a reduces the fertility rate among women of age a in year y by changing the composition of women at risk of giving birth. Put differently, $\beta < 0$ implies that the average woman who was born in year y-a was less likely to have a child at age a than the average woman who was not born in year y-a due to abortion. That is, historical abortion rates affect the type of women born in a given cohort, rather than the timing of those women's fertility.[16] We will return to this point below in discussing the results.

Because of concerns about the possibility of omitted variables, our empirical specifications remove as much of the variation as possible from the data while retaining variation in the historical abortion rate. It is worth pointing out, however, that the patterns we obtain in these highly saturated models mirror the patterns in the raw data. For instance, Figures 3(a) and 3(b) present a comparison of the raw data on fertility for cohorts born immediately before and after *Roe v. Wade* for those states in which the court

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recorded introducing noise into the determination of the birth date, (2) arrests reflect only a select subset of all criminal involvement, and (3) the offender's state of birth is not recorded with arrests.

[15] The current abortion rate no doubt varies by age in a particular state and year, but the data sources do not provide age-specific abortion rates.

[16] Of course, these direct composition effects could have further effects by changing the equilibrium in marriage markets during year y, for example. We abstract from these considerations in discussing our results below, since it is impossible to disentangle the direct effect from any equilibrium effects.

decision makes abortion legal.[17] Figure 3(a) shows results for unmarried teen births; Figure 3(b) corresponds to married teen births. The vertical axis in each of the figures is the difference in the teen birth rate (either unmarried or married, depending on the figure) for women residing in a particular state who were born in 1974 versus those born in 1972. The horizontal axis is our estimate of the change in the *in utero* abortion exposure across those two cohorts. The cohort born in 1972 is unexposed to legalized abortion; the 1974 cohort is exposed. If greater rates of abortion are associated with fewer teen births when the cohorts reach adolescence, then one would expect to observe downward-sloping relationships in Figure 3. For unmarried births in Figure 3(a), there is a discernible negative slope. With the notable exception of Washington, D.C., the states are relatively tightly clustered around the regression line. Note, however, that in many of the states the rate of unmarried teen births rose across these two cohorts, which would not be expected if the change in abortion exposure were the only factor at work across cohorts. Concerns of this sort motivate our desire to control for as many sources of unobserved variation as possible in the regressions. The relationship between *in utero* abortion exposure and married teen births, shown in Figure 3(b), is much weaker than for unmarried births.

The basic regression results from equation (1) are shown in Table 2. The first column of the table reports estimates for the unmarried birth rate, column (2) corresponds to married births, and the final column is for overall births. Controls include year-age and state-year interactions as well as the *Parent* dummy. We divide the sample into 15-19 year olds and 20-24 year olds and report separate estimates for the two age groups.

[17] Levine et al . [1996] and Gruber et al. [1999] exploit the fact that some states legalized abortion in advance of 1973 to measure the impact of legal abortion. For the current question, this approach is not particularly useful because the two most prominent early legalizing states, California and New York, do not

Although the unit of observation is by state, year, and single year of age, to simplify the presentation of the results we restrict the coefficients on the abortion variables to be the same for women aged 15-19, and impose a parallel restriction on women aged 20-24. We provide estimates only for the historical abortion rate, since it is the focus of our analysis.

The first column reports results for unmarried births. The top row of the table presents the coefficient on the historical abortion rate for 15-19 year olds, which is negative and statistically significant. The coefficient on the historical abortion rate for 20-24 year olds appears in the second row. It is negative and a bit larger in magnitude than the estimate for teens. The estimates for married births in column (2) are quite different than those for unmarried births. For teens, the coefficient on the historical abortion rate is essentially zero. Among the group of 20-24 year olds, married births are consistently positively and statistically significantly related to historical abortion rates.

In light of our discussion above regarding the interpretation of the historical abortion coefficients, these estimates tell us that cohorts exposed to higher rates of historical abortion were composed of a smaller share of women who ultimately would have given birth out of wedlock, either as teens or in their early twenties, than cohorts exposed to lower rates of abortion while *in utero*. They also say that cohorts exposed to higher historical abortion rates were composed of a larger share of women who would have given birth while married during their early twenties than cohorts exposed to lower historical abortion rates. Put differently, the women who would have been born were it not for legalized abortion would have been more likely to have births out of wedlock and

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reliably capture whether a birth occurs out of wedlock for much of the period we examine, and thus are wholly or partially excluded from most of our specifications.

less likely to have marital births during their early twenties.

