NBER WORKING PAPER SERIES

STATE REPRODUCTIVE POLICIES AND ADOLESCENT PREGNANCY RESOLUTION: THE CASE OF PARENTAL INVOLVEMENT LAWS

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Working Paper 5354

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
November 1995

We thank John Dinardo, Michael Grossman, Deborah Haas-Wilson, Charlotte Elertson, Shelly Lundberg and participants in the National Bureau of Economic Research Summer Institute on Social Insurance for helpful comments. This research represents initial work on Grant Number R01 HD33256-01 from the National Institute of Child Health and Human Development (NICHD) to the National Bureau of Economic Research (NBER). This paper is part of NBER's research program in Health Economics. Any opinions expressed are those of the authors and not those of the NICHD or the National Bureau of Economic Research.

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ABSTRACT

State laws regulating abortion have increased markedly in the wake of recent Supreme Court decisions. We test whether one form of abortion regulation, parental involvement laws, affects how pregnancies are resolved. Specifically, we examine whether laws that require minors to notify or obtain consent from a parent before receiving an abortion affect the likelihood that a pregnancy will be terminated. We use individual data on births and abortions from three southern states, South Carolina, Tennessee, and Virginia. A distinguishing characteristic of our data is the large sample of abortions, the quality of reporting, and information on individual and county characteristics. We detect no significant effects of parental involvement laws on the probability of abortion for minors as a single treatment group, a finding contrary to several recent studies. We do find, however, that for non-black minors 16 years of age, South Carolina's parent consent statute is associated with a 10 percentage point fall in the probability of abortion, a relative decline of over 20 percent. We believe this to be an upper bound estimate given potential underreporting of induced terminations. We also find a comparatively weak relationship between distance from an abortion provider and the probability that a pregnancy is aborted. We conclude that minors include their parents in the decision to terminate a pregnancy. Other minors seek abortion in a neighboring state. Overall, the impact of parental involvement laws on the pregnancy resolution of minors is not large.

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I. Introduction

State laws regulating abortion have increased markedly in the wake of recent Supreme Court decisions.[1] Since 1993, seven states have begun to enforce mandatory waiting periods for women seeking an abortion. Twenty-six states require that a parent be involved in a minor's decision to terminate a pregnancy, up from 13 states in 1988 (National Abortion Rights Action League 1995). Montana recently became the forty-seventh state to permit only licensed physicians to perform abortions, a potentially important constraint on the supply of abortion services given the decline in doctors trained in the procedure (Macaw and Macaw 1994). Each regulation increases the time and cost of obtaining an abortion. The impact of these regulations on the use of abortion is not well-documented and remains a controversial issue.

The purpose of our study is to test whether one form of abortion regulation, parental involvement laws, affects how pregnancies are resolved. Specifically, we examine whether laws that require minors to notify or obtain consent from a parent before receiving an abortion affect the likelihood that a pregnancy will be terminated. The study is important since state regulation of abortion continues to evolve given changes in the legal and political environment. Thus, our findings should inform legislators considering new statutes as to the effect of parental involvement laws on the pregnancy resolution of minors. In addition, other fertility related outcomes may be affected by changes in abortion. Results, for instance, from Grossman and Jacobowitz (1981), Joyce (1987) and Grossman and Joyce (1990) suggest that mean birth weight would decline and infant mortality would increase if abortion rates fell. Similarly, greater regulatory restraints on abortion services may affect contraceptive use, out-of-wedlock childbearing and subsequent child development.

We use individual data on births and abortions from three southern states, South Carolina,

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[1] For example, see *Hodgson v. Minnesota* 110 S.Ct. 2926 (1990); *Ohio v Akron Center for Reproductive Health* 110 S.Ct. 2972 (1990); *Planned Parenthood of Southeastern Pennsylvania v. Casey* 112 S.Ct. 2791 (1992).

Tennessee, and Virginia to examine the impact of parental involvement laws on pregnancy resolution. A distinguishing characteristic of our study is the large sample of abortions, the quality of reporting, and information on individual and county characteristics. As a result, we are able to test more rigorously than in previous work the impact of parental involvement laws on pregnant minors. In particular, we specify treatment and control groups by age, race, marital status and date of conception. We also exploit within-state and out-of-state control groups and thereby net out unobserved time-varying state and regional characteristics, a major source of confounding in previous work. Finally, abortions in our sample are well-reported. This contrasts markedly with the severe underreporting of induced terminations in national fertility surveys, the only other source of individual data on induced terminations (Jones and Forrest 1992).

We also examine the association between pregnancy resolution and abortion provider availability. Harassment of abortion providers and reductions in physicians trained to perform induced terminations may begin to impact on the number of facilities that offer abortion services. If average travel distance to an abortion provider increases, then abortions may fall due to the increased time and travel costs associated with pregnancy termination. Almost all previous studies have used the number of abortion providers in a state or county, or the proportion of counties that contain providers to proxy the proximity of abortion services.[2] With few exceptions, greater availability is strongly associated with an increased likelihood of abortion. In contrast, we measure availability of abortion services by actual travel distance from a woman's county of residence to the nearest county with an abortion provider. In the absence of capacity constraints, travel distance to a provider is a more proximate measure of availability than the number of providers located in a geographical area.

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[2] See Joyce 1987; Joyce 1988; Grossman and Joyce 1990; Lundberg and Plotnick 1990; Blank, George and London 1994; Gohmann and Ohsfeldt 1994; and Matthews, Ribar and Wilhelm 1995. Haas-Wilson forthcoming. Two exceptions are Shelton, Brann and Schulz (1976) and Kane and Staiger (1994).

The results of our analyses are challenging. We detect no significant effects of parental involvement laws on the probability of abortion for minors as a single treatment group, a finding contrary to several recent studies. We do find, however, statistically significant effects of South Carolina's parent consent statute on the pregnancy resolution of non-black minors, 16 years of age. We also find a comparatively weak relationship between distance from an abortion provider and the probability that a pregnancy is aborted. Moreover, the association between travel distance and the probability of abortion is weaker for minors than for young women and they diminish substantially when we control for education and characteristics of the county. In sum, we conclude that effects of parental involvement laws on the probability of abortion to minors are not large. Most teens, it would seem, include their parents in the decision to terminate a pregnancy. Other teens seek abortion in a neighboring state. The weak association between travel distance and pregnancy resolution suggests that for many parents and minors, travel distance to an abortion provider represents a small expense relative to the social stigma and opportunity costs associated with an out-of-wedlock birth before the age of 17.

II. Previous Research

A. Parental involvement laws

Three recent studies use pooled time-series, cross-section data on state abortion rates or ratios among minors to analyze the impact of parental involvement laws on pregnancy resolution (Haas-Wilson forthcoming, Blank, George and London 1995; Ohsfeldt and Gohmann 1994). In each analysis, parental involvement laws were associated with a 16 to 22 percent decline in abortions to minors. Despite the agreement, the studies have several problems which raise doubts about their validity. Both Haas-Wilson (forthcoming) and Blank, George, and London (1994) use abortions as reported by the Center for Disease Control (CDC). Total abortions as published by CDC are

consistently lower than estimates collected by the Alan Guttmacher Institute (AGI). More importantly, however, CDC reports abortions only by state of occurrence. Abortion figures measured by occurrence are the result from women traveling into and out-of a state. Therefore, estimated effects of a parental involvement law obtained with occurrence data may reflect changes in the location and not the probability of abortion. Cartoff and Klerman (1986) and more recently Henshaw (1995) demonstrate that abortions to minors performed in Massachusetts and Mississippi fell dramatically after imposition of a parental consent statute, but that abortions to minors who were residents of each state fell very little as most minors obtained abortions out of state.

Ohsfeldt and Gohmann (1994) use resident abortion rates as collected by AGI to analyze the impact of parental involvement laws on abortion rates to minors. The data are limited to three years (1984, 1985, and 1988) and approximately 35 states. Given the small number of observations Ohsfeldt and Gohmann (1994) eschew a fixed effects methodology as a control for time-invariant state effects. Instead they use the ratio of minor abortion rates to adult abortion rates as the dependent variable, a form of difference-in-differences estimator in which adults within-state instead of minors in nonexperimental states serve as controls. The authors report a relative drop of 22 percent in abortion rates to minors associated with parental involvement laws, a large and statistically significant effect. The authors never compare their reported estimates to a standard fixed effects estimator, and thus, we do not know the sensitivity of their estimates to different sets of controls.

A major drawback of any state-level analysis is the inability to disentangle unobserved state-specific factors (e.g., sentiment towards abortion) from actual effects of the law. Both Blank, George and London (1994) and Haas-Wilson (forthcoming) employ fixed effects procedures to minimize the problem. Yet, as Blank, George and London (1994) demonstrate, this may not be sufficient. The authors run separate regressions for adult and teenage abortion rates on parental involvement laws controlling for year and state effects. They find that parental involvement laws are associated with an

18 percent decline in teen abortion rates and a 16 percent drop in adult abortion rates. The decline in adult abortion rates is implausible and implies that they are unable to control for state-specific, time-varying sentiment towards abortion.[3] Matthews, Ribar and Wilhelm (1995) present further evidence for the need to control for state-specific trends. In a pooled, time series cross section analysis with year and state fixed effects, they find a negative and statistically significant association between parental involvement laws and aggregate abortion rates by state of residence. Inclusion of a state-specific trend term, however, eliminates any association.

Two studies compare time-series on abortion and birth rates of minors to those of older women in several states which enforced parental involvement laws in the 1980's (Rogers et al. 1991; Ellertson 1995). Both find sharp relative declines in abortion rates to minors by state of occurrence with no substantive change in birth rates. Neither study, however, can dismiss the possibility that minors travelled out of state to obtain an abortion. Thus, impact of the law on residence abortion rates is unknown.

Several studies have analyzed pregnancy resolution among adolescents with individual data, but only two, Serrato (1989) and Lundberg and Plotnick (1990) have examined the impact of state policies.[4] Both studies used the National Longitudinal Survey of Youth (NLSY) and neither found any association between restrictive state policies targeted at teens and pregnancy resolution. A major drawback to both analyses is the small number of abortions in each sample compounded by the severe underreporting of induced terminations in the NLSY. Jones and Forrest (1992) estimate that abortions are undercounted by more than 50 percent in the NLSY and that underreporting is related to age, race and marital status.

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[3] In a similar exercise over a shorter panel, Haas-Wilson (forthcoming) found that parental involvement laws had no impact on abortion rates to non-minors.

[4] See Zelnick, Kantner and Ford 1981; Leibowitz, Eisen, and Chow 1986; Joyce 1988; Serrato 1989; Cooksey 1990; Lundberg and Plotnick 1990.

B. Effects of Provider Availability

Results from research on the effect of provider availability on abortion rates is more uniform. In almost all received work, availability is measured by either the number of providers in the county or state, or by the proportion of women in a state who live in counties served by providers. Whether the unit of observation is the state (Blank, George, London, 1995; Matthews, Ribar, and Wilhelm 1995; Haas-Wilson forthcoming; Gohmann and Ohsfeldt 1993), the county (Joyce 1987) or the individual (Lundberg and Plotnick 1990; Currie, Cole and Nixon 1993) increased availability is associated with an increased likelihood of abortion. A notable exception is Kane and Staiger (1994). They argue that unmeasured fixed effects, or unobserved state-specific trends may confound relationships between availability and abortion. Moreover, attempts to instrument availability have been unconvincing (Blank, George and London 1995). Kane and Staiger (1994) use distance between the population centroid from the county of residence to the population centroid of the nearest county with a provider to measure availability of abortion services. They find that increasing distance to an abortion provider *lowers* county-level birth rates among white adolescents in a large panel of counties. They find less consistent results among nonwhites. Although counties are preferable to states, Kane and Staiger (1994) do not control for county-specific trends within states, which can vary substantially in long panels.[5]

III. Research Design and Methods

A. Theoretical Considerations

Parental involvement laws raise the disutility of abortion for minors who would not have consulted their parents in the absence of such laws. These statutes also increase the cost of abortion

[5] Plots, for instance, presented by Kane and Staiger (1994) show considerable variation in teen birth rates across counties in Vermont, a racially homogeneous state.

if they force minors to travel further and delay abortions longer than they would have had such requirements not been imposed. Thus, as a first approximation we expect parental involvement laws to decrease the likelihood that a pregnancy is terminated.

Parental involvement laws may also affect the likelihood of becoming pregnant if they induce substitution from abortion to contraception. Pregnancies, for instance, may fall if minors who were willing to abort, but unlikely to inform their parents, increase contraceptive efforts in response to the law. Births, however, should not fall, but may rise depending on the degree of substitution between abortion and contraception among teens willing to abort. If there is perfect substitution, then pregnancies are avoided that would have been terminated in absence of the law. Births, however, remain unchanged. If substitution from abortion to contraception is not complete, then births will rise after the law if minors who would have aborted prior to the law, instead carry to term.[6]

For minors unwilling to abort prior to pregnancy, imposition of a parental involvement statute should have no impact on contraceptive behavior and thus, no impact on pregnancies and births.[7] The upshot is that any decrease in pregnancies or increase in births in response to a parental involvement law should occur among minors who would have aborted prior to the law.

Recently, Kane and Staiger (1994) have suggested that adolescents consider the availability of abortion services simultaneously with the decision to be sexually active. When abortion services are more accessible, adolescents increase sexual activity since undesired conceptions can be terminated. Birth rates, however, may rise if teens who had planned to abort were they to become pregnant, forego abortion after conception. Diminished access to abortion, the result of a parental involvement

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[6] We ignore the impact of spontaneous abortions since we lack data on fetal loss. One implication, however, is that the rise in births among women willing to abort should never exceed the fall in abortions since a fraction of the unintended pregnancies would be lost.

[7] Jackson and Klerman (1994) make a similar argument in their discussion of Medicaid financed abortions.

law for example, induces opposite responses: decreased sexual activity, lower rates of pregnancy, and reduced birth rates.

The scenario proposed by Kane and Staiger (1994) depends on minors' knowledge of laws regulating abortion and their awareness of changes in the availability of abortion services. There is some evidence that minors are relatively uninformed as to statutes regulating abortion. A focus-group study of adolescents from cities in the United States found that only a few teenagers knew whether their state required parental involvement for minors seeking abortion (Stone and Waszak 1992). Similarly, Blum, Resnick, and Stark (1987) report that over half the teenagers surveyed in four Minnesota abortion clinics were unaware of laws related to abortion prior to scheduling their appointments, and less than 25 percent knew of the parental notification statute. These studies do not imply significant feedback from state laws to sexual activity and contraception.

