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Variation in Pill Use: Do Abortion Laws Matter?

by

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Abstract

Economists have studied the impact of legalized abortion on a variety of factors including women's decision surrounding when to enter the work force and how many hours to work, schooling and most controversially crime. They have also examined the determinants of state abortion restrictions across the United States, considering the strength of interest advocacy groups and demographic characteristics. Notably absent from the existing literature is a study of the impact of legalized abortion on the use of contraceptives. Earlier work has established that states with more lenient laws regarding access to contraceptive services by minors have greater pill use, but the impact of the legal framework surrounding abortion restrictions has not been examined. This paper explores the possibility that variation in state abortion availability, as proxied by legislation pertaining to women's reproductive rights (particularly either supporting or restricting access to abortions) across the United States may generate variation in the use of birth control pills. Without the option of terminating a pregnancy, one would expect that oral contraceptives would be more widely utilized. We find restrictions on abortion availability (through abortion legislation mandating parental consent or notification) induce women to seek a reliable form of birth control to avoid unwanted pregnancies, while pro-choice sentiments in the legislature may have the opposite effect. We also consider the effect of sex education on the rate of oral contraceptive use within states.

Our paper uses US state level data to determine if there is a significant link between abortion availability and contraceptive use. We examine the period after 1973 when the US Supreme Court ruled that a woman has a constitutional right to an abortion to the present, drawing on census data from 2000. These data include an array of state level demographics (poverty, fertility rates, religion, race, marriage rates, urban population, etc.), as well as data describing particular characteristics of state-level abortion legislation. Interestingly, our findings have broader implications for economists' understanding of individual decision making—the significance of this link sheds light on how forward thinking individuals are when making decisions. In many instances, public health policy aims to incentivize individuals to make decisions or adopt behaviors with longer term health consequences (prenatal care, smoking cessation, weight loss programs). As such, this is particularly relevant in the context of public health policymaking.

1. Introduction

“When the history of the 20th century is written, it may be seen as the first when men and women were truly partners. Wonderful things can come in small packets.”

The Economist, 1993

naming the birth control pill one of the Seven Wonders of the Modern World.

May 2010 marked the 50th anniversary of the approval of the pill by the US Food and Drug Administration. The approval was seen as a remarkable innovation and predictions abounded of the transformative impact of oral contraception. As stated by John Rock, one of the pioneering clinical researchers of the pill, in the years leading up to the discovery, “If [an oral contraceptive] could be discovered soon, the H-bomb need never fall ... [It would be] the greatest aid ever discovered to the happiness and security of individual families – indeed to mankind. ... The greatest menace to world peace and decent standards of life today is not atomic energy but sexual energy.” (May, 2010, p.1)

Though welcomed with tremendous expectations, the advent of the pill was marked by controversy as well. Fifty years hence, while the pill is no longer considered controversial, reproductive rights in the United States are still an issue of great moral debate, political positioning and emotional argument. This is particularly true in the context of abortion. The issue has risen in importance to now comprise a plank in the GOP Platform. The 2008 Republican Platform includes “Maintaining the Sanctity and Dignity of Human Life” which they describe in part by stating, “We oppose using public revenues to promote or perform abortion and will not fund organizations which advocate it.” (RNC website, 2008)

Over the past 50 years the legislation surrounding birth control and abortion has evolved significantly. Marriage is no longer a prerequisite for obtaining oral contraception, and abortion was made uniformly legal throughout the US with the 1973 *Roe v. Wade* U.S. Supreme Court decision. At the same time, abortion legislation differs greatly across the US and the effective availability of the procedure varies extensively from state to state. The legal and ethical questions surrounding abortion continue to make it one of the most contested issues in U.S. society, law and politics.

The consequences of this patchwork of state abortion legislation are the focus of this paper. Economists have studied the impact of legalized abortion on a variety of factors including women’s decision surrounding when to enter the work force and how many hours to work, schooling, teenage pregnancy and most controversially crime. They have also examined the determinants of state abortion restrictions across the United States, considering the strength of interest advocacy groups, percent of female state legislators and demographic characteristics. Notably absent from the existing literature is a study of the impact of legalized abortion on the use of contraceptives. Earlier work has established that states with more lenient laws regarding access to contraceptive services by minors have greater pill use (Levine, 2007), but the impact of the legal framework surrounding abortion restrictions has not been examined. This paper explores the possibility that variation in state abortion availability across the United States may generate variation in the use of birth control pills. Presumably restrictions on abortion availability may induce women to seek a reliable form of

birth control to avoid unwanted pregnancies. Without the option of terminating a pregnancy, one would expect that oral contraceptives would be more widely utilized.

The differences in abortion legislation across states provide an interesting opportunity to explore the implications of these laws on contraceptive use. This paper seeks to examine the consequences of these laws on women's choices and family planning decision making. Given the weighty issues at play and the implications for women's reproductive freedom, it is important to recognize the implications of these laws and the impact they may have on contraceptive choices. . While the results of this study are suggestive of important role abortion legislation plays in contraceptive decisions, current data restrictions and the use of state level observations obviously limit the conclusions we can take from this analysis. Nonetheless, the preliminary evidence is interesting and calls for further study.

Section 2 maps out the specific questions examined here. Section 3 reviews the theory and literature surrounding contraceptive use. Section 4 describes the methodology and the data used in the study. This is followed by a discussion of the Results and Policy implications, in Sections 5 and 6. Finally, Section 7 outlines future work and Section 8 concludes.

2. Hypothesis

The key question is: Do abortion laws and sex education legislation affect the use of oral contraception? If women are forward looking when deciding whether or not to use the pill, they will consider the ease or difficulty of terminating a possible unwanted pregnancy. We hypothesize that more stringent abortion legislation (i.e. more costly to the woman) will positively affect her decision to use the pill. In addition, sex education legislation may affect the utilization of oral contraceptives. When contraception is covered or stressed in the classroom pill use will become less costly in terms of social stigma and will increase. Teaching abstinence, on the other hand, will likely have the opposite effect.