How much did these composition effects change overall fertility, that is, total fertility among these cohorts between the ages of 15 and 24? The estimate in the first column of Table 2 implies that increasing the historical abortion rate from zero to its mean for cohorts that are teens at the end of our sample (a historical abortion rate of 322.6 per 1,000 live births) is associated with a reduction of .0021 unmarried births per teenager per year. This represents a fall of 5.5 percent in unmarried teen births. The estimate in the second row implies that relative to a counterfactual with no abortion, the historical abortion rates prevailing at the end of the sample period reduces unmarried births among 20-24 year olds by .0026 per women per year. This translates into a 6 percent reduction in out-of-wedlock births to 20-24 year olds. Finally, the estimate in row 2 of column (2) implies that, relative to the counterfactual of no abortion, the historical abortion rate prevailing at the end of the sample period increased married births among 20-24 year olds by .0033 per woman per year. These calculations suggest that rising historical abortion rates had relatively little effect on total fertility over the ages 15-24, but rather shifted the marital and age composition of mothers away from being unwed toward being married and somewhat older.

The estimates in the final column of the table, which correspond to overall births regardless of marital status, largely bear these calculations out. They show that overall fertility rates of 15-19 year olds are lower (but not statistically significantly so), whereas overall births to 20-24 year olds are higher (although again not statistically significantly so). Combining the two age groups, we estimate that by age 24, relative to a counterfactual of no abortion, a women exposed to the mean level of historical abortion

at the end of our sample would have had roughly .005 fewer births out of wedlock, partially offset by a .003 increase in married births.

In Table 3 we test the sensitivity of our results to a range of alternative specifications and samples. Although Washington, D.C., was an extreme outlier in the raw data in the figures, excluding it has little impact on our estimates. The same is true of eliminating all of the early legalizing states (New York, California, Washington, Alaska, and Hawaii) from the sample.

Given the difficulties of collecting accurate abortion data, measurement error is an important concern in the analysis. One potential solution to this problem is to instrument for our AGI abortion measure using the abortion data that is independently gathered by the Centers for Disease Control.[18] In these IV specifications, the estimated impact of historical abortion on unmarried teen births more than doubles, although the standard errors also double. The coefficient on unmarried births to women 20-24 also gets larger, as do the coefficients on married births. Indeed, in the IV specification, the overall birth rate combining teens and 20-24 year olds is positive, though not statistically different from zero.

Limiting the sample to the cohorts born between 1971 and 1975—the years immediately before and after *Roe v. Wade*—has little effect on the coefficients for unmarried births, but substantially reduces married births, so that the overall implied reduction in births owing to abortion exposure is much larger in that sub-sample relative to the total sample. Not surprisingly, the smaller 71-75 sample yields less precise estimates.

[18] See Donohue and Levitt (2007) for a further discussion of the rationale for and justification of this instrumenting strategy.

Looking separately by race, abortion is associated with a large reduction in unmarried births for blacks in both age groups, with smaller but negative impacts on married black births. For whites, the largest negative effects are for unmarried births to 20-24 year olds and married births to teens. Overall, there are large implied reductions in black births, but almost no impact on total births to whites. The larger impact of legalized abortion on blacks is consistent with Ozbeklik [2006].

One weakness of the data is that for parts of the sample period, large states like New York and California did not record marital status on the birth certificate, but rather imputed it based on other information. Our baseline sample does not include these imputed observations. When we add these data to the sample, the impact on unmarried teen births shrinks, and the coefficient on married births become positive for both age groups.