In sum, the impact of parental involvement laws on pregnancy resolution is ultimately an empirical question. Parental involvement laws raise the cost of abortion only to those for whom such laws are binding. If most minors inform their parents before an abortion, and if those who do not are willing to travel out of state, then parental involvement laws will have relatively little impact on either abortions or births. To the extent that such laws are binding, we expect first order effects to be a fall in abortions and a rise in births.

B. Data

1. Vital Statistics of Birth and Abortions

Data on births and induced abortions are from the state vital registration offices in South Carolina, Tennessee and Virginia from 1986 through 1991. All 50 states collect detailed information on individual births, but only 14 states collect individual records on induced terminations and report

them to the National Center for Health Statistics (Kochanek 1989).[8] We limit the analysis to these three states for several reasons. First, South Carolina and Tennessee are the only two states among the 14 that report to NCHS that have well-developed reciprocal reporting agreements with neighboring states. This is an important aspect of the data for it allows us to test whether parental involvement laws are associated with an increased probability of out-of-state abortions. Second, South Carolina and Tennessee are large, southern states with racially diverse populations. Third, both states began to enforce a parental involvement law relatively recently. Fourth, we chose Virginia as our control state because it is closest to our experimental states in size, region, demographics and completeness of abortion reports. All the other states are deficient in one of these criteria.[9]

2. Data quality

There have been no published reports as to the completeness with which induced terminations are reported to state vital registration offices. It is generally accepted, however, that the Alan Guttmacher Institute (AGI) maintains the most accurate count of induced abortions in the United States (Jones and Forrest 1992). The Alan Guttmacher Institute surveys abortion providers almost annually to estimate total abortions by state of occurrence. The top panel in Table 1 shows abortions by state of occurrence as reported by AGI and state health departments in Tennessee, South Carolina

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[8] The 14 states are: Colorado, Indiana, Kansas, Maine, Missouri, Montana, New York, Oregon, Rhode Island, South Carolina, Tennessee, Utah, Vermont, and Virginia.

[9] In Colorado, Kansas, Oregon and New York underreporting appears severe. In each state, abortions by state of occurrence as reported to NCHS were more than 15 percent lower than abortions reported by AGI in 1987. Maine, which recently changed its law, does not collect reports for residents who leave the state; Missouri, which also changed its law, does have reports from Illinois, its most important neighboring state (Ellertson 1995). Montana, Rhode Island, Vermont and Utah were too dissimilar to use as control states for South Carolina and Tennessee. Indiana charges $.30 a record for birth and abortion certificates, which in our case was prohibitive.

and Virginia. Concurrence between AGI and state health departments is quite good. The second panel in Table 1 presents comparisons by state of residence. Here we find less agreement.

There are, however, no precise estimates of how well abortions to residents obtained out-of-state are reported. Unlike like counts by state of occurrence, abortions by state of residence are not obtained by AGI's provider survey. Instead, researchers at AGI use an algorithm based on the distribution or out-of-state abortions as reported by the Center for Disease Control (Henshaw and Van Vort 1992). The last panel in Table 1 compares abortions to residents performed out of state. The wide difference between AGI and the Department of Health in Virginia is most glaring. We suspect that the Virginia Department of Health fails to record many of abortions to its residents performed in Washington D.C. Fortunately, Virginia is our control state. As long as the apparent underreporting remains constant over time, we can use abortions to residents of Virginia as a means of netting out unobserved time-varying and state-specific effects.

Estimates of the effects of parental involvement laws on pregnancy resolution will be biased if the proportion of reported abortions to minors obtained out of state, relative to controls, changes with the law. Two studies have shown that minors seek abortions in other studies after a parental involvement law is enforced (Cartoff and Klerman 1986; Henshaw 1995). We anticipate similar behavior in South Carolina and Tennessee. Consequently, we would suspect underreporting if the probability of an out-of-state abortion among minors were to fall relative to controls after a parental involvement statute were enforced. We examine the issue of out-of-state abortions below.

3. Other covariates

Induced termination and birth certificates have information on a woman's age, race, marital status, years of schooling, parity, gestation, and county of residence at the time of the procedure. We concatenate birth and abortion records and create a dichotomous indicator that equals one if a

woman aborts and zero if she gives birth. The availability of gestational age permits us to concatenate by date of conception. We focus on unmarried women since a parental involvement law is not an effective constraint to a married teen. We test the sensitivity of this restriction by re-estimating the model with pregnancies to married women. The appendix contains means for all variables used in the analysis by race and state.

We also include controls for state-specific expansions in Medicaid eligibility. Between 1987 and 1991 states, in response to federal initiatives, aggressively expanded Medicaid income eligibility thresholds. As a result, the proportion of births financed by Medicaid increased from 14.5 percent in 1985 to 32 percent in 1991 (Frost et al. 1993). If expansions in Medicaid encourage births and are coincident with changes in parental involvement laws, then Medicaid expansions may confound effects of parental involvement laws on pregnancy resolution, if they impact differentially on the treatment group relative to controls (Joyce and Kaestner 1995b). As a control, we include a set of dichotomous variables that indicate whether a woman conceived when Medicaid eligibility was between zero and 50 percent of the federal poverty level, between 51 and 100 percent, between 101 and 150 percent, and more than a 150 percent. We also interact Medicaid measures with our treatment group, which allows eligibility expansions to impact minors and young women differently.

4. Availability of Abortion and County Characteristics

Our measure of the availability of abortion services is travel distance from the county capital of residence to the capital of the nearest county with a provider. We use Automap software to calculate travel distance (Automap, Inc. 1993). We ignore state boundaries when determining the nearest abortion provider; in some cases, therefore, out-of-state providers represent the most available services. We specify distance to a provider with four dummy variables as follows: 0 miles to provider which means a woman resides in a county with a provider; 1 to 40 miles to a provider; 41 to

60 miles to a provider; and 60 or more miles. As provider locations change over time, we update our distance measures to reflect the changes. Abortion provider data come from the Alan Guttmacher Institute (AGI), which maintains county-level figures on the number and type of providers for most years between 1986 and 1992.[10]

We treat counties that have only a hospital provider and no non-hospital providers as counties without a provider. In South Carolina and Tennessee, hospitals provided less than two percent of abortions in 1988. In Virginia they provided eight percent. However, in each state, hospitals that provided the most abortions are located in standard metropolitan statistical areas (SMSAs) that are served by non-hospital providers (Henshaw and Van Vort 1992). Thus, the number of abortions performed in hospitals within counties not served by a non-hospital provider is very small.

We treat travel distance to an abortion provider as exogenous. First, we have no feasible instruments for travel distance. Second, distance to the nearest county with a provider changed relatively little between 1986 and 1991 in our sample states. For instance, there were no changes in Tennessee and only one change in Virginia, although in both states the number of providers within these counties fell by more than 12 percent. In South Carolina the number of counties with at least one non-hospital provider increased from five in 1987 to nine in 1991, while the total number of providers grew from 14 to 18.

In addition to provider availability, we augment individual data with county characteristics from the Area Resource File. Proxy variables for the availability of birthing services include newborn bassinets and beds per capita in short term general hospitals in 1990 and 1991, active M.D.'s per capita in 1986, 1988, 1989 and 1990, annual unemployment rates, median family income in 1989 and population per square mile.

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[10] For years in which AGI does not provide data, we will use the previous year's figures.

C. Description of Laws and Model Specification

Tennessee's parental notification law went into effect November, 1989, after a more stringent consent requirement had been ruled unconstitutional. The notification statute required that parents of unmarried minors less than 18 years be notified of the minor's intentions two days prior to the procedure. In a 1992 challenge to the statute, a court interpreted the law as requiring notification of only one parent, but that notification could be waived if a physician found that a minor's physical or emotional well-being was in jeopardy. A parental consent law in South Carolina became effective in May, 1990. The law requires that a parent or grandparent of an unemancipated minor less than 17 years of age provide written consent before a pregnancy can be terminated (National Abortion Rights Action League 1993; Merz, Jackson, and Klerman 1995)..

We allow impact of the parental involvement statutes to vary between South Carolina and Tennessee. Consent statutes, such as South Carolina's, give parents authority to deny a minor an abortion. Notification laws, as in Tennessee, require that parents be informed of the minor's intent to abort. Parents, however, may not prevent the minor from terminating the pregnancy. In short, consent statutes are more stringent, although empirically the distinction may be trivial. Our estimates will offer some evidence as to whether meaningful differences exist.

We eliminate all pregnancies conceived within four months of a parental involvement law because minors who become pregnant in the months just prior to enforcement may be influenced by the law.[11] Thus, the pre-enforcement period begins July, 1988, which insures that we have one year of pregnancies before Tennessee's law is enforced.

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[11] Recall that we use date of conception to specify treatment and control groups. Minors in South Carolina, for instance, who conceived in April or even March of 1990 may not have realized that they were pregnant until May or June. To classify these conceptions as controls -- that is, having occurred prior to the law -- would generate a misclassification since the minors were unaware of their pregnancies until after the law became effective. To minimize this bias we eliminate pregnancies four months prior to a change in the statute since over 90 percent of all abortions are performed within the first four months of pregnancy (Henshaw and Van Vort 1992).

We define the treatment group as unmarried teens 18 years or less in Tennessee and 17 years or less in South Carolina; we use unmarried women 19 and 20 years of age as our controls. We include teens 18 years of age in Tennessee and 17 years of age in South Carolina in the treatment group because age is recorded at the time of birth or abortion and not at the date of conception. Thus, a large proportion of births to teens 18 years in Tennessee and 17 years of age in South Carolina, and a smaller proportion of abortions, were conceived by minors and subject to the law. We test the sensitivity of our estimates to this classification by analyzing the effect of the law on all teens less than 19, teens less than 18, and again for teens less than 17 years of age separately. We then breakdown minors into one-year age intervals and allow effects of the law to vary by age.

We use a difference-in-differences-in-differences (DDD) estimator to identify the effect of parental involvement statutes on the probability of abortion (Gruber 1994). In brief, the DDD estimator exploits changes in pregnancy resolution between minors and controls within experimental states to account for state fixed effects as well as time-varying shocks that impact on minors and controls equally. It also exploits changes among minors and controls in nonexperimental states to eliminate broader trends that impact on individuals in all states equally. The DDD estimator provides a simple and direct means of addressing a major source of confounding in previous work: unobserved time-varying state-specific factors such as sentiment towards abortion and birth.

The DDD estimator is particularly apt for our question because we can delineate treatment and control groups precisely. For instance, only minors are governed by the law and thus older teens within-state and minors in Virginia should be appropriate controls. In addition, Virginia, a southern state, shares no borders with South Carolina and Tennessee and thus its abortion market should experience no major spillover effects from legislative changes in the other two. Finally, the DDD estimator exploits two sets of controls which allows us to test the sensitivity of our estimates to each.

The DDD estimator can be written in a regression framework in which an unobserved propensity to abort a pregnancy, (Y^*), depends on a vector of explanatory variables. Suppressing individual, year and state subscripts, the model is written as

$$(1)\quad Y^* = \beta_0 + \beta_1 Z + \beta_2 P + \beta_3 \text{Minor} + \beta_4 S + \beta_5(P \times \text{Minor}) + \beta_6(S \times \text{Minor}) + \beta_7(P \times S) + \beta_8(P \times \text{Minor} \times S) + \epsilon ,$$

$$Y = 1 \text{ if } Y^* > 0 ,$$

$$Y = 0 \text{ if } Y^* \leq 0 ,$$

where ϵ is an error term, and Y is an indicator of whether the woman aborts ($Y=1$) or gives birth ($Y=0$). Let Z be personal as well as county characteristics of where an individual resides (including distance to a provider), and let P be one if a woman conceives after enforcement of parental involvement law and zero if before. Minor is a dummy that distinguishes the treatment group from controls whereas S characterizes experimental from nonexperimental states. As Gruber (1994) points out, the coefficient on the third-level interaction term, β_8, captures changes in abortion probabilities for minors relative to controls in experimental relative to nonexperimental states. The identifying restriction is that state-specific shocks coincident with the law affect minors and controls equally.

IV. Results

A. Descriptive Statistics

Time series plots of abortion probabilities by age, race and state for minors and controls are presented in Figures 1 through 4. Abortions and births are to unmarried women by state of

residence and year of conception. Annual abortion probabilities are the ratio of abortions to live births plus induced abortions conceived in the same year. Figures 1 and 2 show outcomes for three groups: teens less than or equal to 17 years of age in South Carolina (SC), the treatment group; young women 19 and 20 years old in South Carolina, the within-state controls; and teens 17 years or less in Virginia (VA), the out-of-state controls. Figures 3 and 4 make the same comparisons for residents of Tennessee and Virginia. The only difference is that minors include teens 18 years of age in Tennessee and Virginia. Regardless of race, abortion probabilities of minors in all states trend downwards after 1987 (Figures 1-4). The fall in abortion probabilities is due to a decline in abortions and not births. As we show in Tables A1 to A4 of the Appendix, births to unmarried minors rise over this period. Also note that the decline in abortion probabilities precedes enforcement of a parental involvement law in both South Carolina (May 1990) and Tennessee (November 1989). Moreover, the decline is evident among minors in Virginia, our nonexperimental state, which suggests that time-varying factors other than the law are causing abortion probabilities to fall among all young teens. We also call attention to the similarity in levels and trends between minors and their within-state controls, young women 19 and 20 years of age, prior to changes in the law. An important assumption of our research design is that shocks coincident with changes in the law affect treatment and control groups equally. Figures 1-4 offer some evidence that our control groups are reasonable. In sum, we observe no apparent differential effect of parental involvement laws in either South Carolina or Tennessee on the abortion probabilities of minors relative to their respective within-state or across-state controls.

Differences in abortion probabilities by race appear large. This is deceptive since the proportion of births to unmarried adolescents is much larger among blacks than non-blacks. These differences are narrowed, but not eliminated when we include pregnancies to married women (see Figures A9-A12 in the Appendix). Nationally, abortion probabilities for white and non-white teens

are approximately equal (Henshaw, Koonin and Smith 1991). Thus, blacks in our states abort less frequently than blacks nationally.