3. Theory & Literature Review

Economists have studied the impact of legalized abortion on a variety of factors including women's decision surrounding when to enter the work force and how many hours to work, schooling, teenage pregnancy and most controversially crime. They have also examined the determinants of state abortion restrictions across the United States, considering the strength of interest advocacy groups, percent of female state legislators and demographic characteristics. Notably absent from the existing literature is a study of the impact of legalized abortion on the use of contraceptives. Earlier work has established that states with more lenient laws regarding access to contraceptive services by minors have greater pill use, but the impact of the legal framework surrounding abortion restrictions has not been examined. This paper explores the possibility that variation in state abortion availability across the United States may generate variation in the use of birth control pills. Presumably restrictions on abortion availability may induce women to seek a reliable form of birth control to avoid unwanted pregnancies. Without the option of terminating a pregnancy, one would expect that oral contraceptives would be more widely utilized.

Age: A woman's age plays a key role in her birth control decisions. Studies have found that women in their twenties, and particularly those in their early twenties and as young as 18 are the most likely to use oral contraception (Culwell & Fineglass, 2007; Everett, et. al, 2000; Jones, Darroch, Henshaw "Contraceptive" 2002; Mosher, Martinez, et.al., 2004). Between 1982 and 1988, Pill usage among women 20-34 years old significantly increased (Mosher, 1990). Additionally, women ages 35-44 were significantly less likely than women ages 18-24 to report switching contraceptive methods (Jones, Singh, Finer, 2007).

Education: Educational attainment may also affect a woman's decision to use oral contraception. Women with educational level below a high school diploma were more likely to be inconsistent pill users (Jones, Darroch, Henshaw "Contraceptive" 2002) and are significantly more likely to use emergency contraceptives (Whittaker, 2007). Furthermore, women with less than a bachelor's degree were significantly less likely to use the Pill (Frost & Darroch, 2008). In 2002, 11% of women using contraception without a high school degree used the pill, while 42% of those with a 4-year college did (Mosher, Martinez, et.al. 2004). Moreover, being a student (particularly in higher education) is an indicator of future income and opportunity cost and will make a woman less likely to want a child. Student status has two competing affects in terms of contraception use. First, adolescent women were significantly less likely to have frequent sexual activity if they expected to attain a college degree by age 30 (Sen, 2006). Sexually active adolescent women were significantly more likely to use contraceptives frequently if they expected to attain a college degree by age 30 (Sen, 2006). The former effect makes current students less likely to use the pill while the latter effect makes them more likely to use oral contraceptives.

Whether or not a woman can afford a child and the opportunity cost associated with having and looking after a child both matter to contraception decisions. If a child is too expensive for a woman then she will be more likely to use contraception in order to avoid pregnancy. Likewise, if the opportunity cost of having a child is high a woman will also be more likely to use contraception and avoid having a child.

Marriage & Divorce: A woman's marital status is often key to whether or not she can afford a child. In a survey, 42% of women who responded that they could not afford a child said it was because they were not married (Finer et al., 2005). Similarly, sexually active unmarried women are significantly more likely to use prescription contraceptives (Culwell & Fineglass, 2007). Moreover, pill usage among never-married white, non-Hispanic women significantly increased between 1982 and 1988 (Mosher, 1990).

Female Unemployment: The opportunity cost of having a child depends on the value of the alternative uses of the woman's time. If the alternative use of time is gainful employment then the opportunity cost of having a child is larger and she will be more likely to engage in contraception during sexual activity. Employment or labor force status matters to the pill use decision because employed women have a higher opportunity cost associated with child bearing. Sexually active employed women were significantly more likely to be using prescription contraceptives (Culwell & Fineglass, 2007).

Female Income: A woman's income can potentially affect her decision to use oral contraception in three ways. First, higher levels of income mean she can afford this method of birth control, and if the pill is a normal good then more income will lead to a greater likelihood of pill use. In a survey on women obtaining abortions, 12% of contraceptive nonusers reported having problems with

access to contraceptives, including financial barriers (Jones, Darroch, Henshaw "Contraceptive" 2002; Sable & Libbus, 1998). Additionally, lower-income women have above-average rates for unintended pregnancy which may be evidence that they cannot afford suitable methods of birth control (Jones, 2008). Second, if she is earning this income it represents part of her opportunity cost of having a child. In this case, higher income translates into a higher cost of child bearing and means she will be less likely to want children, hence more likely to use birth control. Third, if she has a higher income she can better afford to bear and rear a child. So if children are normal goods a higher income could lead to less use of birth control. Which effect is the largest and the direction of the overall effect therefore becomes an empirical question. Interestingly, the last effect seems to be strongest among poor teenage girls yet weaker for women as a whole. Teen girls living below the poverty level are more likely to use some form of contraception frequently ($p < .1$) (Sen, 2006). All women living below 250% of the national poverty level are significantly less likely to use the Pill (Frost & Darroch, 2008).

