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The Pill and Partnerships: The impact of the birth control pill on cohabitation

By Finn Christensen

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Finn Christensen
Towson University

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Abstract

This paper investigates the impact on cohabitation behavior of the introduction and dispersion of the birth control pill in the US during the 1960s and early 1970s. A theoretical model generates several predictions that are tested using the first wave of the National Survey of Families and Households. Empirically, the causal effect is identified by exploiting plausibly exogenous variation in state laws granting access the pill to unmarried women under age 21. The evidence shows that the pill was a catalyst that increased cohabitation's role in selecting marriage partners, but did little in the short run to promote cohabitation as a substitute for marriage.

JEL Classifications: J11, J12

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1 Introduction

Unmarried heterosexual cohabitation became more common in the United States for cohorts born around 1950, especially as a precursor to marriage. To wit, about 5 percent of women in the 1940-1949 birth cohort cohabited with their first spouse prior to marriage, whereas a quarter did among those born in the following decade. One difference between these two cohorts is that young, unmarried women born in the fifties enjoyed easier access to the birth control pill. Using plausibly exogenous variation in the timing of state laws regarding pill access, I find that this early legal access to "the pill" played a significant role in making cohabitation more common.

The experience of the fifties-born cohort was only a preview of the important role that cohabitation would come to play in today's society. Currently, over half of all first marriages are preceded by cohabitation, and many couples are treating it as a permanent state—nearly a fifth of all cohabiting couples in 2002 had been doing so for over five years (Stevenson and Wolfers, 2007). In other words, cohabitation is important both for how we select marriage partners and, perhaps more recently, as a substitute for marriage.

Cohabitation as part of the mate selection process has implications for who marries whom (Christensen, 2009) and the resulting stability of those marriages (Brien, Lillard, and Stern, 2006).[1] While some couples are substituting marriage with cohabitation, the substitution is not perfect. Tangible differences include "the default allocation of property rights following separation, tax treatment of the couple, and eligibility for social programs and employment-related family benefits" (Stevenson and Wolfers, 2007:36-37). In addition, cohabitation is typically regarded as a less committed relationship form than marriage. These differences have important interactions with decisions regarding the household division of labor, the pooling of resources, and the willingness and ability to make relationship-specific investments.

So how did cohabitation rise from an obscure and stigmatized relationship form to one featuring more prominent in the landscape of interpersonal relations? Explanations put forward in the literature tend to be the same explanations that have been applied to explain changing family patterns more generally. These include rising individualism and secularism, changes in birth control, changes in women's labor market opportunities, changing attitudes toward gender roles, family life, and sexual relations, among others (see Stevenson and Wolfers, 2007; Smock, 2000; and references therein.) While the pill has been identified by other scholars as a culprit partially responsible for the increase in cohabitation, this is the first paper which formalizes this connection in a theoretical model and, perhaps more importantly, rigorously quantifies the causal effect of the pill on cohabitation.

[1] Economists have been interested in who matches with whom at least since Becker (1973).

To this end, the next section begins by recalling the historical context of the 1960s and 70s, and then lays out the identification strategy crucial to the empirical argument. Section 3 provides a theoretical model that highlights the trade-off cohabitation presents between a greater ability to assess relationship quality and a higher break up cost relative to simple dating. In addition to providing insight on interpreting the empirical results, the analysis generates several testable predictions of the effect of the pill on cohabitation.

Section 4 tests two predictions from the theoretical model using retrospective cohabitation and marriage histories from the National Survey of Families and Households (NSFH). First, I test whether early legal access to the pill increased the likelihood of premarital cohabitation with one's first spouse. Indeed, the results indicate that early legal access to the pill can explain about a quarter of the increase in first-spouse cohabitation between the forties and fifties cohorts. Second, I develop criteria to identify women who are likely using cohabitation as a substitute for marriage, and then test whether access to the pill increased the prevalence of these women. In this case I find a small positive, but statistically insignificant, role for pill access.

Viewing these results in concert with the theory, I conclude in section 6 that the pill significantly increased cohabitation's role in selecting marriage partners, but had little or no immediate impact on increasing cohabitation's role as a substitute for marriage.

2 Background

A couple of anecdotes will help illustrate just how strong the stigma against unmarried cohabitation was in the 1960s. In 1962, Cornell University indefinitely suspended a graduate student for living with a woman who was not his wife. Although there was no formal code of conduct for graduate students, the university found that he was still subject to the "spirit" of the undergraduate code.[2] Six years later, *The New York Times* ran a story on the growing number of cohabiting college students.[3] The story profiled three couples, but the most notable figure was Barnard College sophomore Linda LeClair. Although an alias was used in the article, Barnard officials were able to ascertain her identity. The college president, Martha Peterson, called for LeClair's expulsion on the grounds (officially) that she lied about taking a position as a live-in maid in order to get permission to live off-campus. But student backlash prevailed, and the judicial council only barred LeClair from using the school cafeteria (Allyn, 2000). Interestingly, a different individual in the same article stated:

[2] *The New York Times.* 1962. "Cornell Ponders Rules of Conduct: University Code Reviewed After Student is Ousted," October 4, p. 72.

[3] *The New York Times.* 1968. "An Arrangement: Living Together for Convenience, Security, Sex," March 3, p. 40.

"I probably wouldn't have [cohabited] if it weren't for The Pill [*sic*]."

The stigma against cohabitation was very much tied to the taboo against pre-marital sex. For to cohabit was to publicly acknowledge a sexual relationship with one's partner. In fact, cohabitation was (and sometimes still is) referred to as "living in sin." For example, President Jimmy Carter in 1977 half-jokingly implored a group of government employees: "Those of you who are living in sin, I hope you will get married."[4]

One foundation for the taboo against premarital sex was the fear that it would lead to an unwanted pregnancy or, more to the point, an "illegitimate" or "bastard" child (Pope and Knudsen, 1965). A woman who became pregnant outside of marriage had a limited set of options. If she and her partner were willing (or pressured to by family), the couple might arrange a "shotgun" marriage before the child was born. This would legitimize the child but at the cost of a less-than-ideal marriage or, at the very least, an earlier-than-desired marriage. An alternative would be to give the baby up for adoption. A third option was to seek an abortion, but this was illegal during the sixties and did not become legal throughout the US until after the Supreme Court ruling in *Roe v. Wade* in 1973 (410 U.S. 113).[5] A final alternative was that the woman could raise an illegitimate child herself. But this choice entailed implicit and explicit social penalties for both mother and child. For example, illegitimate children were, and to a lesser extent still are, treated less generously than legitimate children in the eyes of the law (Hirsch, 1976 and Ihara, Warner, and Hertz, 2006).

The pill, which was first sold as an oral contraceptive in 1960, did much to allay fears of unwanted pregnancy. The pill presented women with an almost infallible method of birth control.[6] It was easier to use and more efficacious than other forms of birth control.[7] The

[4] *Time*. 1977. "Just Call Him Mister," February 21. http://www.time.com/time/magazine/article/0,9171,918659-1,00.html

[5] Some women went abroad to get an abortion. For example, Linda LeClair, the Barnard College sophomore, stated that she and her boyfriend flew to Puerto Rico to get an abortion. Shortly thereafter she started on the pill.