B. DDD estimates

We display abortion probabilities for minors and controls in South Carolina and Virginia before and after changes in the law in Table 2. Results for non-blacks are displayed in Panels A, results for blacks in Panel B. The probability of abortion falls 9.9 percentage points among non-black minors less than or equal to 17 years of age in South Carolina after enforcement of a parental consent statute; it falls 4.8 percentage points among non-black residents of South Carolina 19 to 20 years of age -- a statistically significant difference-in-differences (DD) of 5.1 percentage points. In Virginia over the same period, we observe a fall in the abortion probability of 4.0 percentage points among non-black minors and 2.2 percentage points among young women. The difference-in-differences between these two groups is statistically insignificant. In the last row of Panel A, we subtract the DD estimate for Virginia from the DD estimate for South Carolina. This difference-in-differences-in-differences (DDD) estimate nets out fertility shocks that affect minors and controls equally in both states. The DDD estimate indicates that abortion probabilities for non-black minors in South Carolina fell by 3.3 percentage points after the law, a statistically insignificant decline.

Abortion probabilities for blacks in South Carolina are shown in Panel B of Table 2. The likelihood of abortion falls 2.7 percentage points more among minors than among young women. The change is of marginal statistical significance. We find no effect of the law on abortion probabilities of black minors when we incorporate changes in Virginia. The DDD estimate shown in the last row of Table 2 indicates that the likelihood of abortion among minors in South Carolina rose 1.4 percentage points after the law. The rise is statistically insignificant. Overall, we find no evidence to suggest that South Carolina's parental consent law had any meaningful impact on

pregnancy resolution of black and non-black minors.

Table 3 makes the same comparisons between minors in Tennessee and their within-state and across-state controls. Again, results for non-blacks and blacks are displayed in Panels A and B respectively. As in South Carolina, we find statistically significant differences in abortion probabilities between minors and young women within Tennessee after a change in the law. The DD estimate indicates that the likelihood of abortion falls 4.8 percentage points more for minors relative to young women 19 and 20 years of age. When we also control for broader trends that affect all women in Tennessee and Virginia, effects of the law on the pregnancy resolution of non-black minors in Tennessee are eliminated. The results for blacks in Tennessee (Table 3, Panel B) are similar to those in South Carolina. We find relatively small changes in pregnancy resolution among minors associated with the law that are eliminated when broader trends are controlled.

Comparison of DD and DDD estimates underscore the importance of netting out time-varying changes within and across states. None of our DDD estimates reveal important effects of the law whereas several DD estimates are substantial and statistically significant. The upshot is that the DDD estimator provides a more stringent test of the effect of the law than does the standard DD estimator. This difference may explain why our findings are at odds with recent studies that use pooled time-series cross-section data at the state level (Haas-Wilson forthcoming; Ohsfeldt and Gohmann 1994). The fixed effects estimator in these aggregate analyses is equivalent to our DD estimator with minors in Virginia as controls.

C. Regression Results

Regression estimates of equation (1) are presented in Tables 4 and 5 for non-blacks and blacks respectively. We show only coefficients on the age-state-law interactions.[12] In each column,

[12] A full set of results are shown in Table 3A of the Appendix.

coefficients on the age-state-law interactions are from four separate specifications. In the first specification we allow the law to affect minors of varying ages differently. In the other three specifications, we treat minors less than or equal to 18, 17 and 16 years of age as single treatment groups. Note also that estimates in column (1) under each state are identical to the DDD estimates that would be obtained if we had duplicated Tables 3 and 4 for each age group.

Among non-blacks, 16 years of age, the probability of abortion falls 10.3 percentage points relative to controls in South Carolina after imposition of a parental involvement statute (Table 4). The result for South Carolina is statistically significant. Effects of the law on minors 16 years of age in Tennessee are approximately half as large as in South Carolina, a plausible finding given potential differences in consent versus notification statutes discussed above. Effects of the law on minors as a group are not large. As expected, impacts become greater as teens 17 and 18 years of age, a portion of whom are unaffected by the law, are excluded.

Effects of the laws on black minors are smaller in absolute magnitude (Table 5). The probability of abortion falls between 4 and 5 percentage points for black minors 16 years of age in both states. There is little impact on minors as a group. We do notice a statistically significant *increase* in the probability of abortion among minors 17 years of age in South Carolina. A possible explanation is that minors 16 years of age misrepresent their age to circumvent the law.

Results for non-blacks and blacks in Tables 4 and 5 respectively are robust to inclusion of individual and county characteristic. Comparison of columns (1) and (2) in each table reveals relatively little change in the coefficients on the age-state-law interactions, although the adjusted R-squared increases substantially. We interpret the stability as evidence that the law is appropriately treated as exogenous to individual decision making.

Results obtained from a DDD estimator are considerably smaller than results from a fixed effects or DD estimator. If we limit the control group to minors 16 years of age in Virginia, which

is typical of fixed effects regressions, we find that the probability of an abortion falls 13.0 percentage points more for non-black minors 16 years of age in South Carolina relative to minors of the same age and race in Virginia, our nonexperimental state ($p < .01$) [results not shown]. For blacks, the same DD estimate yields a relative difference of 6.8 percentage points ($p < .05$) [results not shown]. The estimated effects are almost 30 percent greater for both racial groups than effects obtained with the DDD estimator. The contrast underscores the need to eliminate both within- and cross-state, time-varying effects.

D. Sensitivity analysis

The only statistically significant finding indicates that South Carolina's parental consent statute is associated with a 10 percentage point fall in the probability of abortion among non-black minors 16 years of age. As noted above, however, our results will be biased upwards if underreporting of abortions to minors increased with enforcement of the law. A plausible scenario is as follows: minors 16 years of age in South Carolina leave the state for an abortion in response to the law. Sympathetic to minors' requests for confidentiality, providers fail to file appropriate termination certificates. We observe a relative fall in abortions, when in fact there has been a relative fall in reporting.[13] We cannot prove that a deterioration in reporting and not a fall in abortions is responsible for our findings. Nevertheless, we believe that a relative *decline* after the law in the proportion of abortions to minors performed out of state would be evidence of underreporting. Table 6 presents these data for South Carolina. Among non-blacks, the greatest increase in out-of-state abortions occurs among minors 16 years of age. Over 30 percent of these teens went to another state for an abortion after imposition of the law, a rise of 12 percentage points. Among women 19 to 20

[13] Of course underreporting could occur within the state that passed the law, but it is probably more likely among providers in states without parental involvement laws.

years of age, there was a small and statistically insignificant change in out-of-state abortions. The large increase is noteworthy for two reasons. First, it suggests a substantial behavioral response to the law as a large proportion of minors left the state for an abortion after the law. Second, reports of abortions performed out of state to residents of South Carolina increased relative to our control groups. We conclude, therefore, that our estimate of a 10 percentage point decline in the probability of abortion among non-black minors 16 years of age is probably an upper bound estimate, but that evidence of gross underreporting is lacking. Finally, the absence of relative change in out of state abortions among blacks in South Carolina is less suggestive, but is consistent with a statistically insignificant change in abortion probabilities associated with the law.

We have argued that if a parental involvement law is binding, then abortions to minors should fall and births should rise or remain unchanged. Further, the rise in births should not exceed the decline in abortions (see Footnote 6). Table 7 displays births and abortions to 16 and 18 year old teens in South Carolina and Virginia by race twelve months before and after the imposition of South Carolina's parental consent statute. Several observations are noteworthy. First, every group experiences a fall in abortions, which is suggestive of broader trends that discourage abortion. Second, the fall in abortions is greatest among non-black minors 16 years of age in South Carolina, the only group to experience a rise in births of any magnitude. Third, the increase in births is less than the fall in abortions. These are small numbers and thus should be interpreted with caution, but they are consistent with our findings that only non-black minors 16 years of age in South Carolina appeared to have been affected by the consent statute.

Identification of effects based on the DDD estimator rely on the relatively weak assumption that shocks coincident with a parental involvement statute impact on the fertility of within-state treatment and controls groups equally (Gruber 1994). The assumption is not testable, but clearly depends on the appropriateness of the control groups. As an informal check on the validity of our

control groups, we applied the DDD estimator to the period 1986-1987, almost two years before Tennessee's law went into effect. Should we uncover any effects associated with the law, then we would have to question the suitability of our controls. We let January, 1987 be the month that a hypothetical parental involvement law took effect in Tennessee and South Carolina. We then re-estimated the specifications in Table 4 and 5 for these two years. We find no relative changes in the pregnancy resolution of minors in South Carolina and Tennessee associated with this artificial date.[14]

We have analyzed the outcomes of unmarried women since only unemancipated minors are affected by the law. For our within-state controls we sought women who would be as similar as possible in attitude and propensity to utilize abortion as women in our treatment group. We consider married pregnant women 19 to 20 years less likely to have conceived unintentionally; they also may be less willing to consider abortion under any circumstance. Thus, elimination of married women seemed a reasonable strategy for specifying an appropriate set of controls.

Parental involvement laws, however, may induce some minors who become pregnant to marry and give birth. If such behavior is important, then we have excluded pregnancies in the post-law period that were likely to have resulted in births. This would lower the denominator in an abortion probability ratio and could offset, in part, a fall in abortions. Put differently, marriage in response to the law would bias our estimates towards no effect or even a positive effect of the law. Among blacks, elimination of married women will have little impact on our results since over 90 percent of all black women less than 21 in our three states who had either a birth or abortion in 1989 were unmarried. The situation is different among non-blacks. Fifty-eight percent of abortions and births to women less than 21 in our three sample states were to unmarried women. Moreover, there is evidence that whites are more likely to marry between conception and birth than are blacks. Among first births to white teens conceived premaritally in 1980, 48 were married by the time they delivered.

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[14] Results are available upon request.

The comparative figure for blacks was only 6.1 percent (Ventura 1987).

To assess the effect of married women on our results, we re-estimated regressions from Tables 4 and 5.[15] The results in Table 8 confirm that inclusion of married women has little impact on our key findings. The coefficient on non-black teens 16 year of age falls from -.103 among a sample of only unmarried adolescents (Table 4) to -.090 when married women are included (Table 8), a minor change but one consistent with our predictions as to the direction of potential bias. As expected, estimates for blacks are virtually unaltered from Table 5.

In summary, we find that South Carolina's parent consent law is associated with a 10 percentage point decline in the probability of abortion among non-blacks minors 16 years of age. This represents an upper bound estimate if underreporting of abortions to minors relative to controls increased with imposition of the law. We believe the data are not consistent with a gross deterioration of reporting. No other group experiences a change of a statistically significant magnitude. We have also shown that our results for non-black minors 16 years of age in South Carolina are consistent with several other responses. First, this group of minors demonstrated a marked increase in out of state abortions, a strong behavioral response not observed among other groups. Second, births rose substantially among this group of minors, but the rise in births was less than the fall in abortions, a change consistent with a prediction that only a fraction of potential aborters would substitute contraception for abortion in response to the law. Third, we offer some evidence as to the appropriateness of our control groups and our findings are robust to the inclusion of pregnancies to married teens.

E. Effects of travel distance

Estimates of the association between travel distance from the county of residence to the

[15] Plots of births and abortions for all women are presented in Figures A1-A4 of the Appendix.

nearest county with at least one non-hospital abortion provider are displayed for non-blacks and blacks in Tables 9 and 10 respectively. In each table, the specification in column (1) is a simple DDD estimator with three dummy variables that characterize distance. The omitted category is zero miles which is assigned to women who live in a county with a provider. Column (2) adds individual and county characteristics. Column (3) is the same as column (2) but the specification allows distance to affect abortion probabilities of minors and older teens differently.

Results are qualitatively the same for both races. First, there is an obvious gradient between distance and the probability of abortion [column (1)]. Regardless of race, the probability of abortion for women who live in a county that is 60 or more miles from a county with a provider is at least 14 percentage points lower than for women who reside in a county with a provider. The relationship weakens, but remains substantial, the closer one resides to a county with a provider (column (1) Tables 9 and 10). The effects of distance, however, fall dramatically with inclusion of county and individual covariates [column (2)]. Differences between columns (1) and (2) are so great that we suspect that a richer specification might eliminate effects of distance altogether.[16] What appears clear is that our measures of distance, unadjusted for other individual and county covariates, capture broad differences between individuals in metropolitan and non-metropolitan counties.

The interactive specifications are also surprising. Distance has a greater negative impact on the abortion probabilities of women 18 to 20 years of age than minors 17 years or less. For blacks these differences are statistically significant (column (3), Table 10). More importantly, point estimates indicate that distance has no impact of the likelihood of abortion among black minors. Point estimates for non-black minors are also quite small, although there are no statistically significant differences between non-black minors and older teens.

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[16] We have in mind a specification with individual measures of religion, parental occupation and completed schooling.

V. Discussion

Except for non-black minors 16 years of age, we find no impact of parental involvement laws on pregnancy resolution among teens in South Carolina and Tennessee. We find no statistically significant effects for minors as a group. Our findings for minors as a group are consistent with other analyses of individual states (Cartoff and Klerman 1986; Henshaw 1995). Our findings are at odds with recent pooled time series, cross section analyses of adolescent abortion rates, all of which report relatively large and statistically significant declines in abortion rates of minors associated with parental involvement laws (Haas-Wilson forthcoming; Ohsfeldt and Gohmann 1994; Blank, George and London 1994). What our study, and the other two studies of Massachusetts (Cartoff and Klerman 1986) and Mississippi (Henshaw 1995) suggest, is that abortions by state of occurrence may yield misleading inferences as to the impact of such laws on pregnancy resolution (Haas-Wilson forthcoming; Blank, George and London 1994). Minors do leave their state of residence to obtain an abortion; similarly non-resident minors who seek abortion would be less likely to use providers in a state that imposed a parental involvement statute. Consequently, analyses of parental involvement laws based on abortions by state of occurrence would misinterpret changes in where abortions are performed for declines in abortion rates.