The final set of sensitivity analysis that we perform is dividing the sample between those who remain in their state of birth and those who migrate between states between their time of birth and the time they reach childbearing age. For those who do not cross state lines, their historical abortion rate is simply the abortion rate in their state of residence when they were born. For movers, the historical abortion weight is a migrant-weighted average of the states of origin.[19] We find that the results for non-movers generally mimic those of the total sample. Among movers, however, historical abortion rates have more mixed effects. One explanation for this difference is that

[19] Indeed, because some women cross state-lines between their time of birth and when they bear children, in principle we could push the identifying source of variation even one step further. In particular, we can include controls for current state of residence * year * age cohort without exhausting the variation in the data by exploiting the fact that women born in different states will have had different abortion exposure, even though they all currently reside in the same state and are the same age. In practice, however, there does not appear to be sufficient remaining variation to reliably estimate the coefficients.

historical abortion exposure influences the selection of which women cross state lines. For instance, if single teenage moms are unlikely to move across state lines, then the availability of legal abortion after *Roe v. Wade* may have increased the probability that the marginal women moved out of state if moving is more common without a child.

V. Conclusion

Teen crime and teen unwed motherhood rose in the United States until around 1991, after which both started to fall, particularly in states that had high abortion rates in the 1970s. We argue that these are related phenomena. Parents who are least able or willing to begin caring for a newborn are most likely to make use of abortion. The abortion rates for teens, the unmarried, and the poor are substantially higher than for the general population. Children who are born unwanted are subject to poorer care both during pregnancy and during the early years of life. With the legalization of abortion, mothers with unwanted pregnancies suddenly had a new recourse. Consequently, the number of children raised in adverse environments dropped substantially.

Our empirical evidence suggests that some 15 to 24 years after abortion legalization in 1973, unmarried births both to post-1973 teens and young adults are negatively associated with being born in a state and time period in which abortion rates were high. Exposure to legalized abortion *in utero* changes the composition of women at risk of teen and unwed motherhood some 15 to 24 years in the future. These composition effects result in a lower share of unwed births and a higher share of marital births to women in their early twenties. Our results suggest that out-of-wedlock birth rates among teens and young adults today may be 6 percent lower as a consequence of legalized

abortion in the 1970s. By our estimates, *in utero* abortion exposure accounts for approximately one-fourth of the observed decline in teen out-of-wedlock childbearing over the period 1991-2002.

Our findings should not be mistaken for an endorsement of abortion or an appeal for state action on fertility decisions. While abortion led to a reduction in teen births, similar decreases could be achieved through a variety of alternative strategies, including a greater allocation of resources to assist those most at risk of becoming teen parents.

Data Appendix

Teen Birth

The teen birth data used in our analysis is from the National Center for Health Statistics publication, Vital Statistics of the United States, Volume I, Natality [annual], except for the historical data in Figures 1 and 2, which are from Ventura et al. (2001).

Abortion

All abortion data is state of residence data provided by The Alan Guttmacher Institute.

Population By Age

These data are from Estimates for the United States, Regions, Divisions, and States by 5 Year Age Groups and Sex: Annual Time Series Estimates, U.S. Census Bureau [annual].

Demographic Components of Population by Age

Data is from the U.S. Census Bureau's online archive: "1990 to 1999 Annual Time Series of State Population Estimates By Single Year of Age and Sex." <http://www.census.gov/population/ www/estimates/st-99-10.html> and "Historical Annual Time Series of State Population Estimates and Demographic Components of Change 1981 to 1989, by Age, Sex, Race, and Hispanic Origin. <http://www.census.gov/population/www/estimates/st_81asrh. html>.