[6] The initial thrust toward the development of the pill can be attributed to Margeret Sanger. She long envisioned the concept of the pill and, by securing an initial small grant through Planned Parenthood, convinced Gregory Pincus to embark on research that eventually lead to *Enovid*, the first birth control pill. Two other key players were Katherine Dexter McCormick and John Rock. McCormick, Sanger's acquaintance and sympathizer, provided the majority of the funding for Pincus' research. Since only physicians could run clinical trials and Pincus was a biologist, Rock, who was a physician, became instrumental once it came time to run the Puerto Rico-based clinical trials. See Asbell (1995) for more on the history of the pill.

[7] According to the FDA, the pill is even more effective than female sterilization when used correctly. With typical use, the pill is three times more effective than condoms, which is the most effective barrier method of birth control. (http://www.fda.gov/fdac/features/1997/conceptbl.html, accessed 3/19/07.) The intrauterine device (IUD) is also a very effective means of birth control and was available before the pill. It also had the advantage of disentangling sex from contraception, but it could not decouple contraception from sex organs; the IUD requires insertion by a physician. The IUD was rarely used (Zelnik and Kantner, 1977).

pill also managed to accomplish two things that most other forms of contraception could not; it disentangled contraception from the sex act and disassociated contraception with sex organs. Thanks to these advantages and easier legal access, the pill replaced the condom and withdrawal between 1971 and 1976 as the most common form of birth control never-married women aged 15-19 used at last intercourse (Zelnik and Kantner, 1977).

By lowering the risk of unwanted pregnancy in a non-invasive way, the pill directly and indirectly encouraged cohabitation. Since cohabitation is bundled with sex, the pill directly increased the net benefits of cohabitation. But this also had an indirect effect. The pill made nonmarital relationships more attractive relative to marriage, and therefore increased selectivity into marriage.[8] Thus, the pill indirectly encouraged cohabitation since cohabitation is a useful means to assess compatibility prior to marriage. Finally, the pill stripped away one of the foundations for the taboo against pre-marital sex—the fear of illegitimate children. While all stigmas have some inertia, this probably also diminished the stigma attached to cohabitation given its association with pre-marital sex.

2.1 Early Legal Access as a Quasi Experiment

A major threat to identifying the causal effect of the pill on cohabitation is selection bias. Simply regressing a measure of cohabitation behavior on pill use would overstate the impact of the pill on cohabitation since those who use the pill are probably also more likely to cohabit, even after controlling for observable characteristics. An ideal experiment would instead take a random sample of women and randomly assign them to a treatment group that has *access* to the pill or a to control group that does not. Using access as the treatment rather than pill use eliminates selection bias. Moreover, a difference-in-differences evaluation of this experiment would reveal the average impact of access to the pill among woman, which is precisely what we wish to measure.

Fortunately, a natural experiment closely approximates this ideal, but only for a subgroup of women. Specifically, I exploit cross-state variation in the timing of legal access to the pill for unmarried women under 21. This variation in timing unfolded "as if" it were random, and can therefore be used as a quasi experiment. This is the same general identification strategy employed by Goldin and Katz (2002) and Bailey (2006), and some of the following discussion draws heavily on their work.

When the pill was first introduced in 1960, most states prohibited doctors from prescrib-

[8] Choo and Siow (2006) demonstrate empirically that the benefit of marriage relative to singlehood fell as a result of *Roe v. Wade*. They did not assess the impact of the pill on the relative benefits of marriage, but its impact is likely of the same direction as abortion.

Table 1: Dates of legal change granting early access to the pill.

Year law effective	State	Number of States
1960	Alaska, Arkansas	2
1962	Utah	1
1963	Idaho	1
1965	Ohio	1
1966	Mississippi, Oklahoma	2
1967	Maryland	1
1968	Georgia, Kentucky	2
1969	Nevada, Wyoming	2
1970	Hawaii, Kansas	2
1971	Alabama, Colorado, District of Columbia, Illinois, Maine, Montana,New Hampshire, New Mexico, New York, North Carolina, Oregon, Pennsylvania, Tennessee, Virginia, Washington	15
1972	Arizona, California, Connecticut, Delaware, Louisiana, Michigan, Nebraska, North Dakota, Rhode Island, South Carolina, South Dakota, Vermont, West Virginia	13
1973	Indiana, Iowa, Minnesota, New Jersey, Wisconsin	5
1974	Florida, Massachusetts, Texas	3
1976	Missouri	1

Source: Bailey (2006), Table 1, pp. 300-301.

ing the pill to unmarried women under the age of 21.[9] Over the course of the 1960s and 1970s, however, all states and the District of Columbia granted legal access to the pill for single women under 21. See table 1. It is this variation in early legal access (ELA) that this study exploits to identify the causal effect of the pill on cohabitation.

There are four important questions concerning changes in legal access for this paper. First, did access to the pill increase its use? Second, did the pill raise the net benefits to regular sex with a committed partner? Third, since my measures of cohabitation involve women over 21, is it reasonable to expect that legal access to the pill before age 21 affects cohabitation behavior after age 21? And finally, was the timing of legal changes exogenous to cohabitation trends? The first three questions relate to the relevance of using early legal access as a determinant of cohabitation behavior, while the fourth speaks to its validity as a quasi experiment.

One reason to be cautious about using legal access as a proxy for use is that laws pro-

[9]Connecticut even had a law on the books that prohibited the use of contraceptives, but the Supreme Court ruled in *Griswold v. Connecticut* (381 U.S. 479 1965) that barring married couples from using contraception violated the marital right to privacy. Seven years later, the Court ruled that a Massachusetts law prohibiting the distribution of contraceptives to unmarried individuals violated the equal protection clause of the 14th Amendment (*Eisenstadt v. Baird*, 405 U.S. 438 1972).

hibiting the sale and distribution of the pill may have been largely ignored in practice. To be sure, industrious young single women were able to obtain the pill by seeking out sympathetic doctors, feigning menstrual disorders, or through other means. However, it appears that legal restrictions did impose significant barriers to access. Goldin and Katz provide evidence of this using data from the National Survey of Young Women. They show that pill usage was greater among women who lived in states with more lenient laws regarding contraceptive services. In particular, they find that pill use was 36-40 percent greater among 17-19-year-olds who lived in less restrictive states.

This paper argues that the key mechanism through which the pill made cohabitation more common is that it raised the net benefits to regular, premarital sex with a committed partner. While this is a difficult claim to verify directly, one would predict several outcomes if it were true. First unmarried sex with a committed partner should be more frequent, conditional on the couple having sex. A causal relationship is difficult to establish, but there is some evidence from contemporaneous studies that pill use was positively correlated with more frequent sexual activity, but not more sexual partners (Garris, Steckler, and McIntire, 1976). Furthermore, since a major risk associated with premarital sex is unwanted pregnancy, women should have their first child at a later age if the pill gives greater control over the timing of pregnancy. Using the Current Population Surveys, Bailey (2006) shows that ELA to the pill reduced the likelihood of a birth before age 22 by around 14 percent. In addition, if the pill increased marital selectivity, women with pill access should marry later in life as it would take longer to find a suitable partner. Indeed, Goldin and Katz (2002) find that the pill was associated with a small but measurable decline in the probability a college graduate woman was married by 23. All three of these findings support the claim that the pill raised the net benefits associated with premarital sex.

