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**The Role of Restrictive Abortion Legislation
In Explaining Variation in Oral Contraceptive Use**

by
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Abstract

Following the legalization of abortion in the United States, scholars have studied its impact on a wide variety of factors including women's educational choices and labor force decisions, abortion rates, and most controversially, crime. Economists have also investigated the determinants of state abortion restrictions across the United States, exploring the importance of demographic characteristics, locational availability, and the strength of interest advocacy groups. Notably absent from the existing literature is an examination of the impact of legalized abortion and the restrictions of its use on the decision to use oral 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. The focus of this paper is an analysis of the possibility that variation in state abortion availability, proxied by legislation restricting a woman's reproductive rights, may generate variation in the use of birth control pills. It is reasonable to expect that without the option of terminating a pregnancy (or in states where the cost of doing so is higher), that oral contraceptives would be more widely utilized. Our findings reveal that restrictions on abortion funding have a significant and positive impact on a woman's decision to use the pill. In addition, women who live in states with higher abortion rates, a likely representation of the ease of terminating an unwanted pregnancy and proxy for the entirety of abortion restrictions, are less likely to use the pill. 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.

1. Introduction

The 1973 landmark US Supreme Court decision *Roe v. Wade*, 410 U.S. 113(1973), legalized abortion in the first trimester of pregnancy and disallowed many state and federal restrictions on abortion in the United States. The decision drastically altered reproductive rights and prompted a fierce national debate that continues today. The decision also spurred a large body of academic work on the impact of legalized abortion on a variety of social, moral, biological and economic questions. Recent economic analysis examines the impact of legalized abortion on a wide array of factors, including women's decisions surrounding when to enter the work force and how many hours to work, schooling and, most controversially, crime. Economists have also examined the determinants of US state abortion legislation and restrictions, considering the strength of interest advocacy groups and state demographics. Strikingly absent from this body of work is a study of the impact of legalized abortion on the use of birth control.

In most countries, legalized abortion emerged in the 20th century. Among the first were the Soviet Union (1920), Iceland (1935), Great Britain (1938), Sweden (1938) and Denmark (1939) (Canadian Federation for Sexual Health, 1995). Nevertheless, abortion remained quite rare through the late 1960s. In the 1970s, however, the number of abortions increased dramatically and national legislation restricting abortion was overturned in a great number of countries. This includes the United States where Tietze (1970) estimates that 390 therapeutic abortions were performed in 1963. This number rose to 4626 in 1968 (Tietze, 1970) and to 1.21 million in 2005 (Guttmacher, 2010). Currently almost two-thirds of the world's women reside in countries where a variety of economic, social and personal reasons enable them to obtain an abortion (Canadian Federation for Sexual Health, 1995).

Clearly the issues of contraception and abortion are closely tied. The reasons for contraception use and those for abortion are frequently rooted in similar concerns. A 1998 study focusing on women from 27 countries found that women seek to terminate their pregnancies for a variety of reasons, including desire to delay childbearing, financial concerns, issues of relationship stability, apprehension over the interruption of work or schooling and perceived immaturity (Bankole, et.al 1998). These reasons are echoed in Finn, et al.'s 2005 study of American women. Surprisingly, the majority (54%) of women seeking an abortion were utilizing a form of contraception at the time of conception (Jones, Darroch and Henshaw, 2002).

Though linked, the relationship between contraception use and legalized abortion remains unexplored. A 2001 study that quantifies how abortion provider availability affects abortion demand, notes that a decrease in the cost of terminating a pregnancy will theoretically create a moral hazard problem when it comes to avoiding unwanted pregnancies (Brown et.a. 2001). Our paper aims to measure whether or not individuals really are less careful in using contraception if abortions are less costly. Specifically, it investigates the impact of abortion restrictions, as proxied by variation across US state abortion legislation, on the utilization of oral contraceptives. Existing legislation limits access to abortion through a variety of restrictions: mandated waiting periods, consent and notification laws, funding restrictions, and counseling requirements. By focusing on the most widespread of these regulations, we hope to capture their impact on women's reproductive choice. 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.

Section 2 reviews the theory and literature surrounding contraceptive use. Section 3 describes the methodology and the data used in the study. This is followed by a discussion of the Results and Policy implications, in Sections 4 and 5. Finally, Section 6 concludes.

2. Literature Review

The past 50 years have delivered important changes in both the technology and legislation surrounding birth control and abortion. 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, and even county to county. Though technology has advanced significantly, the legal and ethical questions surrounding abortion abide and continue to make it one of the most contested issues in U.S. society, law and politics. This study focuses on the consequences of this patchwork of state abortion legislation.