Our analysis is based on a comparison of three southern states, and thus, our findings may not generalize to other regions. Our study, however, has two important advantages over previous work, which strengthens the validity of the findings. First, we use individual data from three states in which abortions are well-reported. As Henshaw (1995) points out, states such as South Carolina, Tennessee and Mississippi have relatively few providers which greatly facilitates accurate counts. The significance of underreporting, especially abortions to residents performed out of state, cannot be overemphasized since failure to capture such movements generates bias towards a negative effect of the law. South Carolina and Tennessee are the only two states in the NCHS reporting system to

have well-developed reciprocal reporting agreements with neighboring states. We interpret the finding that the proportion of abortions to non-black minors 16 years of age performed out of state rose with imposition of the law as evidence that reporting bias was not severe in our sample. A second strength is that we use a large sample of individuals which enables us to identify treatment and control groups by age, race, marital status and date of conception. We then apply a DDD estimator to eliminate time-varying effects that impact on minors across all states as well as shocks within states that impact on minors and young women equally. As we demonstrate, fixed effects or DD estimates, the mainstay of state aggregate time-series and cross section analyses, yield larger impacts of parental involvement laws on pregnancy resolution than we obtain with a DDD estimator.[17]

A lack of strong effects of parental involvement laws on pregnancy resolution is plausible given survey data that indicate the majority of minors inform at least one parent before obtaining an abortion. For instance, Henshaw and Kost (1991) found that in a survey of 1519 minors seeking abortion in states with no parental involvement laws, 66 percent informed at least one parent. Another survey of minors from 6 abortion clinics, 2 in Wisconsin and 4 in Minnesota, report that approximately 64 percent of minors involved at least one parent in their decision to terminate the pregnancy. At the time of the survey Minnesota enforced a parental consent law and Wisconsin did not; however, the rate of parental involvement was the same in both states. Thus, what evidence exists suggests that parental involvement laws are potentially binding for less than 40 percent of minors who obtain an abortion.

Is our finding that only non-black minors 16 years age in South Carolina are affected by the law plausible? We think yes. First, different findings for South Carolina and Tennessee may be

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[17] The importance of controlling for time-varying effects within states has been demonstrated in two recent papers that analyze aggregate abortion rates (Levine, Trainor and Zimmerman 1995; Matthews, Ribar and Wilhelm 1995). In both, effects of Medicaid financing restrictions on abortion rates fall substantially when controls for state-specific trends are added to the regressions.

explained by the strictness and clarity of South Carolina's consent statute. As we noted above, consent confers more power to parents than does a notification requirement. In addition, there was some ambiguity as to the constitutionality of Tennessee's notification statute that was not clarified until 1992 (Merz, Jackson, Klerman 1995). Tennessee's 1989 notification statute was never enjoined, but enforcement might not have been vigorous. Second, minors 16 years of age are the oldest and most mature group affected by the law. There is some evidence that teens 16 years of age are less likely than younger teens to inform their parents of an abortion, which suggests the law is more binding for older minors (Henshaw and Kost 1992). Our finding that minors 16 years of age in South Carolina were the most likely to leave the state for an abortion after the law provides support for this interpretation. Finally, racial differences with respect to adolescent fertility have been noted frequently. Blacks teens initiate sexual activity earlier and are more likely than white teens to experience a premarital pregnancy. Such differences may facilitate greater communication between black parents and their teenage daughters regarding pregnancy, which would lessen impact of the law.

We find that travel distance to an abortion provider has a relatively weak effect on pregnancy resolution among minors. More importantly, estimates are highly sensitive to adjustments for population density, per capita income and completed schooling. We suspect that more detailed information on parental schooling, religiosity, and the academic achievement of teens at the individual level would eliminate the relationship completely. One reason is that costs to parents and minor associated with travelling an extra 40 or 60 miles for an abortion may be relatively small compared with the expected social stigma and academic disruption associated with an out-of-wedlock birth. This would explain why young women 18 to 20 years of age were more sensitive to distance than minors. First, by 20, the stigma associated with an out-of-wedlock birth is diminished; second, a young woman's academic and labor market potential is better known at 20 and thus opportunity costs are more accurately assessed. Third, young women, living apart from parents, are probably poorer

than minors with access to parental resources. All three factors may be more relevant for middle class teens living in suburban or less urban settings than poorer teens in large metropolitan centers.

We suspect that statistically large, positive associations between the number of abortion providers and increased rates of abortion reported in the literature suffer from simultaneous equations bias: states with relatively many providers have relatively strong demands. Although researchers recognize the problem, good instruments are not obvious (Blank, George, and London 1994). An important advantage of distance to the nearest county with an abortion provider is the apparent lack of feedback from changes in demand to changes in distance. Of the 243 counties in our sample only 10 experienced a change in distance; in contrast, the number of abortion providers in each state varied substantially. Thus, our estimates of travel costs based on distance to a provider are probably less contaminated by endogeneity bias than estimates based on the number of providers in a locality.

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Figure 1
Annual Abortion Probablity by Year for Unmarried, Non-Black Minors and Two Control Groups in South South Carolina and Virginia, 1986-1991

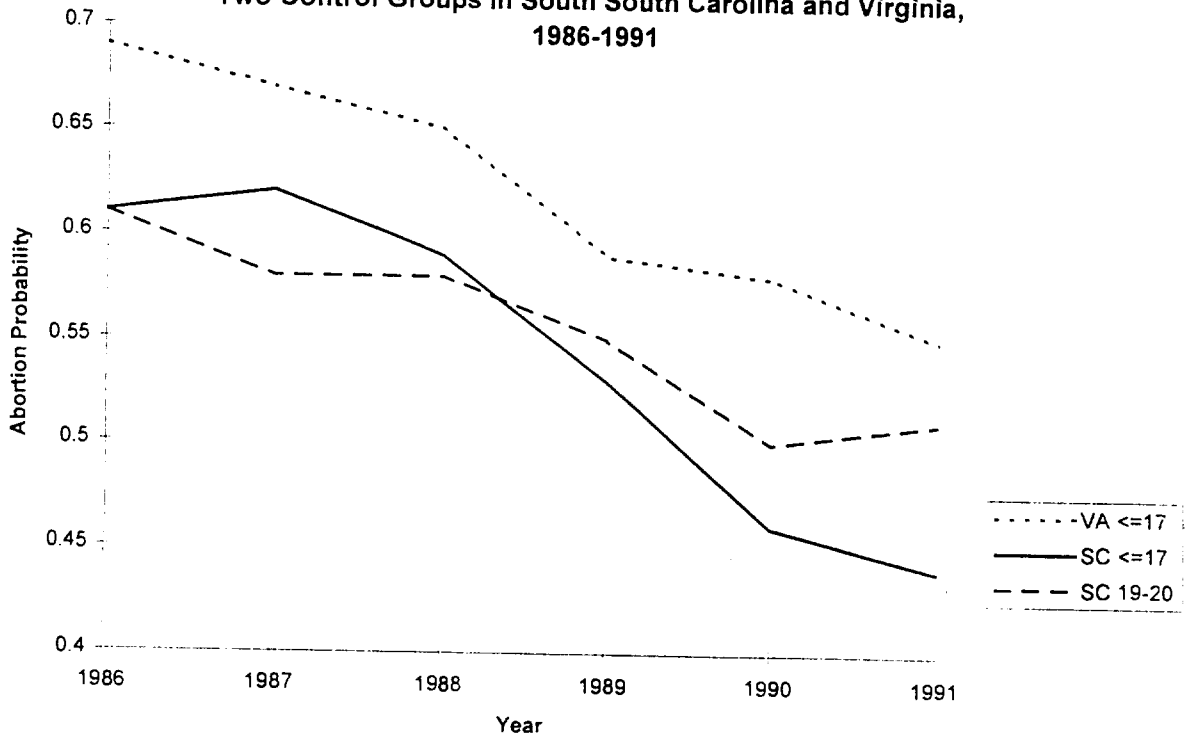


Figure 2
Annual Abortion Probability by Year for Unmarried, Black Minors and Two Control Groups in South Carolina and Virginia, 1986-1991

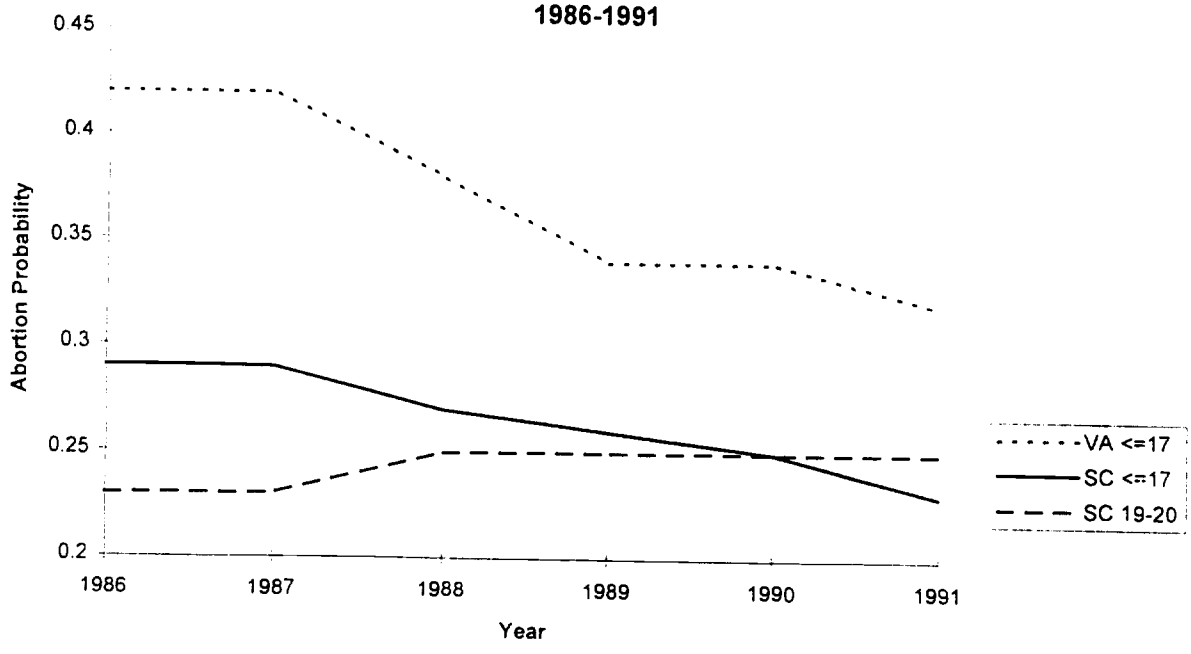


Figure 3
Annual Abortion Probability by Year for Unmarried, Non-Black Minors and Two Control Groups in Tennessee and Virginia, 1986-1991

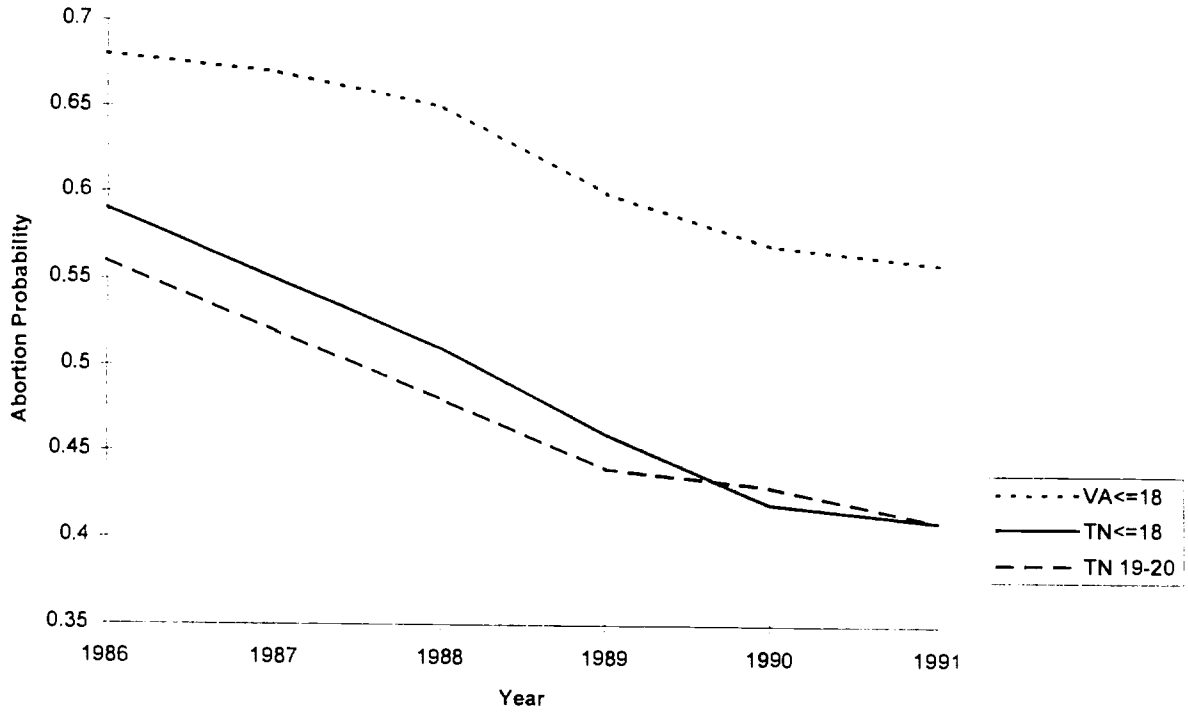


Figure 4
Annual Abortion Probability by Year for Unmarried, Black Minors and Two Control Groups in Tennessee and Virginia, 1986-1991

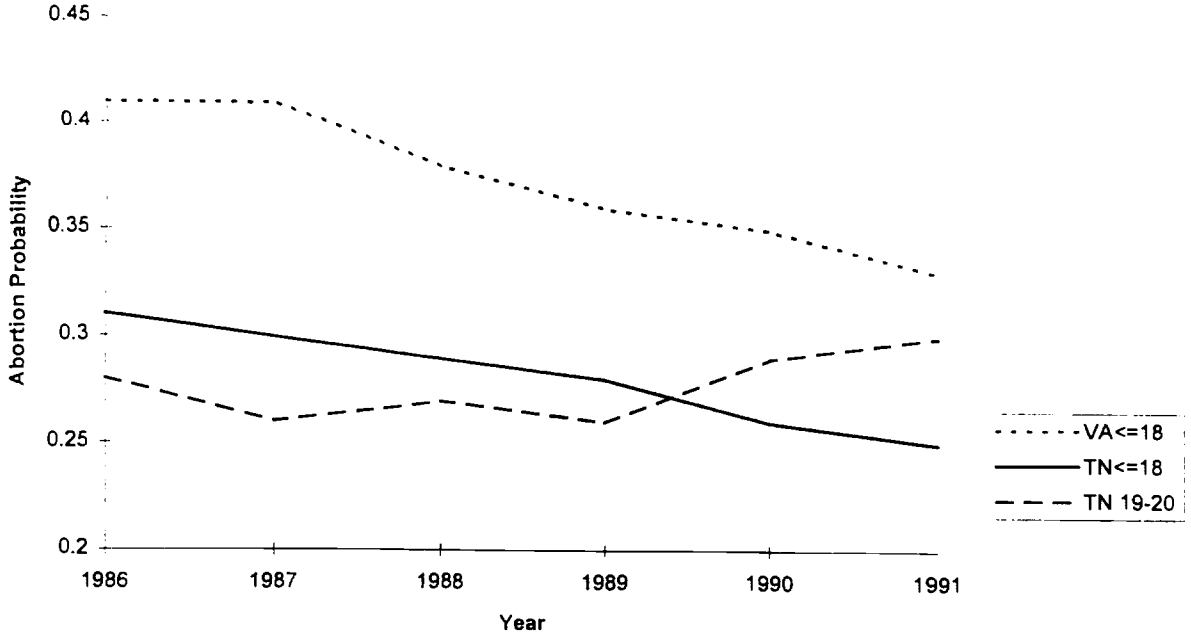


Table 1

Number of Abortions by State of Occurrence and Residence
as Reported by the Alan Guttmacher Institute and State Departments of Health in
Tennessee, South Carolina and Virginia

By State of Occurrence

	AGI	Tenn	% Diff	AGI	South Carolina	% Diff	AGI	Virginia	% Diff
1987	22,050	21,621	-1.9	12,770	12,992	+1.7	34,410	32,930	-4.5
1988	22,090	21,589	-2.3	14,160	14,129	-0.2	35,420	34,029	-4.1
1991	19,840	19,779	-0.3	13,520	12,538	-7.3	35,170	31,934	-10.1
Total	63,980	62,989	-1.6	40,450	39,659	-2.0	105,000	98,893	-6.2
By State of Residence									
1987	19,640	18,816	-4.4	14,810	12,992	-14.0	38,860	32,436	-19.8
1988	20,060	19,305	-3.9	16,444	14,129	-16.4	40,240	33,637	-19.6
Total	39,700	38,121	-4.1	31,254	27,121	-15.2	79,100	66,073	-19.7
Resident Abortions Out of State									
1988	1,890	1,577	-20.1	3,060	2,220	-38.7	6,900	1,615	-327.2

Sources: Tennessee Department of Health and Environment (1993). South Carolina Department of Health and Environmental Control (1992); Unpublished reports from the South Carolina Department of Health and Environmental Control for 1991 and 1992. Virginia Department of Health (1994). Henshaw and Van Vort (1992, 1994).