The third and final question relating to the relevance of ELA to the pill as a determinant of cohabitation behavior is whether ELA should be expected to affect cohabitation behavior beyond age 21. The short answer is yes, it should. I will give more detail in the theory section, but I can briefly discuss the intuition here. First, since the pill makes non-marital relationships a more attractive alternative to marriage, the selectivity into marriage increases and more women 21 and older remain unmarried. This additional group of unmarried women 21 and older will still have a higher selectivity into marriage and therefore more incentive to cohabit.[10]

In order to serve as a valid quasi experiment, the variation in timing of legal access must

[10] Another supporting, but unmodeled, argument is that the fact that fewer women marry when young has spillover effects that further increase selectivity into marriage. That is, the opportunity cost of marriage increases as the of the pool of singles grows because one is more likely to meet attractive mates when the pool is larger.

have been independent of changes in cohabitation behavior or more relaxed attitudes toward family and sexual life. An inspection of Table 1 reveals substantial geographic and cultural variety in the states that granted access within a few years of each other. Among the states that liberalized laws prior to 1971, there are representatives from the West, the South, and the Midwest. States from all four major US regions (the Northeast is the fourth) relaxed their laws in 1971 or 1972. The final adopting states represent all regions but the West.

A second reason to believe that the timing of the laws were independent of cohabitation trends is that the laws were liberalized through a variety of means, most of which had little to do with granting access to the pill (Bailey, 2006). In 28 states, pill access followed as a consequence of lowering the age of majority from 21 to 18. An additional four states lowered the age of majority for women only. Most of these "age of majority" laws were passed as a way to comply with the 26th Amendment, which was ratified in 1971 and lowered the voting age from 21 to 18. This Amendment was motivated by the fact that 18 year-olds could be drafted into the Vietnam War but were not allowed to vote. Fourteen states indirectly granted access to the pill via mature minor doctrines that allowed minors to consent to medical treatment as long as they were mature enough to do so. Only two states (Georgia and Wyoming) and the District of Columbia granted access through family planning statutes that did not prohibit a physician from treating minors. The two remaining states were forced to grant access through Supreme Court decisions. See Bailey for more detail.

To further solidify the case for using legal access as a quasi experiment, Bailey empirically investigates the relationship between the timing of legal access and various state characteristics (demographic, social, technological, and those relating to the labor market). The only characteristic that is statistically significant is the percent of the state's population that is Catholic. As in Bailey, I control for this using state fixed effects.

3 A Theoretical Framework

This section develops a simple dynamic model of mate selection with the option to cohabit. The objective is to provide a framework to understand why couples might cohabit instead of simply date, and to illustrate how the pill increases cohabitation. The model is not equipped nor intended to explain all trends and regularities involving cohabitation, but the analysis does generate several relevant, testable predictions of the pill and sheds light on the empirical results.

Two key assumptions drive the model. The first assumption is that premarital cohabitation allows a couple to learn about aspects of their relationship that are more difficult to learn through simple dating. Secondly, cohabitation is assumed to be a more committed re-

lationship form than dating. These assumptions are supported by survey responses from the first wave of the National Survey of Families and Households conducted 1987-1988. Specifically, the responses reveal that the opportunity to assess compatibility prior to marriage is (or at least was) the primary reason to cohabit, with 50 percent of respondents citing it as "important" (i.e., either important or very important on a 7-point Likert scale).[11] The next most important reason was the opportunity to share living expenses, but only 31 percent said this was important. At 33 percent of respondents rating it as important, the most critical reason *not* to cohabit was that it "is emotionally risky." 27 percent reported that "it requires more personal commitment than dating" as an important reason not to cohabit.[12] These responses suggest that the primary trade-off people face when deciding whether to cohabit is the additional learning opportunities that come with cohabitation versus a higher cost of breaking up relative to dating.[13]

The model. To model this trade-off, consider a continuum of infinitely-lived women indexed by i who are searching in discrete time for a partner to marry or with whom to cohabit. The common discount factor is δ. To simplify matters, assume that a woman can make and execute decisions without consulting her partner. This boils down the analysis to an individual decision problem. In essence, each woman is selecting a man from an infinite pool of candidates.[14]

In any period, a woman can be dating, cohabiting, or married. Dating allows a couple

[11] Currently cohabiting individuals and singles under 35 were asked to rate the importance of several reasons to and not to cohabit. The reasons to cohabit were: it requires less personal commitment than marriage, it is more sexually satisfying than marriage, it makes it possible to share living expenses, it requires less sexual faithfulness than marriage, couples can make sure they are compatible before getting married, and it allows each partner to be more independent than does marriage. The reasons not to cohabit that respondents rated were: it is emotionally risky, my friends disapprove, my parents disapprove, it is morally wrong, it is financially risky, it requires more personal commitment than dating, it requires more sexual faithfulness than dating.

[12] Interestingly, 28 percent reported that an important reason not to cohabit was that it requires more sexual faithfulness than dating. This is peculiar since sexual faithfulness appears to be one dimension of greater commitment, so we would expect this percentage to be less than 27. However, the difference in percentages is not statistically significant. As a point of interest, of the 2,709 respondents who replied to both questions, 488 rated sexual faithfulness as (strictly) more important than greater commitment as a reason not to cohabit.

[13] At first blush, it may seem surprising that respondents report that mate screening is the primary function of cohabitation since considerable evidence shows that marriages preceded by cohabitation are less stable than those not preceded by cohabitation. This is the wrong comparison to make when evaluating this claim, however, since those who cohabit are likely systematically to be different from those who do not. See Brien, Lillard, and Stern (2006) on this important point; their paper finds strong evidence that cohabitation plays a screening role.

[14] While the theoretical model assumes that women face an ideal search market, of course the empirical analysis controls for market characteristics such as the sex ratio.

to assess the quality of their relationship on some dimensions but not others. The couple can fully know their compatibility only by living together. For example, they may learn by dating whether they enjoy the same activities, like long walks on the beach, but only living together will tell them whether they can successfully negotiate a living arrangement, like the preferred position of the toilet seat.

Formally, the flow payoff to marriage is q, the flow payoff to cohabitation is $q + (k + \varepsilon_i)$, and the flow payoff to dating is $k + \varepsilon_i$. The component q can be thought of as the payoff to living together in a serious relationship, and may include the benefit of sharing living expenses as well as idiosyncratic match quality. This component depends on two unknown binary variables x_1 and x_2 that take values in the set $\{l, h\}$. That is, $q = q(x_1, x_2)$. The value of x_1 is perfectly revealed by one period of dating, but the value of x_2 is perfectly revealed only by one period of living together. (The distribution of x_2 may depend on the value of x_1, however.) The component $k + \varepsilon_i$ indicates a woman's preference for non-marital relationships relative to marriage. While k is common to all agents, ε_i varies across individuals and is unknown to the researcher. Empirically, correlates of ε_i may include race, religion, education, whether or not one's parents divorced, etc. The conditional population distribution of ε_i is assumed normal with mean zero. Since cohabitation is still less common than marriage, one might expect that k is negative (but finite).

The other key distinction between dating, cohabitation, and marriage is their flexibility. In particular, assume that marriage is irreversible (i.e., there is no divorce); cohabitation can be broken off at a cost of $c > 0$, which is incurred in the period immediately following separation; and dating can be broken off at zero cost.[15] Whenever a women breaks off a relationship, whether it is a dating relationship or a cohabitation, she immediately begins dating another person in the following period.