Religion & Politics: Because abortion is such a contentious issue, a woman's religious affiliation and political views are likely to contribute to shaping her contraceptive decisions. It makes sense that if a woman sees abortion as a viable solution to an unwanted pregnancy she may be less careful about birth control when engaging in sexual activity. On the other hand if she does not consider terminating a pregnancy to be an option then she may be more careful not to get pregnant. Unmarried sexually active teenagers belonging to religious groups that condemn abortion are significantly more likely to use contraceptives (Sen, 2006). Women with more conservative views and women that are affiliated with churches that disprove of abortion may be more likely to use contraception. The effect of religious affiliation will be contingent on both religiosity and the particular beliefs of the religion. If a woman is more religious her views will be more in line with the church's and it will have a greater influence on her decision. Also, the church's stance on contraception will matter. Surprisingly, Gober (1994) found that the percent of Roman Catholics in a state actually has a positive impact on the abortion rate, while Mormons Jehovah's Witnesses and Conservative Protestants are more likely to be pro-life (Gay & Lynxwiler, 1999). *Democrat* is used to control for the proportion of the state's population that vote democrat. Two conflicting impacts are anticipated here: Democrats may have more liberal views on sexual activity, especially for unmarried women, but they may also be more likely to consider abortion acceptable. Again, the predicted sign is ambiguous and left as an empirical question.

Race & Ethnicity: Research has found that both race and ethnicity play a role in shaping a woman's attitudes about abortion and consequently affect her choice to use oral contraception. First of all, being black has a negative effect on pill usage. The proportion of black women using some contraceptive method increased between 1982 and 1988 (Mosher, 1990). Yet African American women are still significantly less likely than white women to use prescription contraceptives (Culwell & Fineglass, 2007; Frost & Darroch, 2008). Also, Asian women are significantly less likely than white women to use prescription contraceptives (Culwell & Fineglass, 2007; Frost & Darroch, 2008). And both African American and Hispanic women have a greater chance of inconsistent pill use (Lichter, McLaughlin, Ribar, 1998; Jones, Singh, Finer, 2007). In addition, studies by Meier, et al. (1996) and Gober (1994) find that the percent of African Americans in a state had a significant positive impact on the abortion rate.

Domicile: Whether a woman lives in a rural or urban area statistically affects her decision to use the pill. Adolescent women are more likely to have frequent sexual activity if they lived in an urban area and sexually active adolescent girls living in urban areas are less likely to use contraceptives

frequently (Sen, 2006). And the fact that abortions are less taboo in urban areas exacerbates this negative effect on birth control use. People living in urban areas are more likely to be pro-choice and more likely to obtain abortions (Walzer, 1994; Gay & Lynxwiler, 1999; Gober, 1994).

Abortion Restrictions: Finally, this study seeks to establish whether legal restrictions, in the form of abortion legislation, impact a woman's decision to utilize oral contraception. This is an important gap in the literature on abortion legislation. Earlier studies have established the link between legal restrictions on abortions (parental involvement laws and mandatory delay) and abortion demand. For a comprehensive review of such studies, please see Levine (2007). These studies show that there is virtually no evidence of an increase in births when abortion access is restricted by such legislation (Levine, 2007), which suggests that contraceptive use may indeed change. Existing work has established that states with more lenient laws regarding access to contraceptive services by minors have greater pill use, but the impact of the legal framework surrounding abortion restrictions has not been examined. This paper explores the possibility that variation in state abortion availability (as influenced by legislation on notification and/or consent) across the United States may generate variation in the use of birth control pills. Presumably restrictions on abortion availability may induce women to seek a reliable form of birth control to avoid unwanted pregnancies. Without the option of terminating a pregnancy, one would expect that oral contraceptives would be more widely utilized. In sum, this study hopes to consider the impact of state-specific legal environments on women's contraceptive decisions.

Time Trend: It is also important to acknowledge that trends are changing over time. Mosher, Martinez, et.al. (2004) note that the share of women who are sexually active and not using contraception has increased from 5.4% to 7.4% between 1995 and 2002. The increase is present in the female population between 15 and 44 and could raise the rate of unintended pregnancy. This trend is particularly important in the context of restrictions on abortions. Another trend noted over time is an increased reliance on condoms between 1982 and 1995, and a corresponding decrease in the use of the pill and the diaphragm, stemming from an increased concern over HIV/AIDS and other STDs. (Piccinino & Mosher, 1998)

4. Methodology & Data

Due to current data restrictions the analysis that follows uses state level observations. The obvious drawback to this is that causation in an individual decision making model does not immediately follow from any state level correlations identified in this analysis. It does however provide preliminary evidence that abortion legislation may affect contraceptive decisions, which calls for further study of this effect.

In order to isolate the effects of particular types of public support or legislation pertaining to abortions and women's reproductive rights we control for state level demographic variation using the following regression equation.

$$PPillUse = \alpha + \beta\Gamma + \delta X + \varepsilon ,$$

where $PPillUse$, the proportion of women in the state reporting the use of oral contraception, depends on Γ , a vector of variables characterizing the state legal environment and/or public

support women face when considering abortion, and X , a vector of demographic variables controlling for the average characteristics of both the female and total populations in the state. The proportion of women using the pill comes from the Behavioral Risk Factor Surveillance System (2002) and the demographic controls come from the Census Bureau (2000).

Another limitation of the state level analysis is that there are only 51 observations and they are averages. This means that the results of our regressions will often be insignificant. In order to pick up the affects of particular abortion policies in such a small sample we first consider the pertinent legislation in categories and then end the analysis with a comprehensive regression including all the legislative variables. The three categories of legislative variables considered are: (1) the sentiment of the state legislature toward and public support of abortion and women's reproductive rights; (2) legislation restricting the access to abortion of minors; and (3) sexual education legislation. Finally, time is not factored into this analysis because our data is a cross section. We only had access to the proportion of women using the pill in 2002. Accordingly, the regressions that follow only explain a snapshot of variation in female pill use.