Following the legalization of abortion in the United States, scholars have studied its impact on a wide variety of factors including women's educational choices (when to go and how much to pursue), women's labor force decisions (when to enter the work force and how many hours to work), abortion rates and even crime. Legalized abortion has been studied as a complement to contraception in women's decisions to delay marriage and invest in their careers (Goldin and Katz 2000). Akerlof, Yellen and Katz (1996) link the availability of abortion and contraception to the decline in shotgun marriages and the increase in out-of-wedlock births since 1970. In a study on U.S. fertility, Klerman (1999) examines the impact of legalized abortion and Medicaid funding of abortion, finding a degree of substitution from other forms of contraception to abortion, but little explanation for the decline of American fertility. Fertility is clearly a function of permanent income, and the negative relationship between the two was first thoroughly explored by Venieris, Sebold and Harper (1973). More recently, Sen (2007) finds that many state-level restrictions on abortion access are significantly associated with increased homicide-resultant fatal injuries for children.

Economists have also investigated the determinants of state abortion restrictions across the United States, exploring the importance of demographic characteristics, locational availability, and the strength of interest advocacy groups. Notably absent from the existing literature is an examination of the impact of legalized abortion and the restrictions of its use on the use of oral 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. We investigate the possibility that variation in state abortion availability, proxied by legislation restricting a woman's reproductive rights, may generate variation in the use of birth control pills. It is reasonable to expect that without the option of terminating a pregnancy (or in states where the cost of doing so is markedly higher), that oral contraceptives would be more widely utilized.

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. That means a woman's decision to use the birth control pill will incorporate the expected cost of an unwanted pregnancy and will be

sensitive changes in the cost of terminating them. This study investigates the hypothesis that more stringent abortion legislation (i.e. more costly to the woman) will positively affect her decision to use the pill. In order to examine this question specifically, it is necessary to account for the variety of other factors that may play a role in a woman's decision to utilize oral contraceptives—factors that change the direct and opportunity costs of having children, as well as those that account for social norms and even religion. This section is devoted to describing the many variables that influence this decision, and the studies that have explored their impacts.

Earlier studies show 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. Notably, being black has a negative effect on pill usage. While the proportion of black women using some contraceptive method increased between 1982 and 1988 (Mosher, 1990), African American women are still significantly less likely than white women to use prescription contraceptives (Culwell & Fineglass, 2007; Frost & Darroch, 2008). When compared to white women, Asian women are also significantly less likely to use prescription contraceptives (Culwell & Fineglass, 2007; Frost & Darroch, 2008). In addition, inconsistent pill use is greater among both African American and Hispanic (Lichter, McLaughlin, Ribar, 1998; Jones, Singh, Finer, 2007). Finally, 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.

Research reveals that a woman's age plays a key role in her birth control decisions. That is, women in their twenties, 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, 2002; Mosher, et.al., 2004). Between 1982 and 1988, pill usage among women 20-34 years old significantly increased (Mosher, 1990).

Marital status and marriage duration may also play a role in whether or not a woman can afford a child. In a 1990 study of abortion in China, Li, et.al found that the number of previous abortions was positively related to the respondent's length of marriage. In a more recent study in the US, 42% of women who responded that they could not afford a child said it was because they were not married (Finer et al., 2005). Not surprisingly, 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).

A woman's decision to use oral contraceptives may also be tied to her educational attainment. Education, particularly college and/or an advanced degree, is an indicator of future income and opportunity cost and will make a woman less likely to want a child. Women with educational attainment below a high school diploma are more likely to be inconsistent pill users (Jones, Darroch, Henshaw, 2002) and are significantly more likely to use emergency contraceptives (Whittaker, 2007). In addition, women with less than a bachelor's degree are 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 degree did (Mosher, et.al. 2004). Two competing affects may be traced through student status, in terms of contraception use. First, 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). However, adolescent women were also significantly less likely to have frequent sexual activity if they expected to attain a college degree by age 30 (Sen,

2006). The former effect makes current students more likely to use oral contraceptives while the later effect makes them less likely to use the pill.

A woman's ability to afford a child and the opportunity cost associated with having and looking after a child both matter to contraception decisions. If children are perceived to be 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. These calculations are a function of a woman's income and employment status.

There are three ways in which a woman's income may potentially affect her decision to use oral contraception. First, this method of birth control is more affordable at higher levels of income, 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, 2002; Sable & Libbus, 1998). In addition, the rates of unintended pregnancy are above average for lower-income women, which may be evidence that they cannot afford suitable methods of birth control (Jones, 2008). Second, as noted above, this income comprises part of her opportunity cost of having a child. As such, higher income translates into a greater cost of child bearing and perhaps a lower likelihood of wanting children, hence she is more likely to use birth control. Third, higher incomes provide women with more resources to bear and rear a child (Sidenius, 1978). Accordingly, if children are normal goods a higher income could lead to less use of birth control. The magnitude of these differential effects and the direction of the overall effect are therefore 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 (Sen, 2006), while taken as a whole, women living below 250% of the national poverty level are significantly less likely to use the pill (Frost & Darroch, 2008).