I impose three conditions on the parameters of the model to simplify the analysis. As recorded in Lemma 1, these conditions guarantee that women will advance a relationship whenever they see a "high" signal on relationship quality, and will break off a dating relationship or a cohabitation whenever they see a "low" signal. To state the conditions, define $q_l \equiv q(h, l)$ and $q_h \equiv q(h, h)$, where $q_h > q_l$, and let $p \in (0, 1)$ be the probability that $x_2 = h$ given $x_1 = h$. Assume throughout that

1. $q(l, l) = q(l, h) = -\infty$,

2. $pq_h + (1 - p)q_l > 0$, and

[15] The assumption that marriage is irreversible is made for parsimony. As long as the cost of divorce exceeds the cost of breaking off a cohabitation, the implications of the model relevant to the empirical questions in this paper would not change.

3. $-c > \frac{q_l}{1-\delta}$.

The first condition means that if a woman sees $x_1 = l$ while dating, she knows that life with this person would be miserable. On the other hand, the second condition means that if a woman sees $x_1 = h$ while dating, the expected flow payoff from living together in a serious relationship is positive. The third condition implies that breaking off a cohabitation incurs a one-time penalty that is less severe than the prospect of spending a lifetime in a low quality marriage.

Lemma 1 *Assume conditions 1-3. A woman will advance a dating relationship to marriage or cohabitation if she sees $x_1 = h$, and will break off the relationship otherwise. In addition, a woman who is currently cohabiting will break off the cohabitation if she observes $x_2 = l$, and will continue cohabiting or choose to marry otherwise.*

Proof. See appendix. ■

Value Functions. Let V_i^d be woman $i's$ expected present value of beginning a period dating, and let V_i^c be her expected present value of beginning a period cohabiting conditional on having observed $x_1 = h$ while dating. If $\pi \in (0,1)$ is the probability that $x_1 = h$, then

$$\begin{aligned} V_i^d &= k + \varepsilon_i + \delta \left[(1-\pi) V_i^d + \pi \max \left\{ V_i^c, \frac{pq_h + (1-p)q_l}{1-\delta} \right\} \right] \\ &= \frac{1}{1-(1-\pi)\delta} \left[k + \varepsilon_i + \pi\delta \max \left\{ V_i^c, \frac{pq_h + (1-p)q_l}{1-\delta} \right\} \right]. \end{aligned} \tag{1}$$

With probability $1-\pi$, a woman observes $x_1 = l$ in the first period of dating. In this case, she will break off the relationship at zero cost and begin the next period dating someone else. With probability π, she observes $x_1 = h$ while dating and, depending on which choice has the highest expected present value, will either begin the next period cohabiting or married. If a woman chooses marriage without first cohabiting, her expected flow payoff in each period of marriage is $pq_h + (1-q)q_l$. Since marriage is irreversible, the expected present value of marriage is therefore $(pq_h + (1-p)q_l)/(1-\delta)$.

The expected present value of beginning a period cohabiting conditional on having observed $x_1 = h$ while dating is

$$V_i^c = pq_h + (1-p)q_l + k + \varepsilon_i + \delta \left[p \max \left\{ \frac{q_h + k + \varepsilon_i}{1-\delta}, \frac{q_h}{1-\delta} \right\} + (1-p)(V_i^d - c) \right]. \tag{2}$$

The expression outside of brackets is the expected flow payoff from one period of cohabitation. During this period, the woman sees the value of x_2. If she observes $x_2 = h$, which

happens with probability p, she will either marry her partner or perpetually cohabit with him. In either case, the couple will have no incentive to break-up in the future because all uncertainty about relationship quality is resolved. Clearly, the couple will substitute perpetual cohabitation for marriage whenever $k + \varepsilon_i \geq 0$. If the woman observes $x_2 = l$ during cohabitation, she will break up and search for a different partner with whom to cohabit or marry. In this case, she receives the expected present value of beginning a period dating minus c, the cost of breaking off a cohabitation.

Model Characterization and The Implications For Age at First Marriage. With the value functions in hand, I can now determine which women will choose to cohabit after observing $x_1 = h$ while dating. Using equation 2 and doing some algebra, $V_i^c \geq \frac{pq_h+(1-p)q_l}{1-\delta}$ if and only if

$$k + \varepsilon_i \geq \delta \left\{ p \left[\frac{q_h}{1-\delta} - \max \left\{ \frac{q_h + k + \varepsilon_i}{1-\delta}, \frac{q_h}{1-\delta} \right\} \right] + (1-p) \left[\frac{q_l}{1-\delta} + c - V_i^d \right] \right\}. \quad (3)$$

V_i^d is clearly increasing in $k + \varepsilon_i$, which implies that the right hand side of inequality (3) is decreasing in $k+\varepsilon_i$. It follows that there exists s^* such that a woman will choose cohabitation after seeing $x_1 = h$ while dating if $k + \varepsilon_i \geq s^*$. She prefers to directly enter marriage otherwise. The following proposition summarizes the analysis so far and proves that $s^* < 0$.

Proposition 2 $s^* < 0$. *Women for whom $k + \varepsilon_i < s^*$ will marry without first cohabiting if they observe $x_1 = h$. Women for whom $s^* \leq k + \varepsilon_i < 0$ will cohabit for one period if they observe $x_1 = h$, and then convert the relationship to marriage if they observe $x_2 = h$. Women for whom $k + \varepsilon_i \geq 0$ will cohabit if they observe $x_1 = h$, and will choose permanent cohabitation as a substitute for marriage if they observe $x_2 = h$.*

Proof. Suppose $k + \varepsilon_i = 0$. In this case, $V_i^d \geq 0$ because a woman could always choose to date every period and receive $k + \varepsilon_i = 0$ in every period. Since $\frac{q_l}{1-\delta} < -c$ by assumption, it follows that the right hand side of inequality (3) is less than zero when $k + \varepsilon_i = 0$. Thus $s^* < 0$. ■

Let F be the distribution of $k + \varepsilon_i$ throughout the population. Of course, F is a normal distribution with mean k since ε_i is normally distributed and has mean zero. Proposition 2 implies that the proportion of women who marry without first cohabiting equals $F(s^*)$. Call these women *noncohabitors.* The proportion of women who cohabit before marriage to learn about match quality is $F(0) - F(s^*)$, and the proportion who substitute marriage with cohabitation is $1 - F(0)$. Call these last two types of women *learners* and *substitutors,* respectively.

In the long-run, every women will be either married or in a long term cohabitation.[16] Thus, if we select a large sample of women after a sufficiently long period, we would expect that the sample distribution of women into these groups would closely approximate the population distribution. But notice that noncohabitors will marry their current dating partner with probability π, whereas learners marry their current partner with probability $p\pi < \pi$. Moreover, noncohabitors have a shorter courtship period—one period instead of two. Consequently, (i) any sample of women at a period $t < \infty$ will overrepresent noncohabitors and (ii) noncohabitors will marry at a younger age than learners, on average.

Figure 1 shows that these two implications of the model hold up in data from the 1987-1988 NSFH. The sample is women born 1935-1960 who married by age 27.[17] The top panel clearly shows that noncohabitors marry at younger ages on average. The bottom panel illustrates that at any age of marriage prior to 27, a larger fraction of noncohabitors is married relative to the learners group.