There are four variables used to measure public support of women's reproductive rights, which are collected by NARAL Pro-Choice America. These variables quantify the legislative and judicial sentiments toward abortion and female reproductive rights in each state and identify the degree of public support for abortions (with both facility use and funding). *Pro-Choice Declaration* indicates if a state has legislative declarations supporting the right of women to choose abortion in 2002—the dummy variable equals one if this is the case and is zero otherwise. The variable *Non-Exclusion* quantifies the state's judicial stance on abortion. It equal one if state courts have ruled that their state constitutions prohibit the exclusion of medically necessary abortions from medical assistance programs in 2002, and is zero otherwise. This means that the courts have ruled there must be aid for medically necessary abortions. We would expect there to be less oral contraceptive use in states with pro-choice declarations and non-exclusion. If women know they have the support of their state government and courts when it comes to choosing (or having) to terminate a pregnancy it will be less critical to ensure they do not conceive and the benefits of oral contraception will be less. *Public Funding* and *Public Facilities* both measure the public support women will receive during the abortion process. *Public Funding* equals one if public funding for abortions is available under all or most circumstances and is zero otherwise. Some states limit the availability of public funds for abortions that threaten the life of the mother, or are a product of rape or incest. Similarly, some states prohibit the use of some public facilities for abortions. The variable *Public Facilities* equals one if the state has no such prohibitions in 2002, and is zero otherwise. We would expect both *Public Funding* and *Public Facilities* to have a negative effect on pill use, since these are both forms of public support for terminating unwanted pregnancies. This support will make abortions easier to obtain and pill use will wane.

The next category of legislative variables we consider focuses on the reproductive rights of minors. Specifically, these three dummy variables identify how difficult it is for minors to access abortions. Specifically, can they obtain abortions without parental involvement? There are two degrees of parental involvement that we measure, parental notification and consent. We expect that each of these requirements will increase the use of oral contraception among minors. If young women have to notify or obtain the consent of parents before they can obtain an abortion they are likely to be more careful not to get pregnant and perhaps use the pill. Both variables are interacted with the documented enforcement of these laws. That is, *Consent Required* is one if there is a law requiring that at least one parent consent to a minor's abortion in writing and this law is enforced in the state,

it is zero otherwise. *Notification Required* is defined the same way but indicates that at least one parent must be notified of the procedure beforehand.

Finally, we test whether sex education in public schools has an effect on the use of oral contraception. We consider variables indicating whether or not there is a law requiring that abstinence be covered or stressed in schools. *Covering/Stressing Abstinence* is equal to one if there is a law mandating that schools cover or stress abstinence as part of their sex education curriculum and is zero if there is no such law. These sex education variables are provided by the Alan Guttmacher Institute (2002). The table below summarizes all the legislative variables, as well as the state demographic variables used as controls.

Table 1. Summary Statistics for State Level Variables

Variable	Mean	Standard Deviation
Pill Usage [†]	33.39	4.98
<i>State Reproductive Rights and Abortion Legislation</i>		
<i>Public Support</i>		
Pro-Choice Declaration [†]	0.12	0.33
Non-Exclusion [†]	0.29	0.46
Public Funding [†]	0.31	0.47
Public Facilities [†]	0.82	0.39
<i>Minors' Rights</i>		
Notification Required [†]	0.29	0.46
Consent Required [†]	0.35	0.48
<i>Sex Education</i>		
Covering Abstinence [†]	0.16	0.37
Stressing Abstinence [†]	0.54	0.50
<i>State Demographic Controls (percentages)</i>		
Divorce Rate	4.28	1.23
Marriage Rate	9.93	9.95
Rural	27.75	15.28
Proportion Age 18-24	9.81	1.04
Female income [‡]	19492	2592
High School Diploma	82.26	4.41
Bachelors Degree	22.75	4.50
Advanced Degree	8.63	2.68
Unemployment Rate	3.93	0.97
Female Unemployment Rate	3.95	0.96
Black	11.44	11.89
Hispanic	7.79	8.83
Asian	3.65	8.04
Catholic	19.78	12.33
Democrat	45.97	10.13

[†] and [‡] indicate the data is from 2002 and 1980, respectively. All other data is from the 2000 census.

Twelve percent of the state legislatures have pro-choice declarations, approximately one third provide funding for abortions in all or most circumstances and only 18% prohibit abortions in certain public facilities. Almost two thirds of the states have some sort of parental involvement law, either notification or consent. In addition, over half of the states stress abstinence.

5. Results

Education and Income are measures of both a woman's ability to afford oral contraceptives as well as her opportunity cost of having a child and they are likely highly correlated. Because of this correlation we run all our regressions with each of the measures individually and then together since the set of effects on pill use picked up by each variable is neither identical nor mutually exclusive.

Table 2. The Determinants of State Level Pill Use—Baseline Specification

	Income and Education	Education	Income
Marriage Rate	0.08 (0.75)	0.08 (0.08)	0.08 (0.07)
Rural	-0.07 (0.10)	-0.01 (0.08)	-0.03 (0.10)
Proportion Age 18-24	1.95** (0.81)	2.36*** (0.72)	1.82** (0.82)
Female income	-0.001 (0.00)	--- ---	-0.001 (0.00)
High School Diploma	0.07 (0.36)	-0.03 (0.35)	--- ---
Bachelors Degree	0.92* (0.54)	0.90* (0.54)	--- ---
Advanced Degree	-2.10** (0.92)	-2.47** (0.92)	--- ---
Unemployment Rate	2.57 (2.49)	1.84 (2.40)	1.89 (2.51)
Female Unemployment	-2.87 (2.70)	-2.47 (2.68)	-2.56 (2.64)
Black	0.06 (0.12)	0.06 (0.12)	0.01 (0.09)
Hispanic	-0.07 (0.12)	-0.03 (0.12)	-0.10 (0.11)
Asian	0.03 (0.11)	0.02 (0.11)	0.13 (0.10)
Catholic	-0.03 (0.08)	-0.04 (0.08)	0.01 (0.08)
Democrat	0.16 (0.15)	0.21 (0.16)	-0.02 (0.12)
Constant	11.27 (31.06)	3.37 (30.27)	27.80 (19.18)

Adjusted R-squared	0.1539	0.1497	0.0923
Observations ¹	51	51	51

Standard errors are in parentheses below the estimated coefficients. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Before looking at each set of legislative variables we considered that baseline case for determining state level oral contraceptive use. Table 2 (above) summarizes the effects of the state level demographic variables on the proportion of women in that state using oral contraception. In these results there are no state level legislative variables included.