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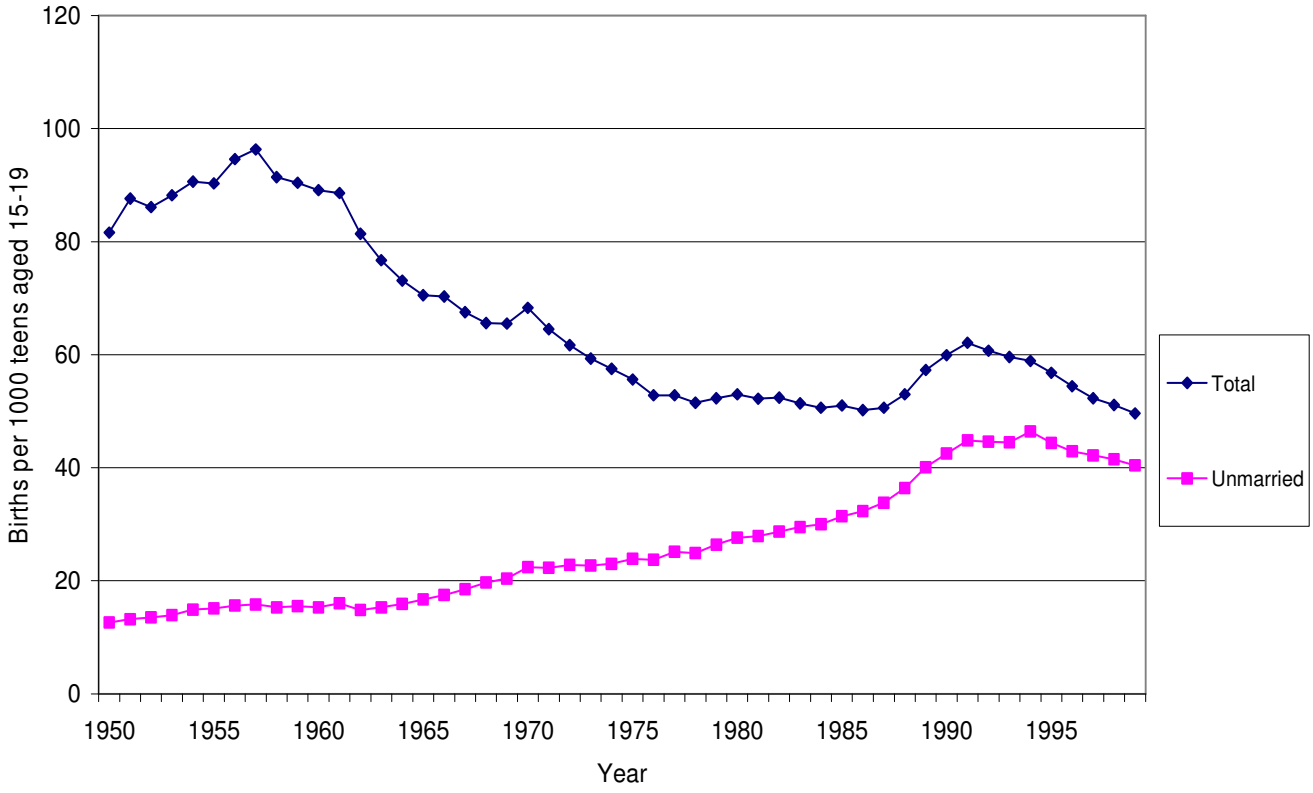
Figure 1
Teen Birth Rates by Marital Status for the United States, 1950-2000



Source: Ventura S. J.,T. J. Mathews, and B. E. Hamilton. "Births to Teenagers in the United States,1940 –2000." National Vital Statistics Reports; vol. 49 no 10. (Hyattsville,Maryland: National Center for Health Statistics, 2001).