The Theoretical Impact of the Pill on Cohabitation and Age at First Marriage. Recall that the key mechanism through which the pill is expected to increase cohabitation is that, by lowering the pregnancy risk surrounding sex, the pill increased the benefits to nonmarital relationships. We can represent this increased benefit to nonmarital relationships as an increase in k. In other words, assume that the pill increases the flow payoff to nonmarital relationships.[18] The question central to this paper is, what happens to the relative prevalence of noncohabitors, learners, and substitutors as k increases from k_1 to k_2? The next proposition answers that question.

Proposition 3 *If $k_1 < s^*$, the introduction of the birth control pill (i) increases the proportion of women who are learners, (ii) increases the proportion of women who are substitutors, and (iii) decreases the proportion who are noncohabitors.*

Assuming $k_1 < s^*$ is equivalent to assuming that those who cohabit are entirely in the right tail of the (symmetric) distribution of $k_1 + \varepsilon_i$. While this assumption would not be

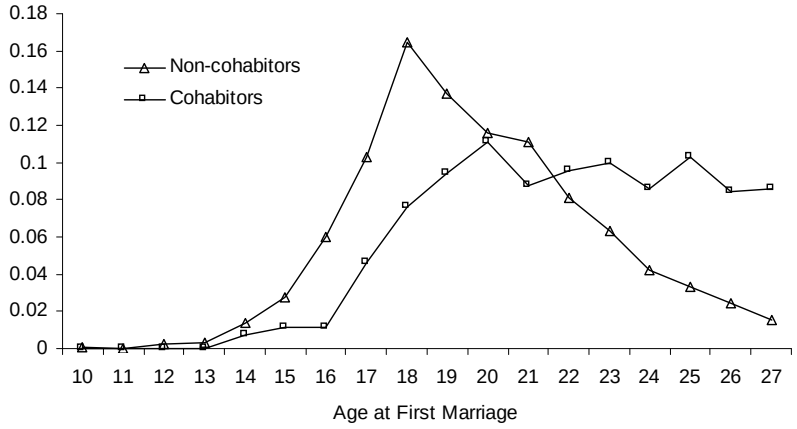
[16] This is because the probability that a women marries or enters a permanent cohabitation with the person she is currently dating is at least $\pi p > 0$. (It equals π for those women who marry without cohabiting first.) The probability she breaks up is at most $1 - \pi p$. It therefore follows that she will be in a committed relationship with probability 1 as time approaches infinity: $\pi p + (1 - \pi p)\pi p + (1 - \pi p)^2 \pi p + \cdots = 1$.

[17] In the figure, however, women are classified as a noncohabitor or learner only if they married by age 27. Some women in each of these groups marry at later ages. However, I restricted the sample to women who marry by age 27 for consistency; women born in 1960 were 27 years-old at the time of a 1987 interview. The figures are qualitatively similar if one considers an older cohort (e.g., 1935-1950) and an appropriately extended maximum age at first marriage (e.g., 37 years-old).

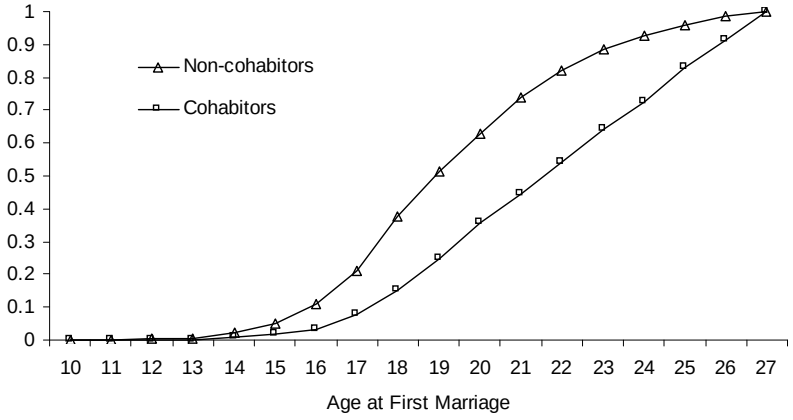
[18] This assumption implies that the pill increases the welfare of all women. A theoretical underpinning to this assumption is provided in Chiappori and Oreffice (2008). See Akerlof, Yellen and Katz (1996) for a model where the pill makes some women worse off, however.

Figure 1: Distributions of age at first marriage among women born 1935-1960 who married by age 27.

Distribution of age at first marriage

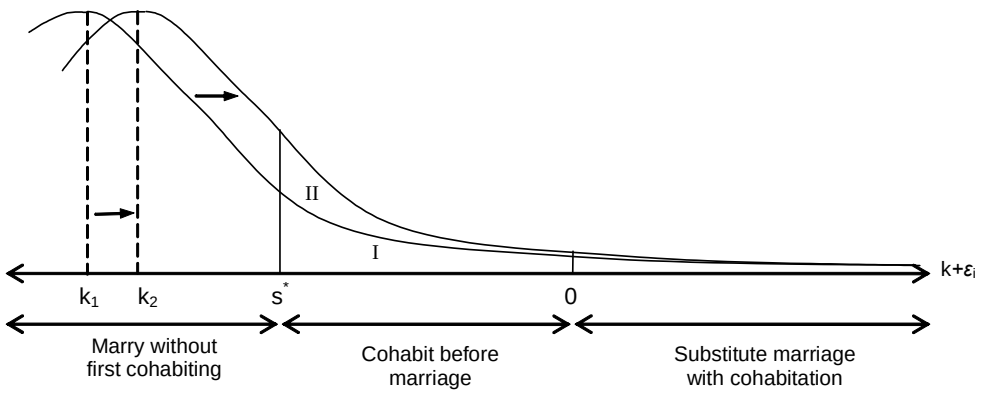


Cumulative distribution of age at first marriage



Source: National Survey of Families and Households, Wave I

Figure 2: The Impact of an Increase in k on Cohabitation Behavior.



valid today since more than half of all couples precede their marriage with cohabitation, this seems like a reasonable assumption for the time period that is the focus of this paper—much fewer than half of women born in the forties cohabited before marrying. Proposition 3 is illustrated in figure 2. Increasing k simply shifts the distribution of $k + \varepsilon_i$ to the right. Since those who cohabit are in the right tail of the distribution, both the fraction of learners and the fraction substitutors in the population will increase. For example, when $k = k_1$, the fraction learners equals the area of region I, but increases to the area of regions I and II when $k = k_2$.

Proposition 3 also implies that the pill causes the probability a woman is married by any given age to fall. Two factor drive this result. First, the pill increases the fraction of women who are substitutors. Second, among those who still do marry, the average woman becomes more selective and therefore takes longer to find a suitable marriage partner. That is, a larger fraction of women become learners and the fraction who are noncohabitors decreases. As discussed earlier, Goldin and Katz (2002) provide evidence that supports this prediction.

Corollary 4 *Suppose $k_1 < s^*$. The introduction of the birth control pill lowers the probability a woman is married by any given age.*

The Lasting Effects of ELA on Cohabitation Behavior. Finally, we come to the question of whether one should expect that granting legal access to the pill for unmarried woman before age 21 should affect cohabitation probabilities after 21. The model can be used to answer this question, and in doing so, I can also show that the estimation strategy used in the paper will *underestimate* the full impact of the pill on cohabitation.