Table 2 reports the results of three separate regressions, the first includes both female income and education as independent variables, the second omits income and the last omits education. Though very few of the variables in these regressions are statistically significant, due to the small sample size, the majority of them have the expected signs. This indicates that they are theoretically controlling for the effects we would expect. There are three variables that are significant, and each of these are statistically significantly different from zero in the expected direction. First, the proportion of women between the ages of 18 and 24 has a significantly positive effect on pill use. This effect is consistent with prior research and makes sense because many women in this age bracket are not yet starting their families so they use reliable birth control. Two of the education variables have significant effects on pill use. A larger proportion of women in the state holding a bachelor's degree affects pill use positively. When women have more education there is a larger opportunity cost to having a child and pill use is more prevalent. Interestingly, the proportion of women holding advanced degrees is significantly negative, meaning that more women with advanced degrees reduces the use of the pill in a state. This indicates that the education variable may have a threshold over which the opportunity cost of having a child is not the driving factor in pill use decisions. Women that hold advanced degrees may have more disposable income, making them more able to afford a child. Also, women in the category have likely finished their education and may be a stage in their life where they are starting a family. The effects of the states laws on women's reproductive rights are explored in the following three subsections.

5.1 Public Support

Theoretically, public support of women's reproductive rights should negatively affect oral contraceptive use, and we find empirically that this is the case. If women know that obtaining an abortion will be difficult in their state then they will likely spend more money and effort on preventing pregnancy. A lack of public support for abortion or actual obstacles to obtaining them will increase the costs women will face for terminating an unwanted pregnancy. This changes the cost/benefit decision to use birth control and increases women's willingness to pay for contraception. Essentially, more women will use some form of birth control, including the pill.

The following table summarizes the effects of state level public support variables on oral contraceptive use.

¹ This data include all fifty states and the District of Columbia. The divorce rate is omitted because 4 states (CA, IN, LA and OK) do not report divorce rates in 2000. Performing the analysis with the divorce rate, in which there are only 47 observations, does not change the results.

Table 3. The Effects of Public Support on State Level Pill Use

	Income and Education	Education	Income
<i>Public Support</i>			
Pro-Choice Declaration	-8.50*** (2.63)	-8.59*** (2.60)	-6.85** (2.60)
Non-Exclusion	-4.10* (2.12)	-4.36** (2.05)	-4.30* (2.26)
Public Funding	2.07 (2.36)	2.10 (2.33)	1.87 (2.53)
Public Facilities	-1.39 (1.72)	-1.32 (1.70)	-0.83 (1.81)
Constant	-4.04 (28.44)	-7.53 (27.62)	13.58 (18.04)
Adjusted R-squared	0.3528	0.3648	0.2450
Observations	51	51	51

Standard errors are in parentheses below the estimated coefficients. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. The independent variables used in the baseline regression are included as controls.

Support of women’s reproductive rights by both the state legislative and judicial bodies decrease the rate at which women choose to use oral contraception—both *Pro-Choice Declaration* and *Non-Exclusion* have significantly negative effects on pill use. If the state’s legislative body has issued a Pro-Choice Declaration then women in that state are less likely to use the pill. This declaration is a summary of the state legislature’s overall stance on female reproductive rights and abortion. If a state declares they are Pro-Choice then there are likely several laws supporting and even facilitating abortion utilization. This variable has a large and significant negative effect on pill use in all three specifications of our regression. If a state has a Pro-Choice Declaration the proportion of women using the pill is between 6.9 and 8.6 percentage points lower. Given the average proportion of pill users is 33 percent, this is more than a 20 percent decrease in pill use. The sentiments of the state’s judicial branch also matter. If the state’s courts support medically necessary abortions then pill use decreases. The magnitude of the effect of *Non-Exclusion* is half the size of that for *Pro-Choice Declaration*.

The effects of public funding and use of public facilities are statistically insignificant. While a lack of prohibitions against the use of public facilities for abortion takes on the expected sign, the use of public funding to support abortion does not. One would expect that if a state provides public funding of abortion in all or most cases then this would lower the expected cost of an abortion and women would be less likely to use the pill. At the same time, if there are no restrictions on the use of public facilities for providing abortions then abortions become less costly to obtain and state pill use declines.

5.2 Minors’ Access to Abortions

Minor's access to abortions has the predicted effect on pill use. If it is harder for minors to obtain abortions the proportion of women using the pill in that state is higher. That is, if minors have to involve their parents in the process of aborting they are more likely to use the pill to avoid becoming pregnant. Waiting periods for minor, however, do not have a significant effect on state level pill use. The effects of a young woman having to notify or obtain the consent of her parents before having an abortion are in the table below. Again, results were obtained controlling for income and education, independently and jointly.

Table 4. Effects of Restricted Access for Minors on Pill Use by State

	Income and Education	Education	Income
<i>Minor's Access</i>			
Consent Required	4.18* (2.32)	3.84 (2.45)	2.02 (2.17)
Notification Required	4.88** (2.44)	4.49* (2.34)	3.37 (2.14)
Constant	-3.07 (30.97)	-11.533 (30.76)	22.21 (19.46)
Adjusted R-squared	0.2093	0.1888	0.1033
Observations	51	51	51

Standard errors are in parentheses below the estimated coefficients. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. The independent variables used in the baseline regression are included as controls.