Table 2

Resident Abortion Probabilities of Unmarried, Non-Blacks (Panel A) and Blacks (Panel B) Before and After Changes in Parental Involvement Laws in South Carolina and Virginia 7/88-4/91[a]

Panel A

Non-blacks, South Carolina (N=10,607)

Age	Before	After	Difference (se)
<=17	.541	.442	-.099 (.015)
19-20	.554	.506	-.048 (.013)
Difference-in-differences			-.051 (.020)

Non-blacks, Virginia (N=22,886)

Age	Before	After	Difference (se)
<=17	.624	.574	-.040 (.011)
19-20	.570	.548	-.022 (.009)
Difference-in-differences			-.018 (.014)
Difference-in-differences-in-differences			-.033 (.024)

Panel B

Blacks, South Carolina N=(16,750)

Age	Before	After	Difference (se)
<=17	.260	.233	-.027 (.010)
19-20	.250	.250	.000 (.009)
Difference-in-differences			-.027 (.014)

Blacks, Virginia (N=19,782)

Age	Before	After	Difference (se)
<=17	.354	.335	-.019 (.011)
19-20	.326	.348	.022 (.009)
Difference-in-differences			-.041 (.014)
Difference-in-differences-in-differences			.014 (.020)

[a] Standard errors are in parentheses. South Carolina imposed a parental consent law in May, 1990. Virginia has no such statute and serves as the nonexperimental state.

Table 3

Resident Abortion Probabilities of Unmarried, Non-Blacks (Panel A) and Blacks (Panel B) Before and After Changes in Parental Involvement Laws in Tennessee and Virginia 7/88-4/91[a]

Panel A

Non-blacks, Tennessee (N=21,448)

Age	Before	After	Difference (se)
<=18	.484	.430	-.054 (.009)
19-20	.444	.438	-.006 (.010)
Difference-in-differences			-.048 (.014)

Non-blacks, Virginia (N=29,459)

Age	Before	After	Difference (se)
<=18	.624	.574	-.050 (.008)
19-20	.570	.548	-.022 (.009)
Difference-in-differences			-.028 (.012)
Difference-in-differences-in-differences			-.020 (.019)

Panel B

Blacks, Tennessee N=(18,928)

Age	Before	After	Difference (se)
<=18	.288	.263	-.025 (.009)
19-20	.273	.292	.019 (.010)
Difference-in-differences			-.044 (.014)

Blacks, Virginia (N=24,789)

Age	Before	After	Difference (se)
<=18	.370	.348	-.022 (.009)
19-20	.326	.348	.022 (.009)
Difference-in-differences			-.044 (.013)
Difference-in-differences-in-differences			.000 (.018)

[a] Standard errors are in parentheses. Tennessee imposed a notification law in November, 1989. Virginia has no such statute and serves as the nonexperimental state.

Table 4

OLS Estimates of the Effects of Parental Involvement Laws on the Probability of Abortion Among Unmarried Non-black Residents of South Carolina, Tennessee and Virginia, 20 Years of Age or Less, July 1988-April 1991

	Coefficients on Age-State-Law Interactions			
	South Carolina		Tennessee	
	(1)	(2)	(1)	(2)
Age 14	0.139	0.099	0.094	0.115
	(0.081)	(0.074)	(0.069)	(0.063)
Age 15	-0.008	-0.012	-0.070	-0.071
	(0.053)	(0.050)	(0.046)	(0.041)
Age 16	-0.103*	-0.108*	-0.051	-0.041
	(0.037)	(0.037)	(0.032)	(0.029)
Age 17	-0.016	-0.027	0.006	0.017
	(0.031)	(0.032)	(0.027)	(0.025)
Age 18	0.017	0.025	-0.028	-0.015
	(0.027)	(0.029)	(0.024)	(0.022)
Age <=18[a]	-0.013	-0.009	-0.021	-0.008
	(0.021)	(0.025)	(0.019)	(0.017)
Age <=17[a]	-0.033	-0.013	-0.015	-0.008
	(0.024)	(0.028)	(0.021)	(0.020)
Age <=16[a]	-0.049	-0.043	-0.038	-0.029
	(0.031)	(0.036)	(0.027)	(0.024)
Individual and County Characteristics	no	yes	no	yes
N	64,610	64,610	64,610	64,610
R^2	0.016	0.196	0.016	0.196

Notes: Standard errors are in parentheses. South Carolina and Tennessee are the experimental states and Virginia is the nonexperimental state. The control group is women 19 to 20 years of age. Individual characteristics include schooling, parity and whether a woman conceived before or after an expansion in Medicaid eligibility. County characteristics include income, unemployment, M.D.s per capita, newborn bassinets per capita, hospital beds per capita, population density and its square, and distance to an abortion provider.

[a] The coefficient is from a restricted specification in which teens of this age are grouped together. In each case the control group is women 19 to 20 years of age.

* $p < 0.01$ + $p < 0.05$

Table 5

OLS Estimates of the Effects of Parental Involvement Laws on the Probability of Abortion Among Unmarried Black Resident of South Carolina, Tennessee and Virginia, 20 Years of Age or Less, July 1988-April 1991.

	Coefficients on Age-State-Law Interactions			
	South Carolina		Tennessee	
	(1)	(2)	(1)	(2)
Age 14	-0.043	-0.060	0.008	-0.001
	(0.047)	(0.049)	(0.048)	(0.045)
Age 15	0.035	0.032	0.076	0.078+
	(0.038)	(0.038)	(0.039)	(0.036)
Age 16	-0.046	-0.038	-0.056	-0.040
	(0.030)	(0.031)	(0.031)	(0.029)
Age 17	0.065+	0.066+	0.006	0.007
	(0.026)	(0.028)	(0.027)	(0.026)
Age 18	0.039	0.097*	0.007	-0.001
	(0.024)	(0.026)	(0.024)	(0.023)
Age <=18[a]	0.024	0.026	0.002	0.003
	(0.018)	(0.021)	(0.018)	(0.018)
Age <=17[a]	-0.014	0.017	-0.001	0.002
	(0.020)	(0.024)	(0.020)	(0.020)
Age <=16[a]	-0.020	-0.016	-0.003	0.005
	(0.023)	(0.028)	(0.024)	(0.023)
Individual and County Characteristics	no	yes	no	yes
N	64,676	64,676	64,676	64,676
R^2	0.011	0.139	0.011	0.139

Notes: Standard errors are in parentheses. South Carolina and Tennessee are the experimental states and Virginia is the nonexperimental state. The control group is women 19 to 20 years of age. Individual characteristics include schooling, parity and whether a woman conceived before or after an expansion in Medicaid eligibility. County characteristics include income, unemployment, M.D.s per capita, newborn bassinets per capita, hospital beds per capita, population density and its square, and distance to an abortion provider.

[a] The coefficient is from a restricted specification in which teens of this age are grouped together. In each case the control group is women 19 to 20 years of age.

* $p < 0.01$ + $p < 0.05$

Table 6

Proportion of Abortions to Residents Performed Out-of-state in South Carolina Before and After Changes in Parental Involvement Laws by Age and Race 7/88-4/91[a]

Non-blacks, South Carolina

Age	Before	After	Difference (se)
16	.188	.306	.118 (.034)
<=17	.179	.240	.061 (.018)
19-20	.167	.184	.017 (.014)

Blacks, South Carolina

Age	Before	After	Difference (se)
16	.209	.209	.00 (.035)
<=17	.219	.204	-.015 (.020)
19-20	.142	.138	-.004 (.015)

[a] Standard errors are in parentheses. South Carolina imposed a parental consent law in May, 1990.

Table 7

Number of Births and Abortions to Teens 16 and 18 Years of Age in South Carolina and Virginia 12 Months Before and After Imposition of South Carolina's Parental Consent Statute

Non-blacks, South Carolina

	Births			Abortions		
Age	**Before**	**After**	**%Chg**	**Before**	**After**	**%Chg**
16	262	308	17.6%	313	206	-34.2%
18	575	568	-1.2%	738	540	-26.8%

Blacks, South Carolina

	Births			Abortions		
16	676	738	9.2%	244	187	-8.3%
18	1243	1265	1.8%	424	403	-5.0%

Non-blacks, Virginia

	Births			Abortions		
16	453	425	-6.2%	600	550	-8.3%
18	948	960	1.3%	1514	1223	-19.2%

Blacks, Virginia

	Births			Abortions		
16	582	557	-4.3%	302	282	-6.6%
18	1127	1067	-5.3%	708	613	-13.4%

Table 8

OLS Estimates of the Effects of Parental Involvement Laws on the Probability of Abortion Among Married and Unmarried Resident of South Carolina, Tennessee and Virginia, 20 Years of Age or Less by Race, July 1988-April 1991.

	Coefficients on Age-State-Law Interactions			
	South Carolina		Tennessee	
	Non-Blacks	Blacks	Non-Blacks	Blacks
	(1)	(2)	(1)	(2)
Age 14	0.093	-0.078	0.147	-0.001
	(0.067)	(0.045)	(0.056)	(0.044)
Age 15	-0.003	0.028	-0.015	0.087
	(0.041)	(0.037)	(0.035)	(0.036)
Age 16	-0.090*	-0.051	0.018	-0.043
	(0.029)	(0.030)	(0.023)	(0.028)
Age 17	-0.013	0.056	0.043	0.013
	(0.024)	(0.027)	(0.019)	(0.025)
Age 18	-0.003	0.040	-0.004	-0.001
	(0.021)	(0.024)	(0.016)	(0.022)
Age $<=18$[a]	-0.013	0.016	0.006	0.006
	(0.018)	(0.020)	(0.017)	(0.017)
Age $<=17$[a]	-0.005	0.007	0.031	0.005
	(0.021)	(0.022)	(0.015)	(0.019)
Age $<=16$[a]	-0.033	-0.026	0.024	0.006
	(0.028)	(0.027)	(0.019)	(0.022)
Individual and County Characteristics	yes	yes	yes	yes
N	110,075	70,228	110,075	70,228
R^2	0.086	0.133	0.086	0.133

Notes: Standard errors are in parentheses. South Carolina and Tennessee are the experimental states and Virginia is the nonexperimental state. The control group is women 19 to 20 years of age. Individual characteristics include schooling, parity and whether a woman conceived before or after an expansion in Medicaid eligibility. County characteristics include income, unemployment, M.D.s per capita, newborn bassinets per capita, hospital beds per capita, population density and its square, and distance to an abortion provider.

[a] The coefficient is from a restricted specification in which teens of this age are grouped together. In each case the control group is women 19 to 20 years of age.

* $p < 0.01$ + $p < 0.05$

Table 9

OLS Estimates of the Effects of Distance to an Abortion Provider on Abortion Probabilities of Unmarried Non-blacks 20 Years of Age or Less by Race in South Carolina, Tennessee and Virginia with Interactions for Teens Less than 18 Years of Age July 1988-April 1991.

	(1)	(2)	(3)	(4)
Distance to Provider[a]	-.089*	-.003	-.099*	-.006
1 to 40 miles (yes=1)	(.005)	(.007)	(.006)	(.007)
Distance to Provider	-.154*	-.029*	-.171*	-.033*
41 to 60 miles (yes=1)	(.006)	(.008)	(.007)	(.009)
Distance to Provider	-.180*	-.046*	-.199*	-.050*
60 + miles (yes=1)	(.007)	(.009)	(.008)	(.012)
Dist 40 x Teen			.034*	.007
			(.011)	(.010)
Dist 60 x Teen			.056*	.012
			(.012)	(.011)
Dist >60 x Teen			.060*	.014
			(.014)	(.013)
Includes individual and county characteristics	no	yes	no	yes
$F_{3 \text{ interaction terms}}$	--	--	9.79*	0.66
N	64,610	64,610	64,610	64,610
Adjusted R^2	.032	.186	.032	.186

Notes: Standard errors are in parentheses. All specifications include controls for states, teens, and parental involvement laws, all second order interactions and a third level interaction of state, teen and parental involvement law. Individual characteristics include schooling, parity and whether a woman conceived before or after an expansion in Medicaid eligibility. County characteristics include income, unemployment, M.D.s per capita, newborn bassinets per capita, hospital beds per capita, population density and its square.

* $p < .01$; + $p < .05$

[a] The omitted category is zero miles, the distance we assign to women who live in a county with an abortion provider.