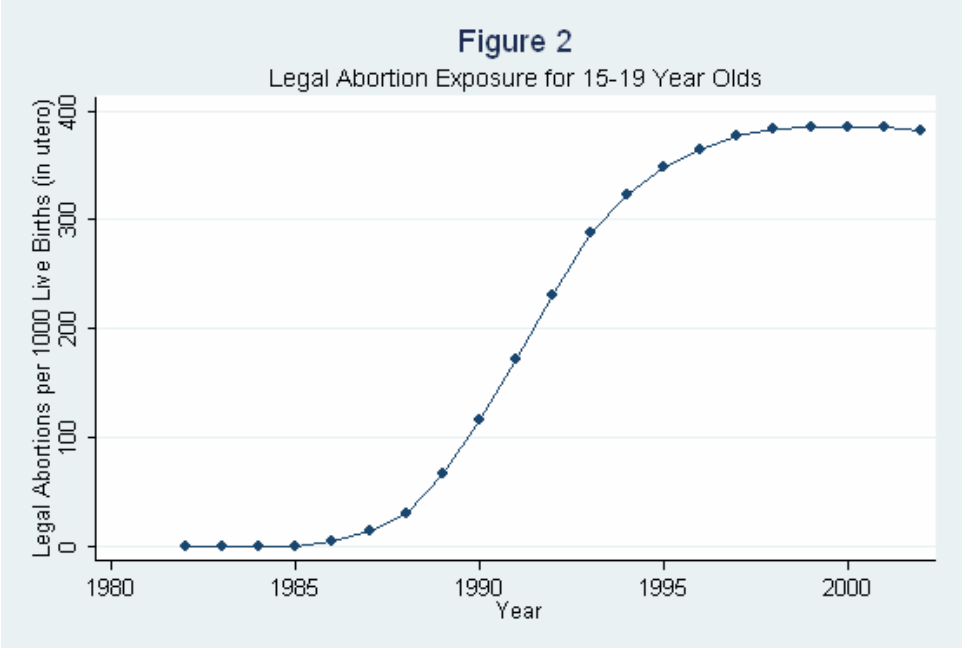


Figure 2
Legal Abortion Exposure for 15-19 Year Olds
Legal Abortions per 1000 Live Births (in utero)
0
100
200
300
400
1980
1985
1990
1995
2000
Year

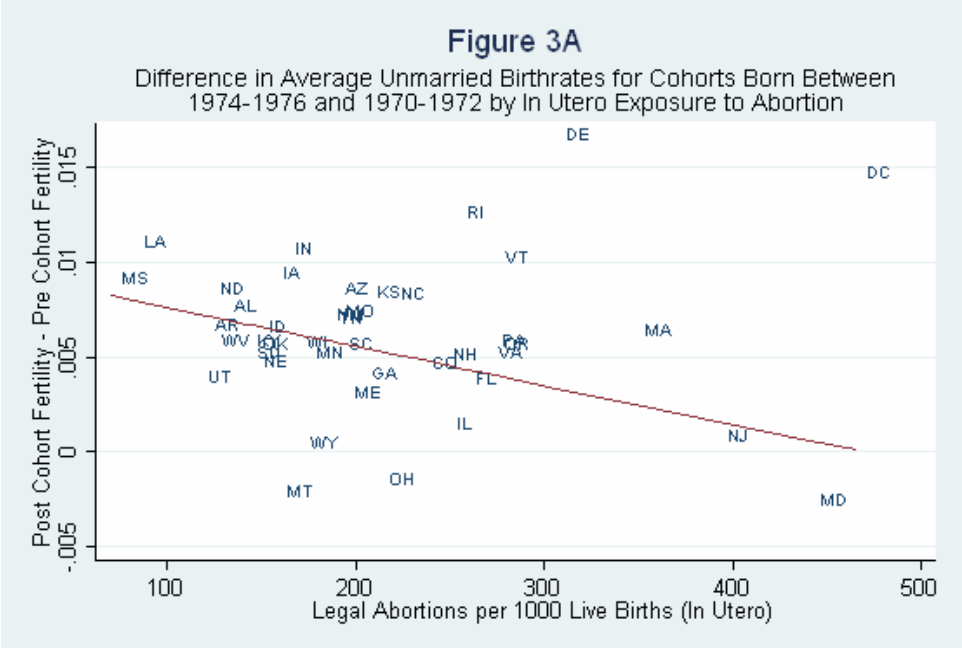


Figure 3A
Difference in Average Unmarried Birthrates for Cohorts Born Between
1974-1976 and 1970-1972 by In Utero Exposure to Abortion
Post Cohort Fertility - Pre Cohort Fertility
-.005
0
.005
.01
.015
100
200
300
400
500
Legal Abortions per 1000 Live Births (In Utero)
DE
DC
RI
LA
IN
VT
MS
IA
ND
AZ
KS
NC
AL
MA
AR
ID
WV
SC
MN
NH
VA
NE
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WY
OH
MT
MD