Table 4 summarizes the effects of consent and notification legislation for minors on pill use. The effects of enforced consent and notification laws are positive in all three cases, indicating that pill use increases when these laws are in place. The requirement of consent and notification are statistically significant when income and education are controlled for and notification is also significant when income is omitted. The effects of these parental involvement laws are relatively large—having one of these laws on the books and enforced increases the proportion of women using the pill by more than 4 percentage points on average. Given the average proportion of pill users is 33 percent, this is more than a 12 percent increase in pill use. In the first regression the consent law has a larger effect than the notification law. This is not surprising because consent imposes a greater cost than notification. Recall, we have information about whether or not these statutes are enforced, and that information is incorporated into these dummy variables. That is, consent (notification) required is one if one or more parent must give consent (be notified) before the abortion can be performed AND this law is enforce, and is zero otherwise. These effects go away when enforcement of these laws is not considered. Just having the legislation has no statistically significant effect on pill use—not surprisingly, the law must be enforced to matter.

It is interesting to note that earlier studies (Henshaw & Kost, 1992) established that 60 percent of minors who have an abortion report that even without specific parental involvement laws, at least one parent knew about it. Clearly parental involvement in abortion decisions matters to minors, but the effect on pill use is striking when this involvement is codified into law.

5.3 Sex Education

Sex education legislation seems to matter when it comes to pill use. Legislation mandating that public schools cover or stress abstinence during sex education has a negative effect on the state's rate of oral contraceptive use. As shown in Table 5 (below), these effects are large and significant in all three specifications.

Table 5. Effects of Sex Education Legislation on Pill Use by State

	Income and Education	Education	Income
<i>Sex Education</i>			
Abstinence Covered	-6.59** (3.01)	-6.61** (3.01)	-8.07*** (2.60)
Abstinence Stressed	-5.12* (2.64)	-5.05* (2.65)	-6.21*** (2.29)
Constant	19.73 (35.93)	14.02 (35.63)	17.61 (20.86)
Adjusted R-squared	0.2095	0.2053	0.2465
Observations	50	50	50

Standard errors are in parentheses below the estimated coefficients. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. The independent variables used in the baseline regression are included as controls.

This may indicate that covering and stressing abstinence is deterring minors from having sex, but only if the teen birthrate and abortion rate are lower as well.² As cited in McKeon (2006), studies show that between 1991 and 2004 the US teen birth rate dropped significantly, from 62 to 41 per 1,000 teenage girls (Martin et al. 2005; Hamilton et al. 2005) Darroch & Singh (1999) attribute 25 percent of the decline to delayed initiation of sex and the majority, 75 percent, to increased contraceptive use.

Notably, this variable measures only the existence of legislation about sex education and does not account for whether or not these rules are followed. Therefore, it is a mediocre measure of what happens in the classroom. Also, these effects become statistically insignificant when *Pro-Choice Declaration* is included in the regression, indicating these variables are picking up the effect of a general Pro-life or Pro-Choice sentiment in the state rather than any effects stemming from the actual subject matter in the classroom. Interestingly, whether contraception is covered or stressed during sex education has no significant effect on pill use. Including contraception education in the regressions did not change these results, so those variables were omitted.

5.4 Comprehensive Results

² Regression analysis using the same data coupled with state level abortion rates from the Guttmacher Institute indicates that neither contraceptive nor abstinence education significantly affect the state abortion rate.

Finally, we present the analysis for the incidence of pill use when including all of the legislative variables described above. Because of the small sample size there are a lot of insignificant independent variables, yet many of the legislative variable remain significant in this comprehensive specification.³ These results are presented below in Table 6.

Table 6. The Effects of All State Legislation on State Level Pill Use

	Income and Education	Education	Income
<i>Legislative Variables</i>			
<i>Public Support</i>			
Pro-Choice Declaration	-10.1*** (3.04)	-10.13*** (3.04)	-4.78* (2.68)
Non-Exclusion	-3.95* (2.08)	-4.37** (2.05)	-3.48 (2.27)
Public Funding	2.69 (2.51)	2.72 (2.51)	1.34 (0.51)
Public Facilities	2.08 (1.66)	1.96 (1.66)	0.84 (0.47)
<i>Minor's Access</i>			
Consent Required	5.02** (2.32)	4.75** (2.31)	0.97 (2.17)
Notification Required	6.07** (2.22)	5.79** (2.21)	2.36 (2.11)
<i>Sex Education</i>			
Abstinence Covered	0.35 (3.12)	0.26 (3.12)	-5.76** (2.68)
Abstinence Stressed	1.14 (2.75)	1.14 (2.76)	-4.45* (2.35)
<i>Control Variables</i>			
Marriage Rate	0.32*** (0.11)	0.32*** (0.08)	0.08 (0.09)
Rural	0.05 (0.09)	0.10 (0.07)	0.05 (0.09)
Proportion Age 18-24	0.50 (0.95)	0.80 (0.91)	1.58 (0.99)
Female income	-0.0004 (0.00)	---	-0.001 (0.00)
High School Diploma	0.30 (0.35)	0.19 (0.34)	---
Bachelors Degree	1.44** (0.56)	1.43** (0.56)	---
Advanced Degree	-1.66	-1.70*	---

³ DC is not included in this analysis because there is no information about DC's sexual education legislation.