The birth control practices of women who are poor and/or likely to use abortion services have been explored in the family planning literature which suggests that numerous factors are important. Murphy, Symington and Jacobson (1984) determine that three are directly influenced by the availability of abortion services: public assistance status, intention to abort and assessment of the consequences of motherhood. The family planning literature also indicates that women who have had an abortion are more likely to have another (Steinhoff, Smith, Palmore, Diamond & Chung, 1979; Tietze, 1978).

In like manner, 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 (Sidenius, 1978). Sexually active employed women were significantly more likely to be using prescription contraceptives (Culwell & Fineglass, 2007).

Given the ethical and moral dimensions of the debate surrounding abortion, a woman's religious affiliation and religiosity are likely to contribute to her contraceptive decisions. Unmarried sexually active teenagers belonging to religious groups that condemn abortion are significantly more likely to use contraceptives (Sen, 2006). Women that are affiliated with churches that disprove of abortion as

well as women with more conservative views 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. These factors play a role in explaining international differences as well; religiosity is cited as one of the most important factors in explaining differences in abortion practice in the US and China (Rigdon, 1996). If a woman is more religious her views are more likely to correspond more closely to those of her church. Accordingly, her church's doctrine may have a greater influence on her decision. Beyond this, the church's stance on contraception will matter. Strikingly, Gober's 1994 study found that the percent of Roman Catholics in a state actually has a positive impact on the abortion rate. Not surprisingly, Mormons, Jehovah's Witnesses and Conservative Protestants are more likely to be pro-life (Gay & Lynxwiler, 1999).

A woman's political affiliation is also likely to shape her opinions surrounding abortion and contraception. We anticipate that Republicans will be more likely to be pro-life while Democrats may be more likely to consider abortion acceptable. At the same time, Democrats may have more liberal views on sexual activity, especially for unmarried women. The overall effect of these two confounding impacts is uncertain. As such, the predicted sign is ambiguous and left as an empirical question.

Residence is another important factor since a rural or urban domicile will statistically affect a woman's decision to use the pill. Sexually active adolescent girls living in urban areas are less likely to use contraceptives frequently and adolescent girls are more likely to have frequent sexual activity if they live in an urban area (Sen, 2006). Recognizing that abortions are less taboo in urban areas exacerbates this negative effect on birth control use. Multiple studies have shown that people living in urban areas are more likely to be pro-choice and more likely to have access to and obtain abortions (Walzer, 1994; Gay & Lynxwiler, 1999; Gober, 1994; Gober, 1997).

It is also important to acknowledge that trends are changing over time. Mosher, 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).

Economists have also explored the role of expectations in women's choice of a contraceptive method. Delavande (2008) finds that women base their decisions on their subjective expectations of method-related outcomes. Her results show that effectiveness, protection against STDs and partner's disapproval are the most important factors in deciding which contraceptive method to utilize.

Finally, this study considers whether legal restrictions on abortion impact a woman's decision to utilize oral contraception. Despite evidence that the most dramatic differences exist internationally (Rigdon notes that China is the only country which allows an abortion at any stage of pregnancy as long as performed by authorized personnel), the focus of this analysis is the more subtle variation in laws across US states. Gober (1997) established the link between legal restrictions on abortions (parental involvement laws and mandatory delay) and abortion demand. For a comprehensive review of other such studies, please see Levine (2007). Notably, results 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 restrictive abortion legislations may indeed alter contraceptive use. 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. Presumably restrictions on abortion availability (as influenced by legislated waiting periods and/or notification laws and/or consent laws) may induce women to seek a reliable form of birth control to avoid unwanted pregnancies. One would expect that oral contraceptives would be more widely utilized in states where terminating an unwanted pregnancy is more difficult, more costly or otherwise more burdensome.

The differences in abortion legislation across states provide an interesting opportunity to explore the implications of these laws on contraceptive use. Drawing on a set of variables that are widely used in the existing literature and controlling for demographic characteristics, 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.

3. Methodology & Data

In order to examine whether or not abortion legislation in a woman's state of residence matters to her decision of whether or not to use the pill we consider the following regression equation.