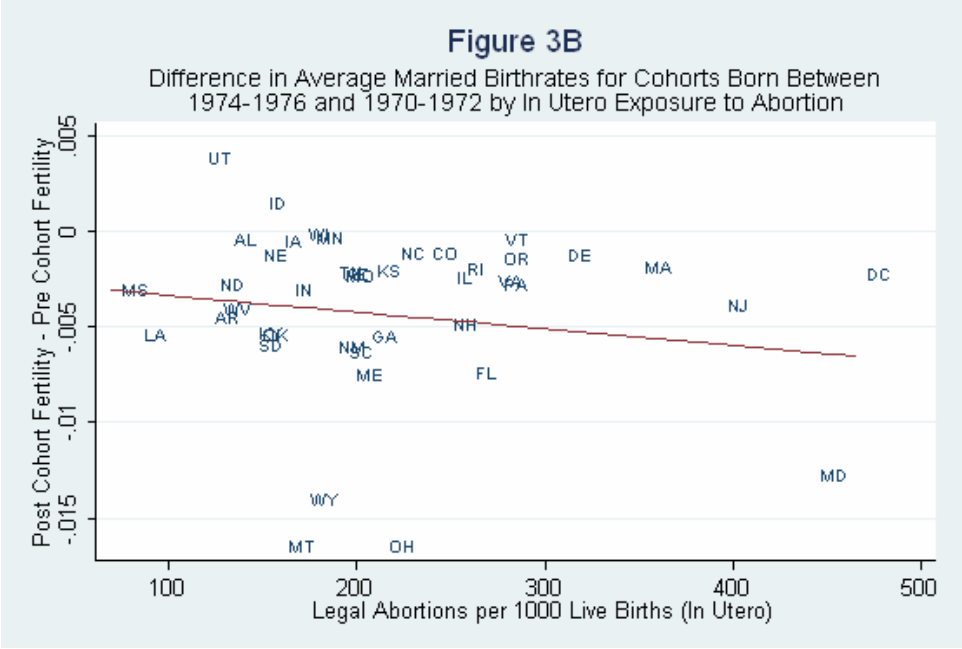
Figure 3B
Difference in Average Married Birthrates for Cohorts Born Between 1974-1976 and 1970-1972 by In Utero Exposure to Abortion
Post Cohort Fertility - Pre Cohort Fertility
.005
0
-.005
-.01
-.015
100
200
300
400
500
Legal Abortions per 1000 Live Births (In Utero)
UT
ID
AL
IA
NE
MN
NC
CO
VT
OR
DE
MA
DC
MS
ND
IN
KS
IL
RI
NJ
AR
LA
SD
GA
NH
ME
FL
MD
WY
MT
OH

Table 1: Summary Statistics

Variable	Mean	sd	sd after controlling for year-age, state-age, and state-year effects
All ages:			
Birthrate	0.082	0.040	0.004
Unmarried birthrate	0.040	0.018	0.002
Married birthrate	0.042	0.033	0.003
Historical abortion rate	159.0	173.0	22.6
Current abortion rate	324.7	127.5	0.0
Ages 15 - 19:			
Birthrate	0.053	0.033	0.002
Unmarried birthrate	0.038	0.020	0.002
Married birthrate	0.015	0.016	0.002
Historical abortion rate	208.4	180.7	17.2
Current abortion rate	322.6	126.6	0.0
Ages 20 - 24:			
Birthrate	0.110	0.021	0.003
Unmarried birthrate	0.043	0.016	0.002
Married birthrate	0.067	0.024	0.002
Historical abortion rate	111.3	150.7	14.5
Current abortion rate	326.7	128.3	0.0

The unit of observation is state x single year of age x year. The sample contains data from the 50 states and Washington D.C. between 1982 and 2002 for 15 through 24 year olds. Data are not available from all states for all years because of incorrect classification of marital status. The states (and number of years) that are excluded are California (15), Connecticut (17), Maryland (7), Michigan (21), Montana (6), Nevada (15), New York (21), Ohio (7), Texas (12). * and ** imply statistical significance at the .05 and .01 levels.

Table 2: Identifying the Impact of Historical Abortion Rates on Birth Rates by Age and Marital Status

	Unmarried birthrate	Married birthrate	Overall birthrate
	(1)	(2)	(3)
ages 15-19:			
historical abortion rate	-0.064	0.006	-0.058
	[0.028]*	[0.015]	[0.033]
ages 20-24:			
historical abortion rate	-0.082	0.101	0.018
	[0.031]**	[0.036]**	[0.056]
Dummies for:			
age*year	yes	yes	yes
state*age	yes	yes	yes
state*year	yes	yes	yes