	(1.00)	(1.00)	---
Unemployment Rate	0.70 (2.37)	0.14 (2.31)	0.68 (2.63)
Female Unemployment	0.58 (2.52)	0.86 (2.51)	-0.77 (2.73)
Black	-0.07 (0.11)	-0.08 (0.11)	-0.02 (0.09)
Hispanic	0.09 (0.12)	0.12 (0.11)	0.05 (0.12)
Asian	-0.04 (0.11)	-0.05 (0.11)	0.10 (0.10)
Catholic	-0.08 (0.08)	-0.08 (0.08)	-0.08 (0.09)
Democrat	0.23 (0.15)	0.26* (0.15)	-0.26 (0.16)
Constant	-27.74 (34.76)	-30.76 (34.68)	11.17 (20.55)
Adjusted R-squared	0.4313	0.4297	0.2929
Observations ⁴	50	50	50

Standard errors are in parentheses below the estimated coefficients. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

As noted earlier, this study utilizes state level observations and draws upon data from a single year only, pill usage in 2002. Accordingly, the results presented here are intriguing and suggestive of what a more extensive analysis may reveal. At the same time, it is important to recognize that this is a mere snapshot of the factors on average that influence a woman's decision over pill usage.

The results presented in Table 6 indicate that state level pill use is significantly impacted by several of the public policy and legislative variables included in the analysis. The first two specifications (Income and Education; Education) have greater explanatory power and more of the variables are shown to be significant in these regressions. The results in Table 6 are generally consistent with those presented in the earlier analyses.

Whether a state's legislative or judicial branch has taken a decidedly pro-choice stance is negatively correlated with pill usage. Presumably, a Pro-Choice Declaration is again indicative of a variety of statutes and policies facilitating easier access to abortion. Also, having the courts' support for abortion use when medically necessary (*Non-Exclusion*) reduces pill usage. Given easier access and fewer allowable restrictions, empirical evidence points to less pill use.

In the context of legislation restricting minors' access to abortion, both parental consent and parental notification laws are shown to increase pill usage. States with laws restricting access impose an additional cost on obtaining abortion services and the likely result is greater use of birth control of all forms in order to prevent an unwanted pregnancy.

⁴ This data includes all fifty states. The District of Columbia is omitted because information on Sex Education legislation for DC was unavailable. The divorce rate is omitted because 4 states (CA, IN, LA and OK) do not report divorce rates in 2000. Performing the analysis with the divorce rate, in which there are only 47 observations, does not change the results.

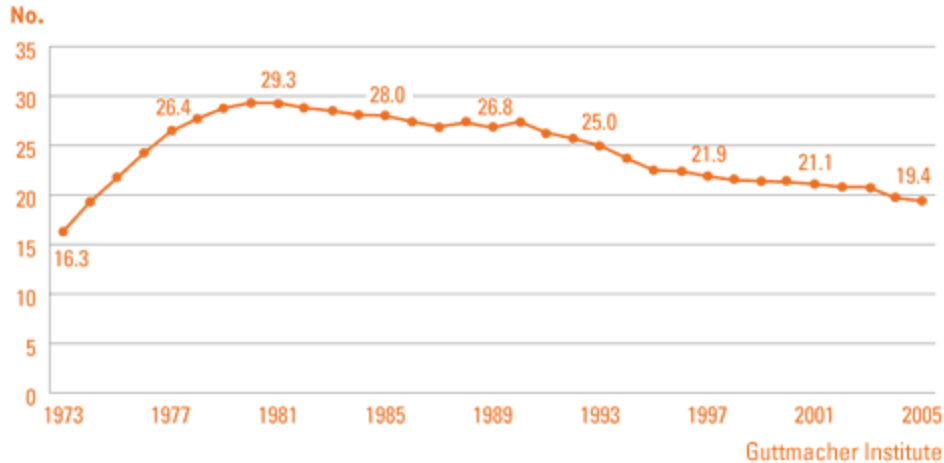
Finally, the demographic characteristics used as controls in this regression are generally insignificant. Some of the education variables are significant and affect pill use in the same way discussed previously. Additionally, *Marriage Rate* has a positive effect on pill use in the first two specifications. That is, as the percentage of a state's population that is married increases so does pill use in that state. This may represent the fact that when women marry they decide on a family size, have the desired number of children and return to a reliable form of birth control in order to space their children and after their family is formed.

6. Policy Implications

When taken in combination with earlier studies, this work has interesting implications for public health in the context of abortion legislation. Earlier work has established that abortion restrictions have no statistically significant effect on a woman's decision to have an abortion (Medoff, 2002). In addition, empirical work (Medoff, 2009) suggests that statutes that restrict abortions impact the unprotected sexual activity of teens, resulting in fewer teen pregnancies. Joint with the results of this study, one can infer that restrictive abortion legislation, while not reducing the number of abortions sought, does encourage greater use of oral contraceptives. This positive result must be weighed against the potentially damaging effects of restrictions on abortions. In particular, one must consider the possibility that some young women will fail to seek care if they have to involve a parent. Moreover, while restrictions on abortions may encourage greater use of oral contraceptives among minors, this population is more likely to be inconsistent pill users (Jones, Darroch, & Henshaw, 2002; Jones, Singh & Finer, 2007; Herold & Goodwin, 1981).

The abortion issue is divisive and difficult in the United States. Independent of the political positions staunchly defended by advocates on both sides of the issue, most individuals would celebrate a reduction in the number of abortion procedures performed. As shown in Figure 1, the number of abortions in the US has seen a steady decline since 1981. Contraceptive use and availability are certainly linked (if only indirectly) to the utilization of abortion, though the relationship is neither well understood nor studied.

Figure 1: Number of abortions per 1,000 women aged 15-44, by year



Source: Guttmacher Institute, May 2010. Available at:
http://www.guttmacher.org/pubs/fb_induced_abortion.html

This project explores this relationship, specifically focusing on the possible role of abortion policy (through state legislation) in contraception decision-making. This study looks to discern whether legal restrictions on abortion either positively or negatively impact contraception decision-making. This information is valuable in understanding how the law intervenes in women’s fertility decisions as well as glimpsing whether forward-thinking decisions are being made. There is also the opportunity to potentially guide future legislation.