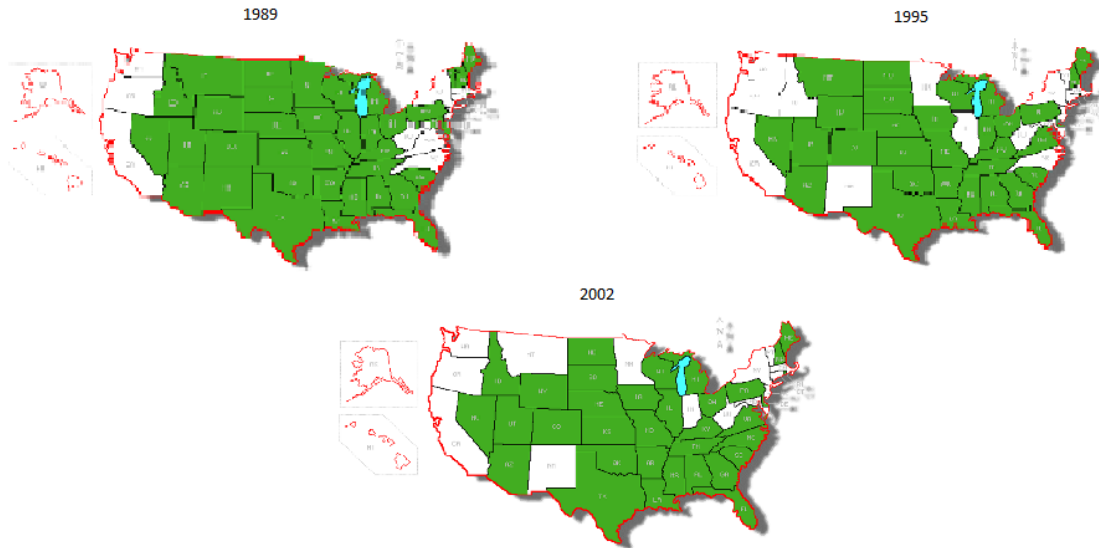
$$PillUse = \alpha + \beta\Gamma + \delta X + \gamma T + \varepsilon$$

In this equation *PillUse* is a binary variable which equals one if the woman's primary method of contraception is the pill and zero otherwise. We hypothesize this choice depends on Γ , a vector of variables characterizing the state legal environment and/or public support women face when considering abortion, X , a vector of demographic variables controlling for her individual characteristics, and T , the year in which the woman is making her contraceptive choice when data from different survey years is pooled.

To determine the effects of restrictive abortion legislation on the decision to use oral contraception, we consider two specifications for this model. The first specification considers the female choice to use the pill given the state abortion rate. This is likely a good proxy for the combined costs due to state level sentiment and legislation surrounding abortion. It will likely capture the relative overall effect of the legal environment the woman faces. The second specification is an attempt to tease out the effects of particular types of laws. We identify and include as explanatory variables three broad categories of legislation variables that may matter to a woman's birth control choice. The three categories are: (1) the sentiment of the state legislature toward abortion (i.e. is the sentiment pro-life or pro-choice); (2) restrictions on the funding of abortions; and (3) mandatory waiting periods for obtaining abortions. State level abortion rate information and state legislative information come from the Guttmacher Institute and NARAL Pro-Choice America, respectively (Henshaw and Kost, 2008; NARAL, 1989; NARAL, 1995; NARAL, 2002). The data on pill use and individual female characteristics comes from the National Survey on Family Growth (NSFG) collected by the Center for Disease Control and Prevention. Our analysis considers three cycles of the NSFG—we utilize Cycle 4 (1989), Cycle 5 (1995) and Cycle 6 (2002).

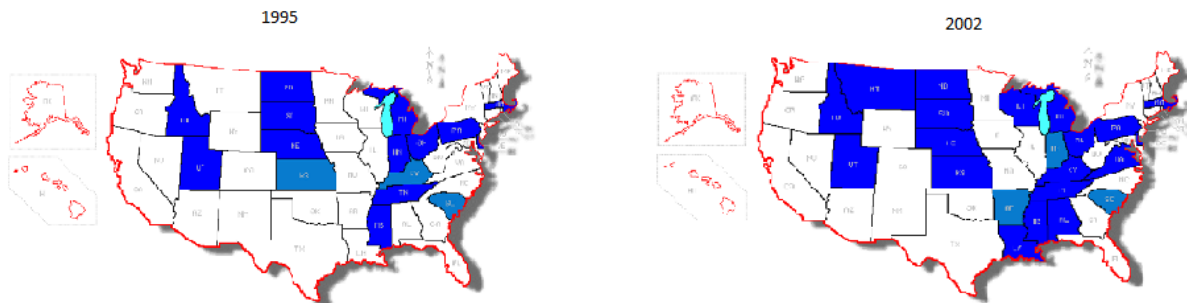
restriction on abortion in that particular year. As you can see, most state have such restrictions, but the number of states with restrictions on public funding seems to have declined a bit since 1989.

Figure 2. Funding Restrictions



Finally, the last category of restrictive legislation we include in our analysis is mandatory waiting periods before an abortion can be obtained. Requiring that a woman wait for a period of time (usually 24 hours) before she can abort will increase the costs associate with that abortion. The variable *MWP* is one if the state has a mandatory waiting period requirement and zero otherwise. Figure 3 demonstrates which states have mandatory waiting periods. The dark shaded states have waiting periods that are at least 24 hours and the lightly shaded states have shorter waiting periods. Between 1995 and 2002 there has been an increase in the number of states with mandatory waiting periods.