Table 10

OLS Estimates of the Effects of Distance to an Abortion Provider on Abortion Probabilities of Unmarried Blacks 20 Years of Age or less in South Carolina, Tennessee and Virginia with interactions for Teens less then 18 years of age, July 1988-April 1991.

	(1)	(2)	(3)	(4)
Distance to Provider[a] 1 to 40 miles (yes=1)	-.054* (.005)	-.009 (.007)	-.074* (.006)	-.027* (.008)
Distance to Provider 41 to 60 miles (yes=1)	-.082* (.005)	-.010 (.008)	-.105* (.007)	-.026* (.008)
Distance to Provider 60 + miles (yes=1)	-.136* (.007)	-.045* (.009)	-.154* (.009)	-.055* (.010)
Dist 40 x Teen			.055* (.010)	.052* (.010)
Dist 60 x Teen			.060* (.011)	.044+ (.010)
Dist >60 x Teen			.048* (.015)	.027 (.014)
Includes individual and county characteristics	no	yes	no	yes
$F_{\text{3 interaction terms}}$	--	--	14.00*	10.87*
N	64,676	64,676	64,676	64,676
Adjusted R^2	.017	.131	.023	.132

Notes: Standard errors are in parentheses. All specifications include controls for states, teens, and parental involvement laws, all second order interactions and a third level interaction of state, teen and parental involvement law. Individual characteristics include schooling, parity and whether a woman conceived before or after an expansion in Medicaid eligibility. County characteristics include income, unemployment, M.D.s per capita, newborn bassinets per capita, hospital beds per capita, population density and its square.

* $p < .01$; + $p < .05$

[a] The omitted category is zero miles, the distance we assign to women who live in a county with an abortion provider.

Figure A1
Annual Abortions by Year for Unmarried, Non-Black Minors and Two Control Groups in South Carolina and Virginia, 1986-1991

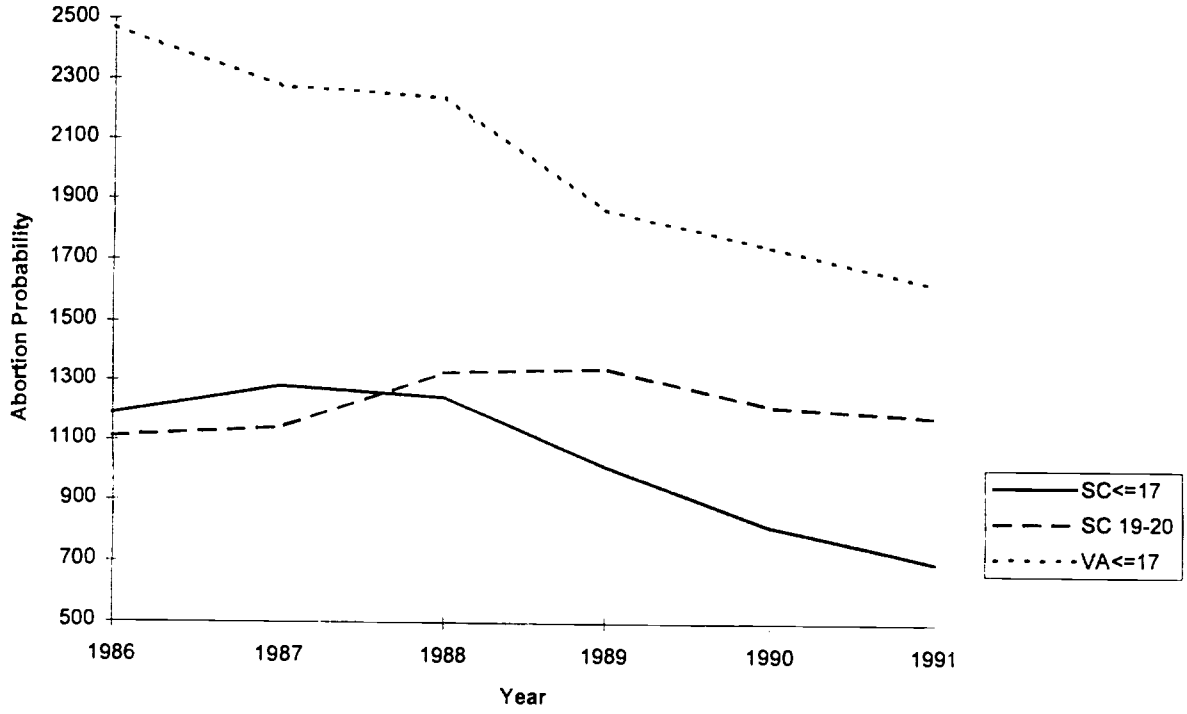


Figure A2
Annual Abortions by Year for Unmarried, Black Minors and Two Control Groups in South Carolina and Virginia, 1986-1991

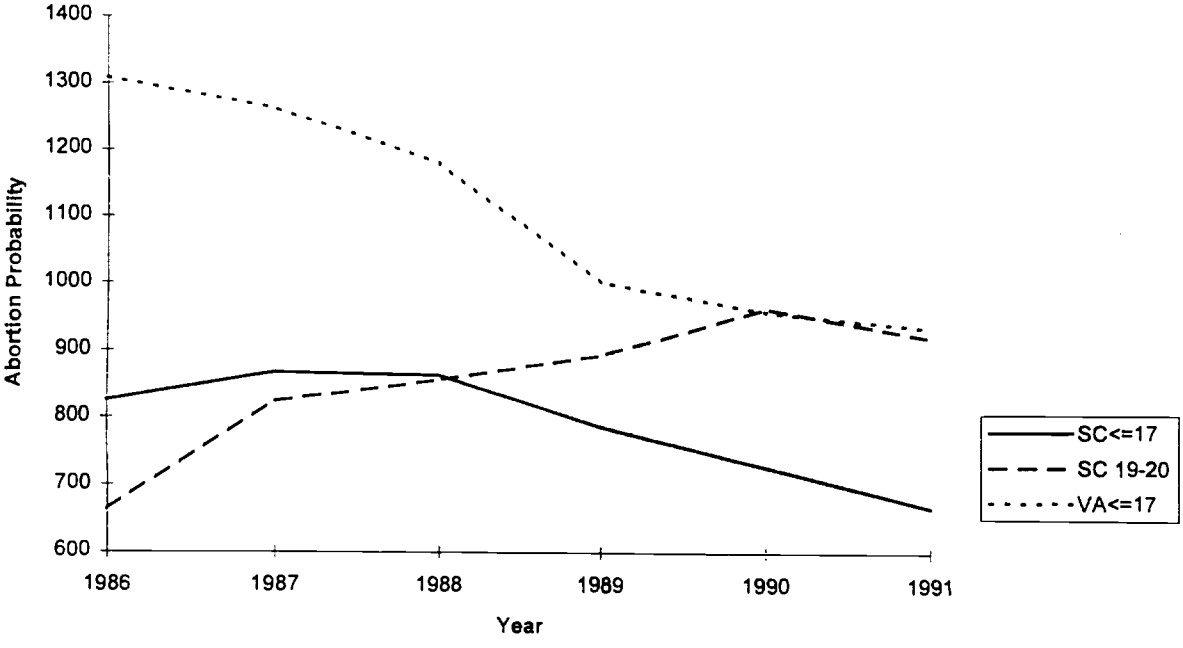


Figure A3
Annual Abortions by Year for Unmarried, Non-Black Minors and Two Control Groups in Tennesee and Virginia, 1986-1991

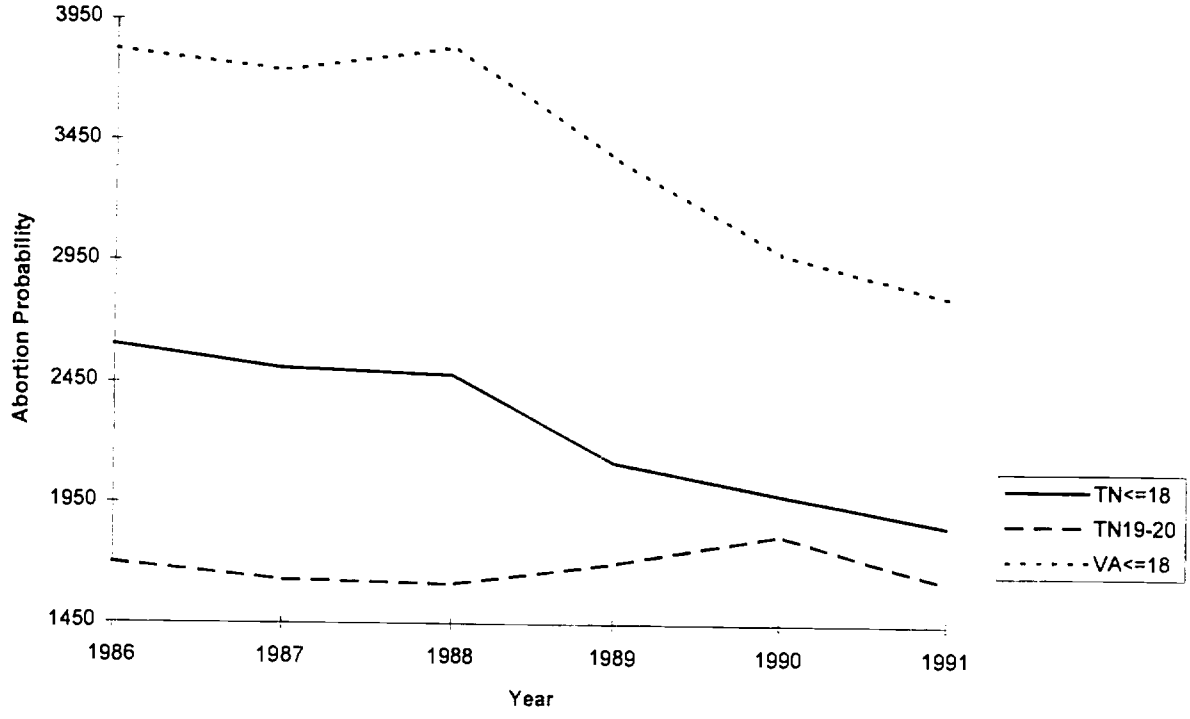


Figure A4
Annual Abortions by Year for Unmarried, Black Minors and Two Control Groups in Tennessee and Virginia, 1986-1991

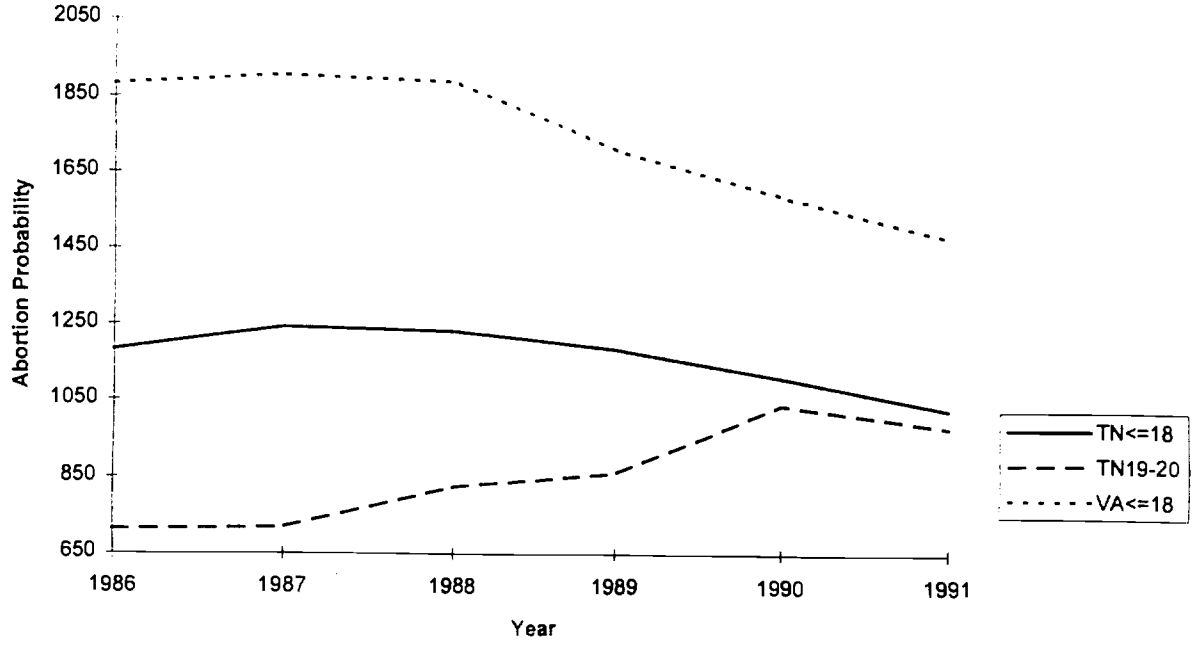


Figure A5
Annual Births by Year for Unnmarried, Non-Black Minors and Two Control Groups in South Carolina and Virginia, 1986-1991

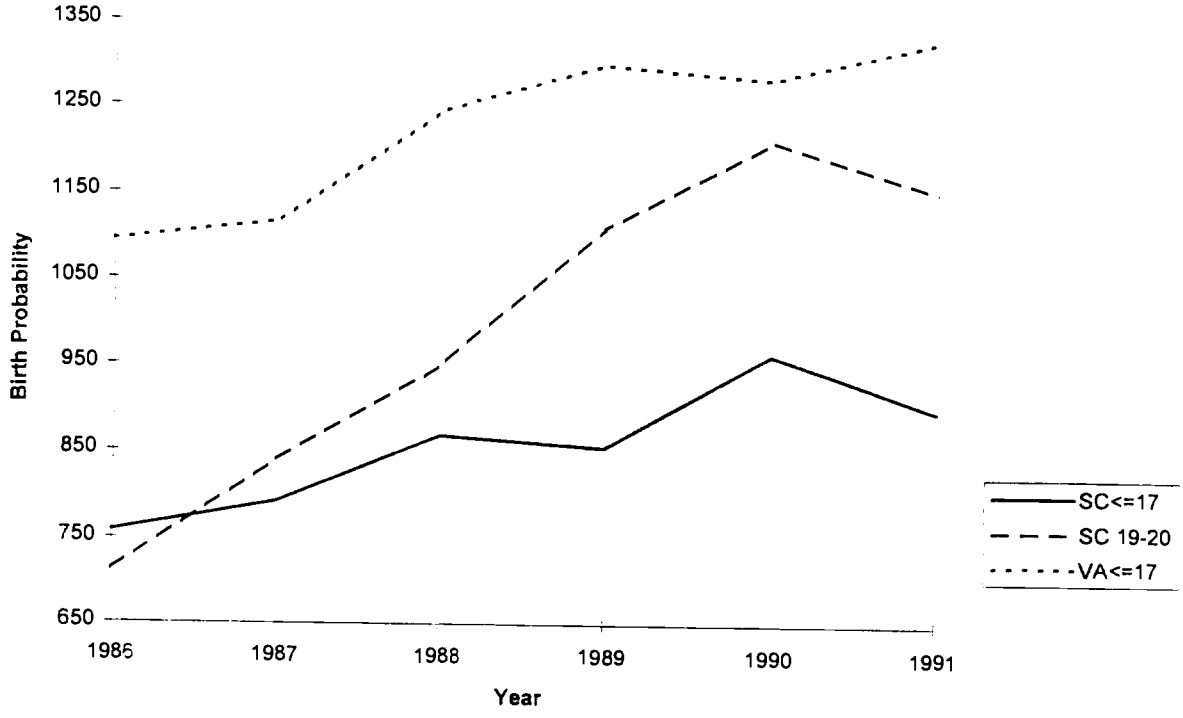


Figure A6
Annual Births by Year for Unmarried, Black Minors and Two Control Groups in South Carolina And Virginia, 1986-1991