Recall that the pill first became available in 1960, but did not become available to young,

single women throughout the US until 1976 when Missouri finally granted these women access. Call the pre-1960 period the *no-access era*, the 1960-1976 period the *transition era* and the post-1976 era the *full-access era.* While the cross-state variation in timing is crucial for the empirical work, it complicates the theory. I abstractly represent events as follows. To represent the no-access era, let $k = k_1$ for all t. The key aspect of the transition era is that (most) unmarried women over 21 enjoyed legal access to the pill while access was slowly being granted to unmarried women under 21. I model this by assuming all unmarried women had access to the pill upon turning 21. That is, I let $k = k_1$ for all $t < t^*$ and $k = k_2$ otherwise. Here, t^* corresponds to age 21. Finally, model the full-access era by letting $k = k_2$ for all t.

In the no-access and full-access eras, women who marry without first cohabiting are those for whom $k_1 + \varepsilon_i < s^*$ and $k_2 + \varepsilon_i < s^*$, respectively. During the transition, women who marry without first cohabiting *after* period t^* are those for whom $k_2 + \varepsilon_i < s^*$ as well since their decision problem is no different from those in the full-access era. However, prior to period t^*, the decision problem is different. Women know that k will increase from k_1 to k_2 in period t^* (i.e., at age 21). This impending change increases the value of non-marital relationships since women are forward-looking, but the future is discounted so the value of these relationships is not as high as it would be if $k = k_2$ today. Consequently, women during the transition era prior to period t^* (i.e., younger than 21) are more selective than their no-access counterparts, but less selective than their full-access counterparts.[19]

The empirical section of the paper estimates the impact of moving from the transition to the full-access era, rather than from the no-access to full-access eras. The analysis in the previous paragraph implies that moving from the transition to the full-access era will increase the proportion of women at period t^* who are learners or cohabitors but are not yet in a permanent cohabitation or marriage. At the same time, the proportion women who marry without first cohabiting by period t^* will fall. Consequently, even restricting attention women older than 21 (i.e., periods after t^*), the typical unmarried women is more likely to cohabit in the full-access era as compared to the transition era. However, since women under 21 in the transition era are more selective than their no-access counterparts, the magnitude of this effect is smaller than if one were to compare the no-access and full-access eras. The empirical analysis will therefore underestimate the full impact of pill access on cohabitation.

[19] In fact, women in the transition era will become increasingly selective as time approaches t^* since the anticipated increase in k becomes less distant.

3.1 Summary

The simple model in this section analyzed the effects of introducing the pill in an environment where the choice between cohabitation and dating represents a trade-off between a more complete means of assessing relationship quality associated with cohabitation and lower break up costs associated with dating.

The model generated several testable implications of the pill. First, if one restricts attention to a sample of women whose marriages occurred within a given age group (e.g., between 18 and 27), the proportion of women in this sample who preceded marriage with cohabitation will increase. This is the first hypothesis tested in the empirical section below. The second prediction tested below is that the proportion of women who are substitute marriage with cohabitation will increase. The model also predicts that the pill will decrease the probability that a woman is married by a given age, a prediction that finds support in Goldin and Katz (2002). Finally, the model shows that (i) access to the pill before age 21 will have effects on cohabitation behavior after 21 and (ii) the estimated effect of access to the pill for young, unmarried women will be smaller than the effect of granting access to all unmarried women. In other words, the estimates presented below are lower bounds for the total effect of the pill on cohabitation.

4 Data and Empirical Methodology

The broad objective of the econometric analysis is to uncover the causal effect of the birth control pill on cohabitation behavior. To attack this question, I use cross-state variation in the timing of legal access to the pill for young, single women as a quasi experiment. The two predictions from Proposition 3 that I test are (i) that the pill increases the likelihood that a woman will premaritally cohabit with her (first) spouse and (ii) the pill increases the likelihood that a women substitutes marriage with cohabitation. A third prediction, that the share of women who do not premaritally cohabit falls, is a derivative of these two.

I test both of these predictions using the first wave of the National Survey of Families and Households (NSFH). The NSFH is a nationally representative survey of 13,007 individuals conducted 1987-1988 which contains retrospective cohabitation and marriage histories. Some individual characteristics, like income at the time of cohabitation, are not available, but others are, including religious preference. Crucially, the NSFH includes state of residence at age 16, which proxies for state of residence between the ages of 18 and 20, the age group that was most directly affected by the changes in law (Goldin and Katz, 2002).

For both questions, the basic econometric specification takes the form

$$C_{iscy} = \gamma ELA_{scy} + \eta X_{iscy} + \pi Y_{scy} + \alpha_s + \beta_c + \delta_y + \varepsilon_{iscy}, \tag{4}$$

where i indexes individuals, c indexes year of birth (cohort), and s indexes the state in which the respondent lived at age 16, which is a proxy for the state in which the respondent lived between the ages of 18 and 20. The subscript y indexes year of first marriage to capture period effects when estimating the effect of pill access on premarital cohabitation. The binary dependent variable, C_{iscy}, equals one when we observe a cohabitation event. Its precise definition depends on the context as described below. α_s, δ_y, and β_c are sets of dummy variables which control for unobserved state, period, and cohort fixed effects. ELA_{scy} is an indicator variable for whether the respondent's proxy state relaxed their laws to allow young, unmarried women access to the pill by the time the respondent was 21. X_{iscy} contains individual-level controls and Y_{scy} is a vector of state-level marriage market and other controls. The parameter γ on ELA_{scy} is the main parameter of interest and is expected to be positive when testing either prediction.

4.1 Outcome Variables and Sample Selection

4.1.1 First spouse cohabitation

To test the prediction that the pill increases the likelihood that a woman premaritally cohabits with her first spouse, I use the following survey question: "Nowadays, many unmarried couples live together; sometimes they eventually get married and sometimes they don't. Did you and your (first) husband live together before you were married?"[20] C_{iscy} is one if the respondent answers affirmatively.

The sample for this question is restricted to women born between 1935 and 1960 who married between the ages of 18 and 27, and who reported living in one of the fifty American states or the District of Columbia at age 16. While only women born between 1940 and 1956 varied in their access to the pill before age 21, the sample is expanded on this dimension to control for pre-existing cohabitation trends. Since a woman born in 1960 was 27 years old at the time of a 1987 interview, I focus on women who married by age 27 to ensure cohorts are analyzed in a consistent manner. If anything, this will downward bias the estimated impact of legal access if the pill is associated with a delay in marriage and an increased likelihood of first-spouse cohabitation. Almost all states relaxed access laws for women between 18 and 20, but the minimum age varies by state, so I further restrict the sample to those who

[20] The data set also allows me to determine whether a woman lived with *anyone* prior to her first marriage. The results are robust to using this metric of premarital cohabitation as the dependent variable.

Table 2: Summary Statistics Among Sample A Women.