Figure 3. Mandatory Waiting Periods



We hypothesize that each of our legislative variables, since they are measures of restricting abortions and make it more costly for women to terminate unwanted pregnancies, will have a positive effect on a woman’s decision to use the pill (*PillUse*). If the woman is forward thinking, and knows that terminating an unwanted pregnancy will be more costly given the legal environment in her state she will be more likely to seek a reliable form of birth control like the pill.

Before considering the results of these two specifications, (1) the first with the overall cost of obtaining an abortion measured by the state level abortion rate and (2) the other measuring the effects of particular restrictive laws, it is interesting to note how these variables are related. Table 1 presents a correlation matrix for the overall abortion rate and our three specific types of legislation.

Table 1. Correlation Between Abortion Rate and Restrictive Legislation

	<i>AbortionRate</i>	<i>Pro-Life</i>	<i>MWP</i>
<i>AbortionRate</i>	1.00		
<i>Pro-Life</i>	-0.24	1.00	
<i>MWP</i>	-0.06	0.21	1.00
<i>FundRestrict</i>	-0.21	0.27	0.28

Not surprisingly, the state abortion rate is negatively correlated with each of the individual abortion restrictions. What is interesting is that Pro-Life legislative sentiment and funding restrictions matter more than mandatory waiting periods. Time costs seem to be less of a concern. Also, the correlation between the different restrictions is positive, meaning that states that have one type of restriction are more likely to have the other two as well. Overall, this correlation matrix indicates that both of our specifications will be measuring similar effects, but neither may tell the complete story.

3.2 Individual Characteristics

In all of our estimations we control for an array of individual female characteristics that theoretically matter to her contraceptive choice (those discussed in the previous section). A woman's formal marital status is captured by *Married*, which equals one if she is married and zero otherwise. If she lives in an urban rather than a rural area then *Urban* is one and it is zero otherwise. Her religious status is indicated by *Catholic*, which is one if she identifies herself as catholic and zero otherwise. *Black* and *Hispanic* are one if the woman identifies her race as such and zero otherwise.

To control for a woman's education we include *BA* indicating whether she has had any higher education. *BA* equals one if the woman has completed high school and engaged in at least some college and zero otherwise. A woman's income, *Income*, is measured as a proportion of the poverty line and due to data limitations is capped at 500. Since there is an artificial cap we include an indicator for women at or above that cap—*HighIncome* equals one if *Income* is at least 500. We also account for her labor force status by including *FullTime*, which is one if she works fulltime and zero otherwise. The model controls for the effect age has on her decision to use the pill and allows this effect to be nonlinear. *Age* and *Age-Squared* are both measured in years.

3.3 The Sample and Descriptive Statistics

Because we are interested in contraceptive decisions we restrict our sample to women who are currently deciding how to prevent the possibility of becoming pregnant. Thus, we omit women who are pregnant, actively trying to become pregnant, sterile, have a sterile partner, have never had sex or are on a long term form of birth control (i.e. an IUD, Norplant, Depo Prevera or Lunelle). The women remaining are making a medium term decision about whether or not and how to prevent pregnancy.

The following table describes the samples of women we consider in 1989, 1995 and 2002 (Cycles 4, 5 and 6, respectively). Since survey design issues prevent us from pooling all three cycles for our analysis, we describe each sample individually in the following table. Table 2 summarizes the means and standard deviations for individual pill use, state legislative variables, state abortion rates and the individual characteristics of women in each sample.

Table 2. Summary Statistics for Cycles 4, 5 and 6

Variable	Cycle 4 (n = 4090)		Cycle 5 (n = 5116)		Cycle 6 (n = 4237)	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
PillUse	0.38	0.48	0.35	0.48	0.35	0.48
<i>Abortion Legislation</i>						
Pro-Life	0.21	0.41	0.19	0.39	0.15	0.36
FundRestrict	0.66	0.47	0.54	0.50	0.62	0.48
MWP	---	---	0.24	0.43	0.33	0.47
<i>Abortion Rate</i>						
AbortionRate	27.63	14.05	23.30	11.26	21.96	8.76
<i>Individual Characteristics</i>						
Married	0.40	0.49	0.42	0.49	0.35	0.48
Age	27.64	7.25	29.28	7.63	28.56	7.70
Age-Squared	816.50	422.28	915.68	456.01	875.09	460.26
FullTime	0.49	0.50	0.45	0.50	0.46	0.50
BA	0.47	0.50	0.52	0.50	0.56	0.50
Income	275.69	162.30	294.70	156.39	267.28	160.52
HighIncome	0.16	0.36	0.20	0.40	0.15	0.35
Hispanic	0.08	0.27	0.14	0.34	0.19	0.39
Black	0.34	0.47	0.00	0.04	0.22	0.41
Catholic	0.27	0.44	0.31	0.46	0.30	0.46
Urban	0.32	0.47	0.36	0.48	0.48	0.50

In all three samples, the proportion of women that use the pill is just above one third. The average woman is younger than thirty and has a household income almost three times the poverty line. Fewer women in the 2002 sample are married than are so in 1989 and 1995, but more women have obtained a college degree. Approximately a third of the population is Catholic in each cycle and as time goes on more women live in urban areas, almost half in 2002.