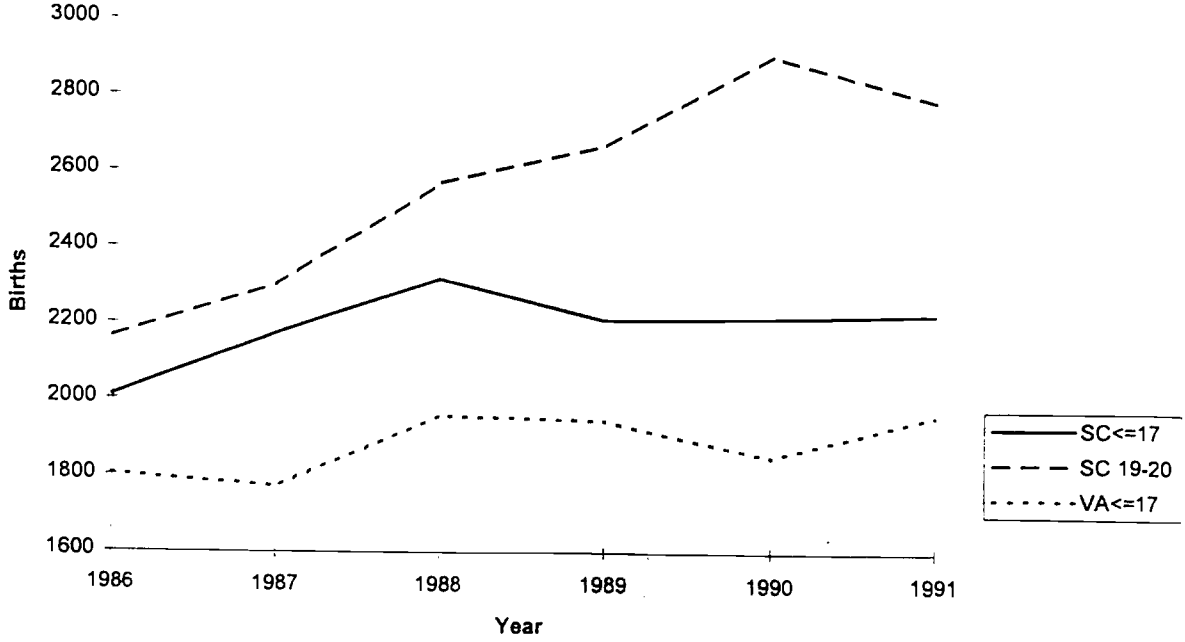


Figure A7
Annual Births by Year for Unmarried, Non-Black Minors and Two Control Groups in Tennessee and Virginia, 1986-1991

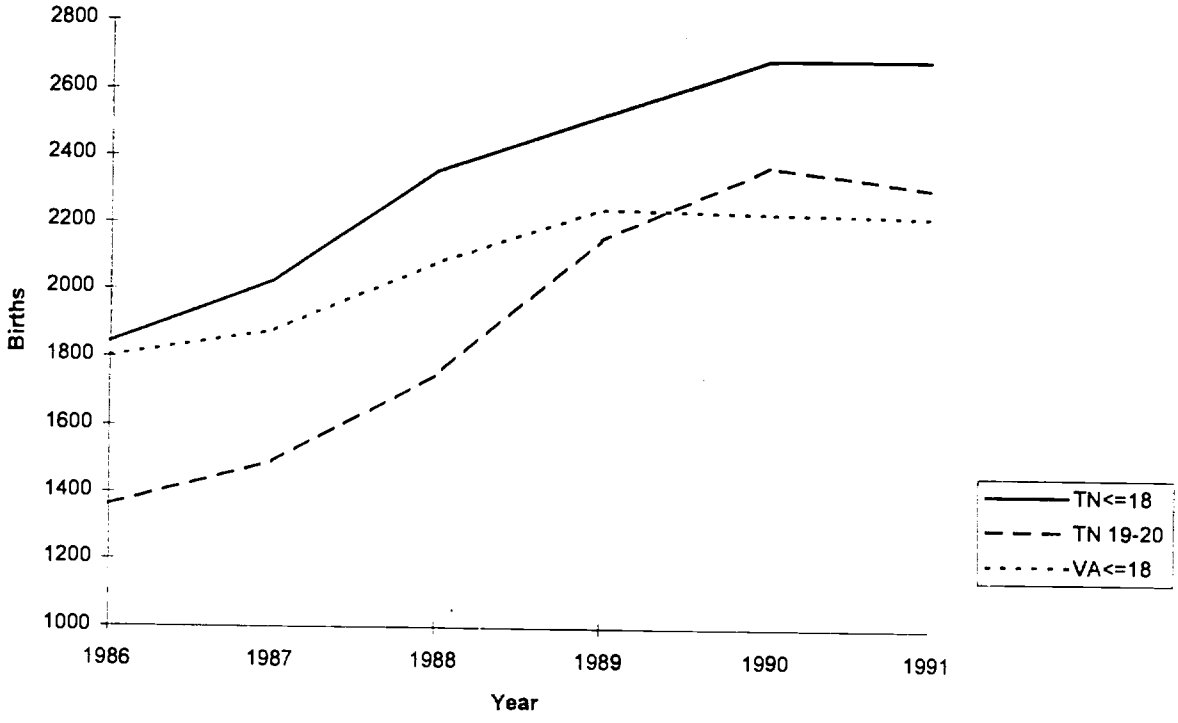


Figure A8
Annual Births by Year for Unmarried, Black Minors and Two Control Groups in Tennessee and Virginia, 1986-1991

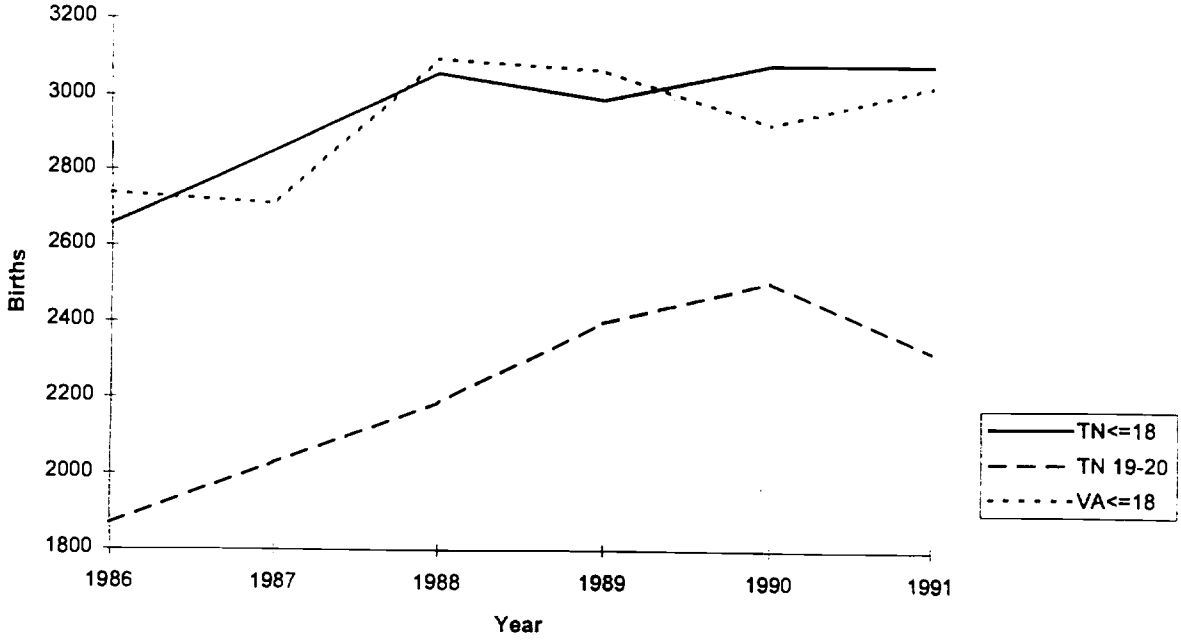


Figure A9
Annual Abortion Probability by Year for Married and Unmarried Non-Black Minors and Two Control Groups in South Carolina and Virginia, 1986-1991

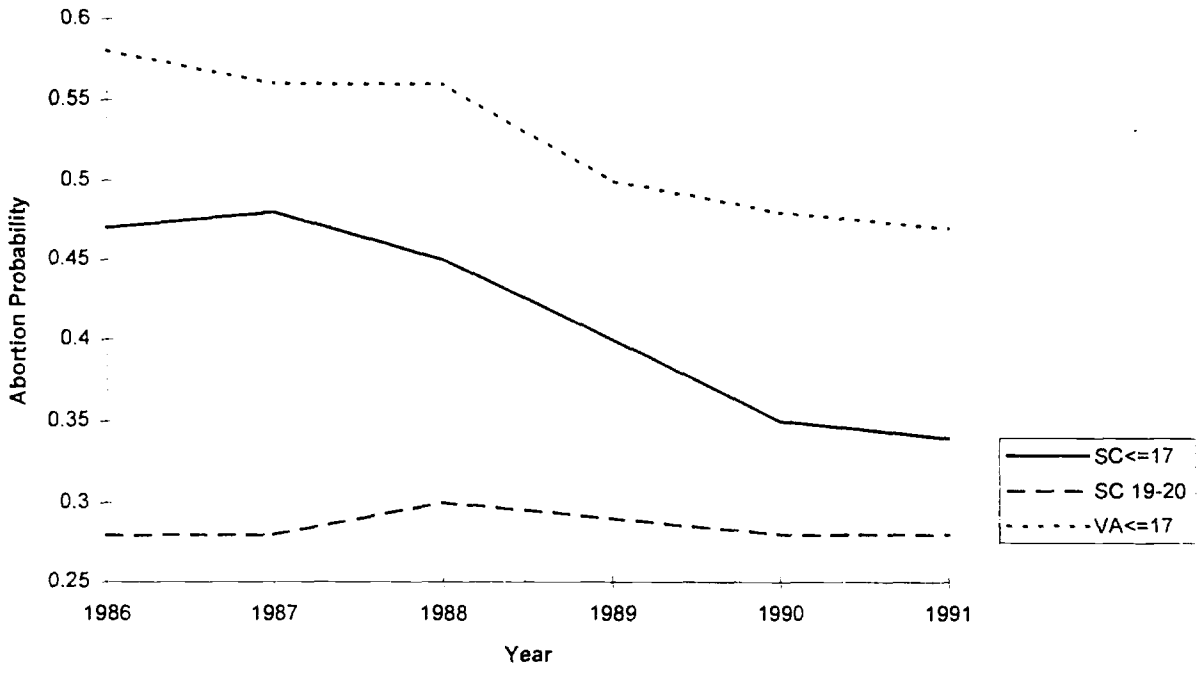


Figure A10
Annual Abortion Probability by Year for Married and Unmarried Black Minors and Two Control Groups in South Carolina and Virginia, 1986-1991

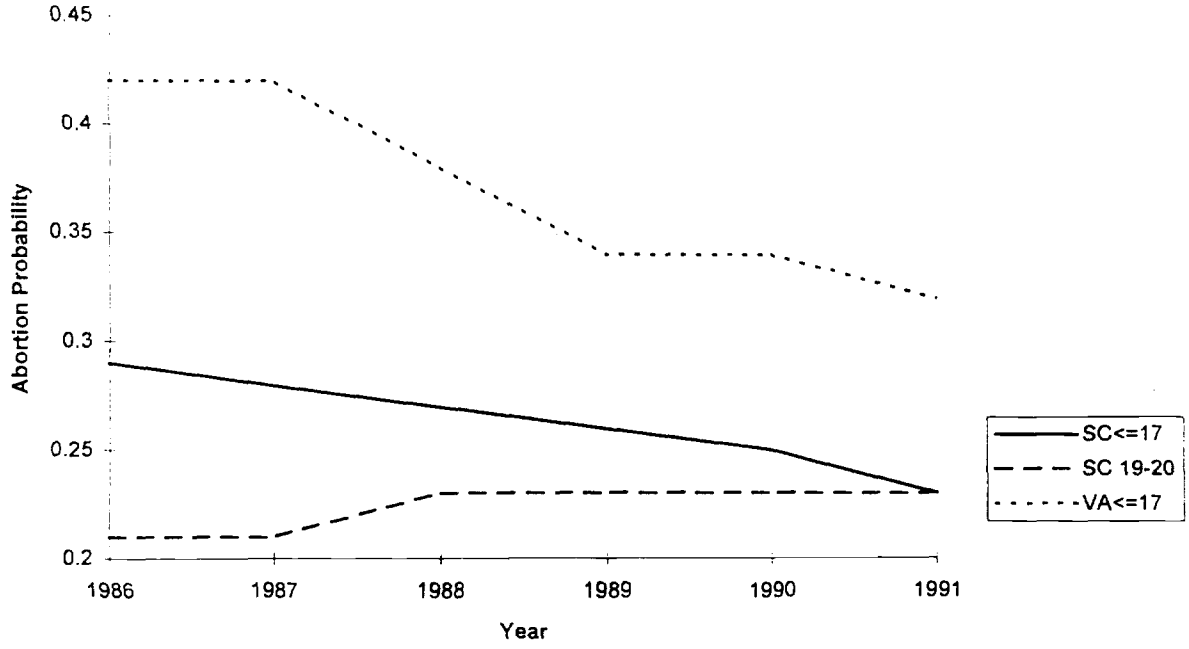


Figure A11
Annual Abortion Probability by Year for Married and Unmarried Non-Black Minors and Two Control Groups in Tennessee and Virginia, 1986-1991