Variable	Mean	Std. Dev.	Minimum	Maximum	N
Dependent variable					
Cohabited with first spouse	0.15	.36	0	1	2516
Access to Fertility Controls					
ELA to pill	0.44	.50	0	1	2523
ELA to abortion	0.37	.48	0	1	2523
Individual-level variables					
Catholic preference	0.27	.45	0	1	2495
Less than high school	0.07	.26	0	1	2520
High school	0.43	.50	0	1	2520
Black	0.10	.30	0	1	2521
White	0.85	.35	0	1	2521
Born out of state	0.41	.49	0	1	2519
Parents divorced	0.09	.28	0	1	2523
Age at interview	38.5	6.98	27	53	2523
Age at first marriage	21.0	2.44	18	27	2523
State-level variables[a]					
Unilateral	0.20	.40	0	1	2477
Pct more than HS (30+)	0.21	0.06	.08	.40	2477
Female LFPR (18+)	0.42	0.06	.25	.61	2477
Pct never married by age 28	0.12	0.05	.00	.47	2477
Single sex ratio	0.92	0.13	.72	2.39	2477
Divorce rate	3.61	2.05	0.4	26.4	2400

Notes: Estimates are weighted. [a]The values of the state level variables are matched to women when they were 21 years old.
Sample: Women born 1935-1960 whose first marriage occurred between 18 and 27 and who lived in the US at age 16.
Sources: NSFH, Wave 1, 1950-1990 decadal censuses, and Wolfers (2006).

married after age 18 to focus on women most directly affect by access laws.[21] I refer to this sample as *sample A*. As shown in Table 2, fifteen percent of women in sample A premaritally cohabited with their first spouse.

4.1.2 Cohabitation as a Substitute for Marriage

It is less straightforward to identify *substitutors*, that is, those who use cohabitation as a substitute for marriage. One must come up with observable, and inevitably imperfect, criteria to distinguish between *learners*, i.e., those who are cohabiting primarily to learn

[21]Including all women who married before age 27 does not significanlty affect the results.

about match quality, and substitutors.[22] I classify a woman as a substitutor if she has never been married and has experienced a cohabitation lasting at least two years. I also explore the robustness of the results to using cohabitations lasting more than three, four, and five years.[23]

The sample for this question is women born between 1935 and 1960 who reported having lived one of the fifty American states or the District of Columbia at age 16. Again, the youngest person in this sample was 27 years-old at the time of interview. For consistency, when classifying persons as substitutors, I consider marital status and maximum cohabitation duration at the age of 27.[24] Without this artificial censoring, older respondents who married after age 27 would not be considered substitutors, which would upward bias the results if women in later cohorts are more likely to be substitutors and to have ELA to the pill. I refer to this sample as *sample B*. As shown in Table 3, only two percent of women in sample B are classified as substitutors.

4.2 Control Variables

The late 1960s and early 1970s was a period of transition for marriage and women in the labor market. Women completed more schooling, participated more in the labor force, and delayed marriage. Bailey and Goldin and Katz show that the pill can explain a non-trivial portion of these changes, and it is known that education and labor force participation are correlated with cohabitation propensities (e.g., Smock, 2000; Ressler and Waters, 1995). In addition to controlling for these attributes at the individual level when possible, I also control for them at the state level in Y_{scy} with the percent of women over 30 who have more than a high school education, the labor force participation rate (LFPR) among women over 18, and the percent of women who have not married by age 28. I also include the state-level singles sex ratio (single males aged 20-29 divided by single females aged 18-27) since it is well-known that sex ratios influence marriage market outcomes (e.g., Grossbard-Shechtman, 1993; Angrist, 2002). These state-level characteristics are calculated from the 1950-1990 decadal censuses using linear interpolation between decades, and are then matched to a

[22] There are other reasons to cohabit, like sharing living expenses, convenience, or to "have an experience," that are not necessarily oriented to long-term partnership formation. However, I lump these cohabitors into either the learner or substitutor categories to keep the analysis simple and because, as noted earlier, the primary reason to cohabit people give in the NSFH is to learn about compatibility prior to marriage.

[23] It is worth noting that it would be a mistake to test this prediction by investigating the impact of ELA to the pill on average duration of a cohabitation. This approach neglects the possibility that the pill may cause new cohabitations to form and that these might be short-term cohabitations. Thus, one may misleadingly conclude that ELA to the pill shortens the duration of the typical cohabitation.

[24] In practice, the NSFH contains relevant duration data only for a person's first cohabitation, current cohabitation if applicable, and cohabitation duration to one's first spouse.

Table 3: Summary Statistics Among Sample B Women.

Variable	Mean	Std. Dev.	Minimum	Maximum	N
Dependent variable					
Substitutor[a]	0.02	0.15	0	1	3810
Access to Fertility Controls					
ELA to pill	0.47	.50	0	1	3810
ELA to abortion	0.40	.49	0	1	3810
Individual-level variables					
Catholic preference	0.25	.43	0	1	3765
Less than high school	0.13	.33	0	1	3803
High school	0.42	.49	0	1	3803
Black	0.13	.33	0	1	3808
White	0.82	.38	0	1	3808
Born out of state	0.40	.49	0	1	3804
Parents divorced	0.10	.30	0	1	3810
Age at interview	38.2	7.39	27	53	3810
Age at first marriage	21.0	3.83	10	51	3330
State-level variables[b]					
Unilateral	0.20	.40	0	1	3750
Pct more than HS (30+)	0.21	0.06	.08	.40	3750
Female LFPR (18+)	0.43	0.06	.25	.61	3750
Pct never married by age 28	0.12	0.05	.00	.47	3750
Single sex ratio	0.92	0.13	.72	2.39	3750
Divorce rate	3.68	1.97	0.4	26.4	3625

Notes: Estimates are weighted. [a]*A* woman is classified as a substitutor if she has never been married and experienced a cohabitation lasting at least two years by the time she turned 27. [b]The values of the state level variables are matched to women when they were 21 years old.
Sample: Women born 1935-1960 and who lived in the US at age 16.
Sources: NSFH, Wave 1, 1950-1990 decadal censuses, and Wolfers (2006).

women for the year and proxy state in which she was 21 years old.

Since ELA was granted in most states around the time that young women gained legal access to abortion, some specifications include dummies indicating whether the woman lived in a state that granted legal access to abortion by the time she was 21.[25] Finally, this period also witnessed an increase in divorce rates and a transition to unilateral divorce in many states. On the chance that the timing of unilateral divorce or divorce rates are systematically correlated with both the timing of ELA and cohabitation behavior, I control for these using data from Wolfers (2006).

[25]Early access to abortion was available by 1970 in Alaska, California, Hawaii, New York, and Washington; by 1972 in Vermont and New Jersey; and by 1973 in all other states with *Roe v. Wade.* This is the same coding used in Bailey (2006).

While using pill *access* rather than pill *use* circumvents the selection problem, it may still be useful to control for observable characteristics which are correlated with a willingness to break community norms and engage in non-traditional behaviors. To this end, I follow Rosenfeld and Kim (2005) in using whether or not a person lives in his or her state of birth as such a characteristic.[26] I also use a dummy indicating whether or not the respondent's parents divorced by the time she turned 18 to identify those who might be more cautious about entering marriage.

Summary statistics for the control variables are shown for the two different samples in Tables 2 and 3. The statistics are quite similar across the two samples, with the obvious exception of age at first marriage. A little less than half of women had early access to the pill, and a somewhat smaller portion had early access to abortion. About forty percent were born in a different state and ten percent of respondents' parents divorced before the respondent turned 18.