The state abortion rate is declining over time, from 28 abortion per one thousand women in 1989 to 23 in 1995 and 22 in 2002. Simultaneously the state level legislative sentiment across the US is becoming less Pro-Life. The number of states having legislation declaring they will regulate abortion to the fullest extent of the law steadily declines between each survey cycle. The proportion of states restricting the use of public funds for abortions is between one half and two thirds for all cycles. Finally, the proportion of states with mandatory waiting periods increases from one quarter to one third from 1995 to 2002 (this information is unavailable for 1989).

4. Results

The result of our logit estimations of oral contraceptive use as a function of abortion legislative restrictions are summarized in the two tables below. As previously mentioned we are unable to pool all three cycles into a single analysis. So we consider four samples of females—each cycle individually and then cycles 5 and 6 pooled together. For each sample we first consider the effect of the state’s abortion rate on the propensity to use the pill. The abortion rate is likely representative of the overall ease of terminating an unwanted pregnancy in a woman’s state. Second, we consider the separate effects of three different types of abortion restrictions: (1) the time costs of mandatory waiting periods (*MWP*); (2) the monetary costs that come from the restriction of public funds for the use of abortions (*FundRestrict*) and (3) the potential social costs that come from living in a state with a Pro-Life legislative sentiment (*Pro-Life*). Finally, for both abortion legislation specifications and each sample we control for female income and education both separately and together (this change in the model’s specification is indicated by column). 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 accounted for by each of these variables is neither identical nor mutually exclusive.

Table 3 reports the effect of state abortion rate on a woman’s decision to use the pill, from our survey weighted logit estimations. Column one identifies the sample and how large it is.

Table 3. The Effects of the Abortion Rate on Pill Use

Sample	Income & Education	Income	Education
Cycle 4 (n=4090)	-0.007 (0.004)	-0.007 * (0.004)	-0.007 (0.004)
Cycle 5 (n = 5116)	-0.022 *** (0.004)	-0.022 *** (0.004)	-0.021 *** (0.003)
Cycle 6 (n = 4237)	-0.010 * (0.006)	-0.010 * (0.006)	-0.008 (0.005)
Cycle 5&6 (n = 9353)	-0.017 *** (0.003)	-0.017 *** (0.003)	-0.016 *** (0.003)

Notes: Linearized standard errors are in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

The state abortion rate (*AbortionRate*), our proxy for the overall ease or difficulty of obtaining an abortion in any given state, has a negative effect on female pill use in all specifications. This effect is significant in most cases. This is consistent with our prediction that greater ease in obtaining abortions (demonstrated with a higher abortion rate) will decrease pill use. Essentially, abortions are less costly and, therefore, the benefit of pill use is smaller. The magnitude of this effect is small, ranging from -0.007 in 1989 to -0.022 in 1995, and tells us that the abortion rate in a state increasing by 1 point (or 1000 women) will make women in that state 1-2% more likely on average to choose the pill as their primary form of birth control all else equal. Though it is small, this effect is almost always significant indicating that the overall cost of obtaining an abortion matters to a woman’s choice of birth control.

Before drawing any conclusions about the negative coefficient on state abortion rate it is important to consider the direction of causality in the model. It not only makes sense that a higher rate of abortions will decrease pill use because the cost of obtaining an abortion is lower, but it also could be the case that high levels of pill use are lowering the abortion rate. We attempted to mitigate the effects of this reverse causality, and isolate the effects of the abortion rate on pill use when choosing the timeframe in which each of these variables are measured. Pill use should affect subsequent abortion rates, while contemporary and past abortion rates play into the contraceptive decisions of women. In each specification we use the abortion rate in the same year that we measure pill use. We are of course limited by the fact that our observations are at the year level—we are unable to account for whether or not the contraceptive decision was made in January and the potential abortion occurred in December.

Table 4 summarizes the estimated results for the model where we consider separately different types of abortion restrictions. This table tells us how particular restrictions affect a woman's choice to use oral contraceptives. Each of the four panels of results represents the survey weighted estimates for a particular sample; the sample and its size is indicated at the top of the panel in bold.