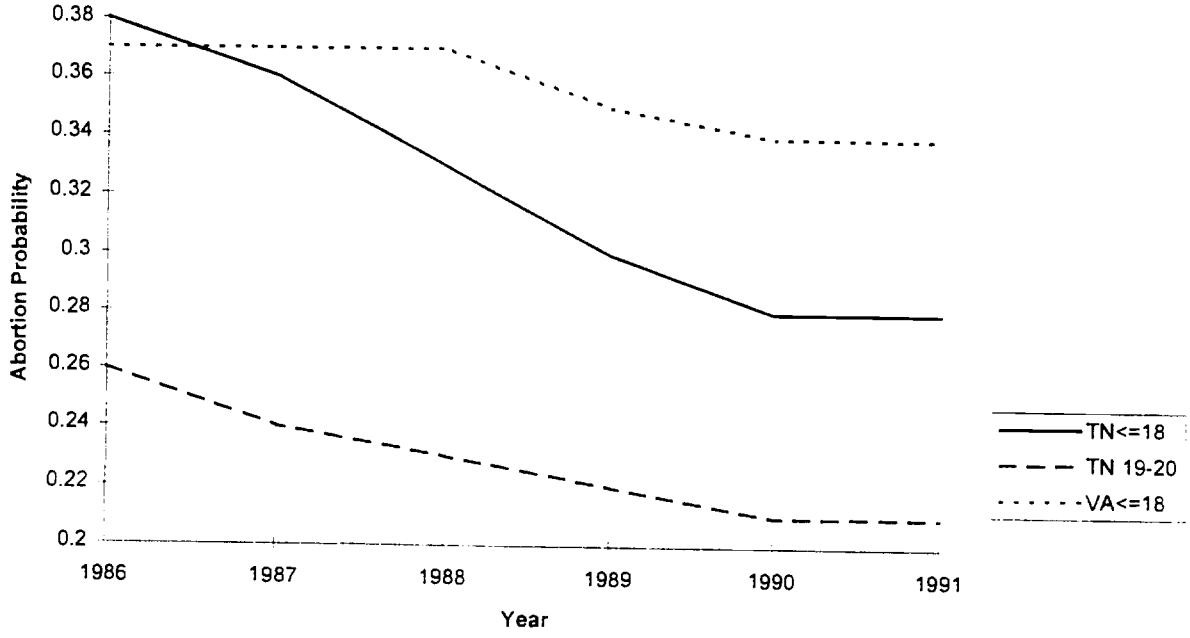
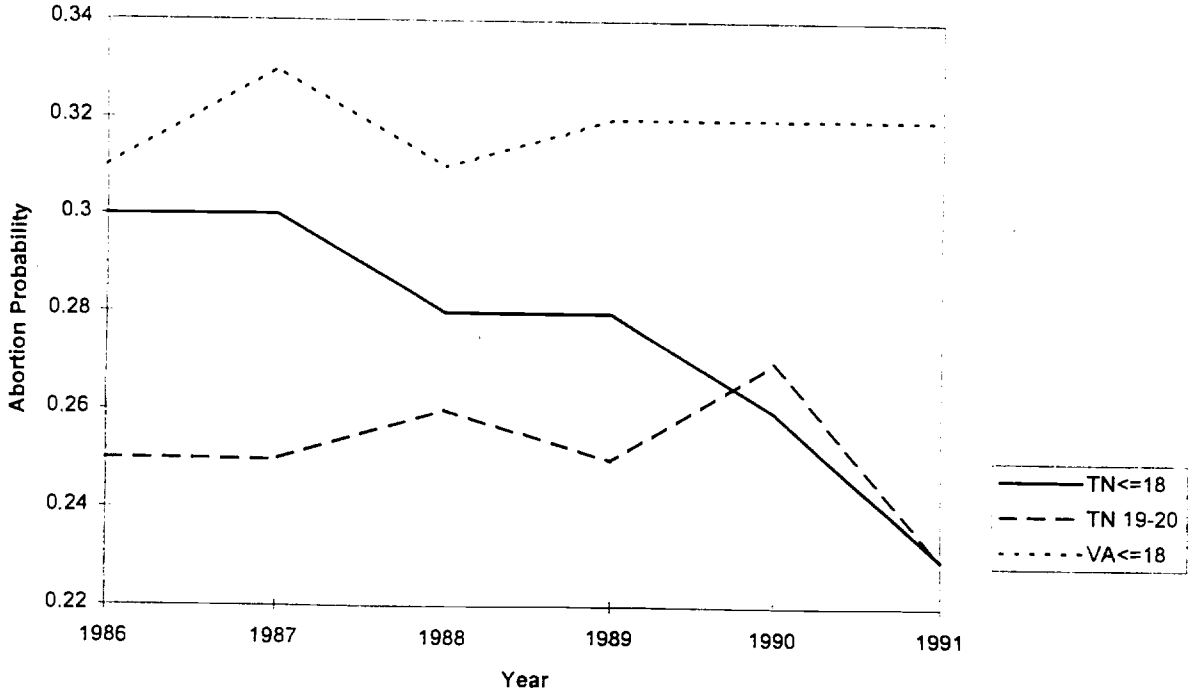


Figure A12
Annual Abortion Probability by Year for Married and Unmarried Black Minors and Two Control Groups in Tennessee and Virginia, 1986-1991



Appendix Table A1

Means and Proportions for South Carolina, Tennessee and Virginia,
Before and After Changes in Parental Involvement Laws, Non-Blacks, July 1988-April 1991

	Parental Involvement Law					
	Before	After	Before	After	Before	After
Individual Characteristics	**South Carolina**		**Tennessee**		**Virginia**	
Abort	0.551	0.481	0.466	0.433	0.599	0.561
Age 14	0.018	0.018	0.019	0.021	0.018	0.016
Age 15	0.043	0.050	0.050	0.048	0.040	0.040
Age 16	0.106	0.098	0.104	0.104	0.099	0.092
Age 17	0.175	0.167	0.158	0.148	0.158	0.144
Age 18	0.234	0.212	0.237	0.208	0.231	0.219
Ages 19-20	0.228	0.234	0.228	0.240	0.239	0.248
Less high school	0.493	0.523	0.508	0.528	0.430	0.423
High school	0.342	0.326	0.346	0.316	0.390	0.393
Some college	0.148	0.131	0.122	0.124	0.146	0.145
College	0.003	0.005	0.008	0.005	0.002	0.002
Schooling unknown	0.013	0.016	0.017	0.027	0.032	0.037
Parity	0.135	0.168	0.166	0.185	0.136	0.151
State Policies						
Medicaid 101-150%	0.000	0.000	0.000	0.886	0.000	0.587
Medicaid 151-185%	0.340	1.000	0.000	0.000	0.000	0.000
County Characteristics[a]						
Family income ($)	28763	28734	29943	29936	40287	40532
Unemployment rate	5.435	6.236	5.630	5.679	4.019	4.564
M.D./pop	0.101	0.098	0.186	0.191	0.195	0.199
Hospital beds/pop	0.305	0.293	0.515	0.506	0.362	0.353
Newborn bassinets/pop	0.029	0.029	0.032	0.031	0.025	0.025
Pop/sq. mile	1.301	1.272	4.151	4.018	12.784	12.352
Distance = 0 mi.	0.130	0.189	0.451	0.433	0.320	0.314
Distance = 1 -40	0.255	0.406	0.222	0.233	0.451	0.449
Distance = 41-60	0.398	0.401	0.154	0.158	0.155	0.162
Distance = 60 +	0.216	0.003	0.172	0.176	0.074	0.075
N	8485	5218	8212	13236	10449	19010

[a] County characteristics are unweighted--Hospital beds, newborn bassinets and M.D.'s are per 100 population.

Appendix Table A2

Means and Proportions for South Carolina, Tennessee and Virginia,
Before and After Changes in Parental Involvement Laws, Blacks, July 1988-April 1991

	Parental Involvement Law					
	Before	After	Before	After	Before	After
Individual Characteristics	**South Carolina**		**Tennessee**		**Virginia**	
Abort	0.254	0.242	0.281	0.276	0.350	0.348
Age 14	0.037	0.035	0.042	0.038	0.040	0.035
Age 15	0.063	0.060	0.071	0.065	0.056	0.059
Age 16	0.112	0.108	0.111	0.104	0.105	0.097
Age 17	0.152	0.148	0.147	0.147	0.148	0.136
Age 18	0.205	0.194	0.208	0.192	0.209	0.198
Ages 19-20	0.223	0.225	0.210	0.226	0.225	0.239
Less high school	0.525	0.540	0.528	0.520	0.515	0.494
High school	0.372	0.350	0.365	0.350	0.374	0.384
Some college	0.093	0.098	0.077	0.091	0.092	0.103
College	0.002	0.003	0.006	0.002	0.000	0.001
Schooling unknown	0.008	0.009	0.024	0.037	0.019	0.018
Parity	0.422	0.459	0.488	0.531	0.385	0.432
State Policies						
Medicaid 101-150%	0.000	0.000	0.000	0.881	0.000	0.588
Medicaid 151-185%	0.332	1.000	0.000	0.000	0.000	0.000
County Characteristics[a]						
Family income ($)	28085	28003	32023	32023	35814	35988
Unemployment rate	5.539	6.306	4.828	4.806	4.619	5.056
M.D./pop	0.113	0.111	0.266	0.277	0.246	0.254
Hospital beds/pop	0.318	0.309	0.636	0.642	0.532	0.514
Newborn bassinets/pop	0.028	0.027	0.032	0.032	0.034	0.034
Pop/sq. mile	1.283	1.279	7.974	7.986	17.196	17.282
Distance = 0 mi.	0.145	0.193	0.793	0.790	0.478	0.467
Distance = 1 -40	0.222	0.396	0.047	0.048	0.341	0.352
Distance = 41-60	0.461	0.431	0.063	0.063	0.149	0.149
Distance = 60 +	0.172	0.007	0.096	0.098	0.033	0.032
N	12362	8597	7280	11648	8672	16117

[a] County characteristics are unweighted--Hospital beds, newborn bassinets and M.D.'s are per 100 population.

Appendix Table A3

OLS Estimates of Abortion Probability for Non-Blacks and Blacks in South Carolina, Tennessee and Virginia

	Non-Blacks		Blacks	
	Coefficient	t-stat.	Coefficient	t-stat.
Constant	0.129	5.935	-0.163	-7.031
Age < = 14	0.398	11.731	0.295	12.349
Age 15	0.332	14.419	0.254	12.219
Age 16	0.339	21.490	0.217	13.543
Age 17	0.295	22.640	0.200	14.333
Age 18	0.157	13.912	0.137	11.325
South Carolina	0.074	6.219	-0.009	-0.880
Tennessee	-0.048	-4.527	-0.051	-4.724
PN_law	0.000	0.005	0.026	2.646
PN_law x 14	-0.041	-0.956	-0.028	0.924
PN_law x 15	0.017	0.598	-0.063	-2.419
PN_law x 16	-0.013	-0.648	-0.025	-1.228
PN_law x 17	-0.045	-2.590	-0.056	-3.036
PN_law x 18	-0.041	-2.657	-0.050	-2.998
PN_SC	-0.024	-1.338	-0.033	-2.147
PN_TN	0.023	1.842	0.000	0.027
SC_state x 14	-0.094	-1.868	0.008	2.263
SC_state x 15	-0.090	-2.635	-0.014	-0.527
SC_state x 16	-0.043	-1.825	0.013	0.618
SC_state x 17	-0.053	-2.643	-0.035	-1.898
SC_state x 18	-0.062	-3.397	-0.060	-3.608
TN_state x 14	-0.070	-1.421	-0.002	-0.069
TN_state x 15	-0.022	-0.687	-0.076	-2.649
TN_state x 16	-0.022	-0.974	0.009	0.384
TN_state x 17	-0.079	-4.061	-0.038	-1.852
TN_state x 18	-0.012	-0.691	-0.022	-1.231
PN_law x SC_state x 14	0.099	1.324	-0.059	-1.275
PN_law x SC_state x 15	-0.012	-0.240	0.032	0.827
PN_law x SC_state x 16	-0.108	-2.917	-0.038	-1.228

Appendix Table A3

OLS Estimates of Abortion Probability for Non-Blacks and Blacks in South Carolina, Tennessee and Virginia

	Non-Blacks		Blacks	
	Coefficient	t-stat.	Coefficient	t-stat.
Constant	0.129	5.935	-0.163	-7.031
Age < = 14	0.398	11.731	0.295	12.349
Age 15	0.332	14.419	0.254	12.219
Age 16	0.339	21.490	0.217	13.543
Age 17	0.295	22.640	0.200	14.333
Age 18	0.157	13.912	0.137	11.325
South Carolina	0.074	6.219	-0.009	-0.880
Tennessee	-0.048	-4.527	-0.051	-4.724
PN_law	0.000	0.005	0.026	2.646
PN_law x 14	-0.041	-0.956	-0.028	0.924
PN_law x 15	0.017	0.598	-0.063	-2.419
PN_law x 16	-0.013	-0.648	-0.025	-1.228
PN_law x 17	-0.045	-2.590	-0.056	-3.036
PN_law x 18	-0.041	-2.657	-0.050	-2.998
PN_SC	-0.024	-1.338	-0.033	-2.147
PN_TN	0.023	1.842	0.000	0.027
SC_state x 14	-0.094	-1.868	0.008	2.263
SC_state x 15	-0.090	-2.635	-0.014	-0.527
SC_state x 16	-0.043	-1.825	0.013	0.618
SC_state x 17	-0.053	-2.643	-0.035	-1.898
SC_state x 18	-0.062	-3.397	-0.060	-3.608
TN_state x 14	-0.070	-1.421	-0.002	-0.069
TN_state x 15	-0.022	-0.687	-0.076	-2.649
TN_state x 16	-0.022	-0.974	0.009	0.384
TN_state x 17	-0.079	-4.061	-0.038	-1.852
TN_state x 18	-0.012	-0.691	-0.022	-1.231
PN_law x SC_state x 14	0.099	1.324	-0.059	-1.275
PN_law x SC_state x 15	-0.012	-0.240	0.032	0.827
PN_law x SC_state x 16	-0.108	-2.917	-0.038	-1.228