When it comes to the access minors have to abortions, parental involvement matters. Legislation which restricts minors’ access to abortions increases pill use, seemingly encouraging more responsible contraceptive choices. In terms of sex education legislation, our finding that the effects of teaching abstinence become insignificant when the state’s general sentiment about women’s reproductive rights is Pro-Choice is informative. This insignificance suggests that sexual education programs without an emphasis on abstinence do not make students more promiscuous, confirming the results of earlier studies. (Kirby, 2001; Kirby, 2005; Alford, 2003; Alford, 2008; USAIDS, 1997; Baldo et al., 1993) Moreover, studies report that no sex ed program with a focus on abstinence-only-until-marriage has been shown to delay the initiation of teen sex or to help teens protect themselves when they do engage in sexual activity. (McKeon, 2006; Santelli et al., 2006; Hauser, 2004; Society for Adolescent Medicine, 2006; Committee on HIV Prevention Strategies in the US, 2000) Given that abstinence instruction seems to have little impact on teens’ propensity for sexual activity, the resources that are devoted to sexual education programs in the schools may have a greater public health impact if the program content incorporates more information about sexually transmitted diseases and HIV/AIDS in place of the seemingly ineffective emphasis on abstinence.

These results indicate that women are forward thinking when making their contraceptive decisions, at least relative to abortion legislation. This is also evidence that women react to the legislative environment in which they find themselves. Together this means that public health policy aimed to incentivize individuals to make decisions or adopt behaviors with longer term health consequences (prenatal care, smoking cessation, weight loss programs) can be successful. If individuals are forward thinking enough such that legislation and policy governing the consequences for today's actions can affect today's decisions, then there are important policy implications for increasing health outcomes. In some contexts, similar policies are already in place. For example, active alcohol

or substance abuse may disqualify a patient in need of a liver transplant since the continuation of the unhealthy lifestyle would likely result in the failure of the newly transplanted liver.

In the extreme, this means that taxing insulin or making heart surgery more expensive (both consequences of lifestyle decisions; poor eating habits and lack of exercise) could induce people to make better choices and be healthier today. Likewise, a tax on BMI could induce people to make better health decisions. Admittedly, these consequences only apply when behavioral factors are the cause, rather than an individual's genetic makeup.

Alternatively, these results indicate that perhaps policymakers should consider subsidizing pill use. If abortion restrictions induce more responsible contraceptive choices through increased pill usage, then perhaps the same result can be achieved through subsidizing the cost of the pill. This would avoid the potentially negative consequences of the abortion restrictions, specifically that some young women will fail to seek care if they have to involve a parent. Again, there are examples of similar policies currently utilized to induce better behavior. Consider the health insurance plans that subsidize gym and health club memberships to encourage exercise and greater fitness among members.

7. Future Work

Two clear avenues exist for improving this study and establishing the robustness of these initial results. First, the results would be strengthened with data from additional years, those spanning a period of time in which greater variation in abortion statutes existed within states. Second, more accurate and interesting results would likely emerge from individual level analysis. The individual level analysis would help establish how the probability a woman uses oral contraception is affected by her individual characteristics and the legal environment in her state. This approach would provide an interesting second perspective to the state level results and allow us to disentangle causality, rather than just rely on correlation. This individual level analysis would necessarily incorporate both state and time fixed effects to account for unobserved state level variation and trends over time. We are currently pursuing both of these avenues and have applied for access to a new dataset that will enable both improvements.

8. Conclusions

Due to current data restrictions, this analysis utilizes state level observations to examine whether variations in abortion laws impact pill usage. Moreover, the data is based on state averages. Admittedly, the causation in an individual decision making model does not follow from the state-level correlations explored here. Nonetheless, the results of this study are suggestive and intriguing. These results provide preliminary evidence that contraceptive decisions are influenced by abortion legislation and women respond in a forward-thinking way.

The empirically tests presented here examine the impact of variation in abortion and sex education legislation across US states on the utilization of oral contraception. Presumably, restrictions on abortion availability may induce women to seek a reliable form of birth control to avoid unwanted pregnancies. Controlling for demographic characteristics, our analysis reveals that if a state's

legislative body has issued a Pro-Choice Declaration, women in the state are less likely to use the pill. Ostensibly, Pro-Choice Declarations likely accompany state laws supporting abortion utilization.

We also examine the effect on pill usage of restricted abortion access for minors through parental consent/notification laws and legislated waiting periods. In essence, legislated restrictions impose an additional cost on minors seeking an abortion. With the imposition of additional conditions on terminating a pregnancy, one would expect that oral contraceptives would be more widely utilized. Regression analysis indicates that more restrictive abortion statutes increase the proportion of women using the pill. This finding corresponds nicely with evidence that young women are the most likely pill users. This seems to indicate that restrictions on the availability of abortions for minors evoke more responsible contraceptive choices.

Finally, our analysis shows that sexual education legislation mandating that public schools cover or stress abstinence has a negative effect on the state's rate of oral contraception use. Ironically, legislation mandating that public schools cover or stress contraception has no significant effect on pill use.

These results indicate that women are forward thinking when making their contraceptive decisions, at least relative to abortion legislation. If individuals are forward thinking enough such that legislation and policy governing the consequences for today's actions can affect today's decisions, then there are important policy implications for increasing health outcomes. While we aren't yet willing to endorse taxes on ill health or life-saving operations, these results open up a new array of policy tools that might be worth considering, both to encourage more responsible contraceptive choices and to induce other healthy behaviors. Given the divisive nature of the abortion debate, as well as rising healthcare costs, any policy that would result in enhanced public health should be thoroughly explored.

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