Table 4. The Effects of Abortion Restrictions on Pill Use

Restriction Variables	Income & Education	Income	Education
<i>Cycle 4 (n=4090)</i>			
FundRestrict	0.268*** (0.094)	0.276 *** (0.094)	0.263 *** (0.094)
Pro-Life	-0.314*** (0.108)	-0.314*** (0.108)	-0.315*** (0.108)
<i>Cycle 5 (n = 5116)</i>			
MWP	-0.124 (0.089)	-0.125 (0.090)	-0.121 (0.089)
FundRestrict	0.315 *** (0.070)	0.314 *** (0.070)	0.303 *** (0.068)
Pro-Life	0.198 ** (0.098)	0.195 ** (0.099)	0.198 ** (0.098)
<i>Cycle 6 (n = 4237)</i>			
MWP	0.195 * (0.104)	0.196 * (0.108)	0.183 * (0.106)
FundRestrict	0.163 * (0.097)	0.152 (0.100)	0.162 * (0.095)
Pro-Life	-0.249 ** (0.115)	-0.263 ** (0.115)	-0.301 ** (0.118)
<i>Cycle 5&6 (n = 9353)</i>			
MWP	0.038 (0.070)	0.038 (0.072)	0.040 (0.070)
FundRestrict	0.252 *** (0.061)	0.247 *** (0.062)	0.233 *** (0.059)
Pro-Life	-0.020 (0.077)	-0.029 (0.078)	-0.037 (0.078)

Notes: Linearized standard errors are in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

In this model our results are mixed. The effects of monetary costs are always large, significant and positive, as predicted. But time and social costs are less consistent and sometimes insignificant. This tells us that in terms of the restrictions women consider the money cost most important to contraceptive choice.

Time costs have a significantly positive effect on pill use in 2002. In states that have mandatory waiting periods before abortions can be obtained women are nearly 20% more likely to use oral contraception. This effect is large in 2002, but insignificant in 1995 as well as when cycles 5 and 6 are pooled. Perhaps this increase in the significance of time costs is a product of the trend toward more waiting periods between 1995 and 2002. Eight states either added a mandatory waiting period or increased the length of their existing one. The overall increase in waiting period prevalence and

associated legislative initiatives may have made this cost more palpable to a woman's family planning decision between 1995 and 2002.

Restrictions on using public funds for abortions consistently have a relatively large, positive and significant effect. This indicates that the monetary costs associated with terminating a pregnancy matter to a woman's decision to use the pill. Theoretically, this is what we would expect. In states where there is some form of restriction on public funding of abortions, women are 16-32% more likely to use oral contraception.

The effect of a legislative Pro-Life sentiment is significant in all three cycles, but the direction of the effect is not consistent. *Pro-Life* has a negative effect on pill use in 1989 and 2002, and a positive effect in 1995. (Not surprisingly since the effects act in opposite directions for cycles 5 and 6, the overall effect is insignificant in the pooled sample.) In cycles 4 and 6, women states with Pro-Life legislative intent are 25-32% less likely to use the pill. And in cycle 5, being in a state with this Pro-Life legislative sentiment makes a woman 19% more likely to use oral contraception.

Finally, the individual female characteristics we use as control variables are generally consistent with what we would expect. These variables were included in each of the twenty four models but were left out of our results table in the interest of being clear and concise. Interestingly, the effect of income on this decision was negligible. Household income had an insignificant effect in cycles 4 and 5 and only increase the probability a woman chooses the pill by 0.1% in cycle 6 and the pooled sample. Full time work status made women more likely to use the pill. Though significant in all specifications this effect decreased in magnitude over time—women who work full time are 45-50%, 33-35% and approximately 19% more likely to use oral contraception in 1989, 1995 and 2002, respectively. Similarly, the effect of education on contraceptive decisions changed over time. In 1989 women with a BA were 25% less likely to use the pill, but in 1995 and 2002 they were 13% and 50-65% more likely to make this choice. Over the 15 year period more education women became more and more likely to choose the pill as contraception. This shift may be due to increases in the opportunity cost associated with having a child. Being married had a positive and significant effect on pill use in all cases—it made women 20-32% more likely to use oral contraceptives. Age had the predicted concave relationship with pill use choice (increasing in the first order with a decreasing second order effect), and this relationship was significant in all but a couple of specifications in cycle 6. Being catholic and living in an urban area did not matter much to women's contraceptive choices—being catholic was insignificant in all specifications and living in a urban area was only significant half the time in cycle 5 (affecting a woman's choice to use the pill negatively). Finally, we find that race sometimes matters to the pill use decision. Being Hispanic is insignificant in cycle 4, significantly decreases the probability that a woman uses the pill by about 25% in half the specification in cycle 5 and significantly decreases the probability a woman chooses the pill by about 30% in cycle 6. Being black affects the pill use decision positively by about 20%, insignificantly and negatively by approximately a third in cycles 4, 5 and 6, respectively.