Notes: The unit of observation is state x year x single year of age. The sample includes data from 1982 through 2002 for women between the ages of 15 and 24. The dependent variable is the birthrate where the marital status of the mother is given by the column headings. Data are not available from all states for all years because of incorrect classification of marital status. The states (and number of years) that are excluded are California (15), Connecticut (17), Maryland (7), Michigan (21), Montana (6), Nevada (15), New York (21), Ohio (7), Texas (12). The table is broken horizontally into two age groupings. The first includes women who are 15 to 19 years old at the time of childbirth. The second group includes women who are 20 to 24 years old at the time of childbirth. The current abortion rate is dropped because it does not vary with age and is thus collinear with the state*year dummies. The measure of historical abortion is constructed as a weighted average of the calculated year of birth, year of birth - 1, and year of birth - 2. This calculation is necessary due to inexact information on birthdates. All coefficients have been multiplied by 10,000. Standard errors are clustered by (state*year of birth).). * and ** imply statistical significance at the .05 and .01 levels.

Table 3: Sensitivity Analysis

	Unmarried Birthrate		Married Birthrate		Overall Birthrate	
	age < 20	age >= 20	age < 20	age >= 20	age < 20	age >= 20
baseline	-0.064	-0.082	0.006	0.101	-0.058	0.018
	[0.028]*	[0.031]**	[0.015]	[0.036]**	[0.033]	[0.056]
Without Washington, D.C.	-0.076	-0.084	0.019	0.110	-0.058	0.026
	[0.027]**	[0.032]**	[0.016]	[0.037]**	[0.032]	[0.059]
Without Early Legalizers	-0.060	-0.093	-0.008	0.106	-0.069	0.013
	[0.030]*	[0.034]**	[0.017]	[0.039]**	[0.035]	[0.062]
Without Early Legalizers or Washington, D.C.	-0.075	-0.095	0.006	0.117	-0.069	0.022
	[0.029]*	[0.035]**	[0.017]	[0.042]**	[0.035]*	[0.065]
IV using CDC (without DC)	-0.149	-0.101	0.204	0.248	0.054	0.148
	[0.054]**	[0.062]	[0.040]**	[0.079]**	[0.064]	[0.119]
limit sample to people born between 1971 - 75	-0.050	-0.079	-0.052	-0.215	-0.102	-0.294
	[0.045]	[0.054]	[0.019]**	[0.060]**	[0.053]	[0.101]**
Whites Only	-0.035	-0.017	0.002	0.088	-0.033	0.071
	[0.024]	[0.028]	[0.018]	[0.044]*	[0.030]	[0.062]
Blacks Only	-0.143	-0.157	-0.015	-0.031	-0.157	-0.188
	[0.066]*	[0.074]*	[0.011]	[0.026]	[0.071]*	[0.087]*
Everybody (includes state-years with imputed marital status)	-0.025	-0.086	0.049	0.152	0.023	0.066
	[0.027]	[0.028]**	[0.019]**	[0.030]**	[0.032]	[0.043]
Movers	-0.156	0.148	0.016	0.318	-0.140	0.466
	[0.055]**	[0.058]*	[0.036]	[0.081]**	[0.076]	[0.126]**
Nonmovers	-0.065	-0.094	0.041	0.034	-0.025	-0.060
	[0.022]**	[0.025]**	[0.010]**	[0.022]	[0.026]	[0.037]
Unweighted	-0.038	-0.072	0.011	0.188	-0.028	0.116
	[0.029]	[0.037]	[0.018]	[0.051]**	[0.037]	[0.077]

Notes: The unit of observation is state x year x single year of age. The sample includes data from 1982 through 2002 for women between the ages of 15 and 24. The dependent variable is the birthrate where the marital status of the mother is given by the column headings. Data are not available from all states for all years because of incorrect classification of marital status. The states (and number of years) that are excluded are California (15), Connecticut (17), Maryland (7), Michigan (21), Montana (6), Nevada (15), New York (21), Ohio (7), Texas (12). The regressions correspond to the specifications in column (3) of Table 2. They include age*year, age*state, and state*year fixed effects. Standard errors are clustered by (state*year of birth). The measure of historical abortion is constructed as a weighted average of the calculated year of birth, year of birth - 1, and year of birth - 2. This calculation is necessary due to inexact information on birthdates. All coefficients have been multiplied by 1000. The unweighted row excludes D.C. because it is an outlier in terms of its abortion rate. * and ** imply statistical significance at the .05 and .01 levels.