5. Policy Implications

Table 3 reveals that public funding provisions or restrictions are very impactful. The results indicate that restriction on abortion funding is the most consistently significant variable in all specifications and all cycles. In all but one case (cycle 6, controlling for only female income), funding restrictions

have a significant and positive impact on pill usage. It appears that of the three costs described (time cost, monetary cost, social cost) the financial burden is the most salient over time. If society's ultimate objective is to engender more responsible family planning decision making, then this may be cast as an argument for increasing funding for contraception. At some level, the pill and abortion services are substitutes. Given the very significant impact of abortion funding restrictions on pill usage, essentially an increase in the cost of the substitute, one would expect that greater funding for the pill would increase pill use and more responsible fertility decisions. If a reduction in the number of abortions is considered socially desirable, an increase in contraceptive funding may increase pill usage and reduce the number of women seeking to terminate an unwanted pregnancy.

Another way to interpret these results is as evidence that an increase in the restrictions associated with public funding of abortions will both decrease abortion rates and increase pill use. While this would appear to be a gain on two fronts in the pursuit of responsible fertility choices, the consequences for some populations may be sufficiently damaging as to warrant against it. The authors caution against this course of action because this type of policy modification would unduly affect poor women, the very population that may struggle to afford the pill. Given that public assistance for abortions is most often targeted to low-income women, an increase in the effective cost of abortion services may disproportionately hurt those least able to purchase oral contraceptives. For this segment of the population the impact may not translate into an increase in pill usage.

The analysis also demonstrates that, in the majority of cases, mandatory waiting periods do not significantly impact a woman's decision to use the pill. If such legislation is envisioned to deter women from seeking an abortion, it does not do so by encouraging greater contraceptive use to prevent unwanted pregnancy, or fostering more responsible fertility decision making. Admittedly, the use of this type of legislation is increasing over time and the analysis of the most recent cycle demonstrates that the variable has a positive and significant impact on pill usage. This suggests that measuring the true impact of time costs may call for the incorporation of more recent data and time costs may matter to the contraceptive decision.

Finally, the results indicate that the variable measuring whether a state legislature espouses a Pro-Life sentiment has a significant and negative impact on pill usage in a majority of cases. If the pill and abortion services are perceived to be substitutes, then the Pro-Life sentiment's effect of discouraging pill use may increase reliance on the substitute, driving women to greater need for abortion. As such, it may be that the legislatures' aim of reducing abortion utilization is undermined by the publication of a Pro-Life sentiment. Alternatively, it may be that the announcement of a Pro-Life sentiment by the state legislature results in a change of heart for some women. The negative coefficient may indicate a behavioral change as women abandon the pill in favor of abstinence or another alternative. Recognizing that this analysis does not tease out the causality, these implications should be viewed with an appropriate amount of skepticism.

6. Conclusions

With the US Supreme Court decision *Roe v. Wade* abortion was legalized in the United States and many abortion restrictions were lifted. The decision changed the landscape of reproductive rights and fertility decision making and compelled an extensive body of academic study on the impact of legalized abortion on a vast array of social, moral, biological, psychological and economic questions.

Despite its reach, absent from this body of work is a study of the impact of legalized abortion on the use of contraceptives. This paper explores the effect of abortion restrictions, as proxied by variation across US state abortion legislation, on the utilization of oral contraceptives. The analysis considers the impact of mandated waiting periods, funding restrictions and formalized Pro-Life sentiments by state legislatures. 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 order to determine whether state legislation in a woman's state of residence influences her decision to use the pill, we regress a vector of variables characterizing the state legal environment and a vector of demographic characteristics controlling for her individual characteristics on the woman's contraceptive choice. Drawing on pill use data and individual female characteristics data from the National Survey on Family Growth (NSFG) collected by the Center for Disease Control and Prevention and state level abortion rate information and state legislative information from the Guttmacher Institute and NARAL Pro-Choice America, respectively, we analyze three cycles of the NSFG: cycle 4 (1989), cycle 5 (1995) and cycle 6 (2002).

The results of the logit estimation of oral contraceptive use as a function of abortion legislative restrictions reveal that restrictions on abortion funding have a significant and positive impact on a woman's decision to use the pill. This finding is robust across time and for a variety of specifications controlling female income and education. In addition, we find that women who live in states with higher abortion rates, a likely representation of the ease of terminating an unwanted pregnancy and proxy for the entirety of abortion restrictions, are less likely to use the pill. Again, this result is robust across the time and a variety of specifications. While all the restrictions on abortions measured matter to contraceptive decisions, financial restrictions matter the most.

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. Given the potential for shaping fertility decision making and incentivizing other healthy choices, these results open up a new array of policy tools that might be worth exploring. Considering 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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