5 Results: The Effect of ELA on Cohabitation

A first glance at time trends suggests an important role of pill access in increasing cohabitation. Panel A of Table 4 illustrates a stark contrast between cohorts both in the propensity to cohabit with one's first spouse and in pill access. Women born in the fifties are at least five times more likely to cohabit with their first spouse compared to women born in the forties. At the same time, about 82 percent of the younger cohort had ELA to the pill while 8.5 percent of the older cohort enjoyed such access. Similarly, Panel B of Table 4 shows that 3.9 percent of women born in the fifties were classified as substitutors while only 1.3 percent of women born in the forties were so classified.

While the data in Table 4 demonstrate a compelling coincidence in timing between cohabitation prevalence and greater ELA, an econometric analysis will determine just how much, if any, of the rise in cohabitation is attributable to pill access.

5.1 Probability of Cohabiting with First Spouse and ELA

Table 5 reports average marginal effects from a probit model of the effect of ELA on the likelihood that a woman cohabits with her first spouse prior to marriage. Robust standard errors are reported in parentheses and are corrected for clustering on state-cohort cells, as this is the entity for which early access varied.

[26] Using Census data, Rosenfeld and Kim find that those who live outside of their birth state are more likely to be racially intermarried or to live with a same-sex partner.

Table 4: Percent of Women Who are Learners or Substitutors, by Cohort.

A. First Spouse Cohabitation and ELA to the pill, sample A

Cohort	Cohabited with first spouse	ELA to pill
1950-1959	25.6	82.2
1940-1949	4.7	8.8
Difference[a]	20.9	73.4

B. Substitution and ELA to the pill, sample B

Cohort	Substitutor	ELA to pill
1950-1959	3.89	83.8
1940-1949	1.31	9.1
Difference[a]	2.58	74.7

Notes: The cells provide weighted estimates. [a]All differences are statistically significant at conventional levels.
Sample: Women born 1935-1960 whose first marriage occurred between 18 and 27 years of age and who lived in the US at age 16. (n=2269)
Source: NSFH, Wave I.

The models in columns 1-4 all include state, cohort, and year of marriage dummies. In this way, the effect of access to the pill is identified by within state-cohort-period variation. Column 1 suggests that ELA is associated with a 7.6 percentage point increase in the probability of a first-spouse cohabitation. There may be concern that this estimate is picking up the effect of legal access to abortion, but adding abortion controls has no effect on the estimate, as indicated in column 2. Adding the set of individual controls in column 3 and then state-level controls in column 4 has no effect on the estimate, either, which reinforces the case that legal access to the pill is a valid natural experiment once we control for state, cohort, and period effects.

The probit model in column 5 drops state fixed effects to examine the impact of unobserved state heterogeneity. The estimated effect of pill access falls, which suggests that women in states that passed early access laws earlier were systematically less likely to cohabit with their first spouse. In other words, excluding state fixed effects biases the results. The estimates may also be biased if ELA is associated with state-specific time trends which are correlated with the timing of access laws and cohabitation behavior. For example, perhaps the movement against the double standard—by which promiscuous women were judged more harshly than promiscuous men—matured more quickly in New York than it did in Tennessee, and this movement was correlated with both the timing of laws and cohabitation behavior. To see if such bias exists systematically, I introduce state-specific linear time trends. That is, I include the term $\alpha_s * time_y$, where $time_y$ is the number of years between the year in which the respondent married and 1960, the year in which the pill was introduced as a

Table 5: The Effect of ELA to the Pill on Pre-Marital Cohabitation with First Spouse.

Dependent variable: 1 = cohabited with first spouse						
Regressor	(1)	(2)	(3)	(4)	(5)	(6)
Access to fertility controls						
ELA to pill	.076	.076	.080	.074	.040	.084
	(.029)	(.028)	(.028)	(.029)	(.029)	(.029)
ELA to abortion		-.043	-.059	-.045	-.051	-.012
		(.030)	(.033)	(.035)	(.032)	(-.035)
Individual controls						
Age at marriage			.019	.017	.012	.018
			(.013)	(.014)	(.014)	(.013)
Roman Catholic			-.040	-.045	-.026	-.048
			(.016)	(.017)	(.019)	(.016)
Black			-.010	-.003	.003	.005
			(.041)	(.047)	(.045)	(.046)
White			-.077	-.065	-.046	-.050
			(.041)	(.045)	(.042)	(.046)
Less than HS			.114	.127	.122	.139
			(.031)	(.034)	(.035)	(.033)
High School			.016	.024	.015	.024
			(.015)	(.017)	(.017)	(.017)
Born out of state			.045	.050	.055	.045
			(.015)	(.016)	(.016)	(.016)
Parents divorced before age 18			.051	.051	.051	.047
			(.026)	(.026)	(.028)	(.026)
State-level controls[a]						
Unilateral				-.009	.015	-.025
				(.029)	(.023)	(.036)
Divorce rate				.001	.006	-.034
				(.019)	(.006)	(.026)
Pct of women unmarried by age 28				1.10	.718	.920
				(.603)	(.242)	(.739)
Sex ratio $\left(\frac{\text{single men 20-29}}{\text{single women 18-27}}\right)$				-.014	.072	-.693
				(.229)	(.097)	(.357)
Female LFPR				-1.97	-.570	-.547
(women 18 and over)				(1.01)	(.332)	(1.66)
More than high school				-.174	-.007	.308
(women 30 and over)				(.831)	(.277)	(.987)
Fixed effects[b]	S,C,Y	S,C,Y	S,C,Y	S,C,Y	C,Y	S,C,Y
State-specific linear trends	No	No	No	No	No	Yes
Observations	2415	2415	2380	2221	2239	2221
Pseudo-R^2	.253	.253	.281	.281	.236	.322

Notes: Observations are weighted using NSFH individual weights (WEIGHT) and the coefficients are average marginal effects of a probit model. Robust standard errors, reported in parentheses, are corrected for clustering in cohort-state cells. [a]The values of state-level control variables are matched to the year and state in which the respondent was 21. [b]S, C, and Y are fixed effects for state of residence, year of birth, and year of first marriage. Year of birth is calculated as year of interview minus age.

Sample: Women born 1935-1960 whose first marriage occurred between 18 and 27 years of age and who lived in the US at age 16.

Sources: NSFH, Wave I, 1950-1990 decadal censuses, and Wolfers (2006).

contraceptive. However, comparing columns 4 and 6 reveals no significant bias of this sort.

To gain an interpretation of the power of the pill in explaining the rise in first-spouse cohabitation, notice from Table 5 that ELA to the pill increased from 8.8 to 82.2 percent between the forties- and fifties-born cohorts. Using column 4 estimates, my preferred specification, ELA can explain a 5.4 percentage point increase in first-spouse cohabitation (.074*.734). Since the increase in first-spouse cohabitation was 20.9 percentage points, ELA can explain slightly more than a quarter of the total increase (5.4/20.9). Given the causal interpretation of this estimate and the fact that it is a lower bound estimate, these findings strongly support the claim that early legal access to the birth control pill positively affected a woman's decision to cohabit with her first-spouse prior to marriage. In other words, the pill helped to increase cohabitation's role in the mate selection process.

While the focus of this paper is on pill access and cohabitation, it is worthwhile to comment on the other parameter estimates in Table 5. Though not statistically significant in most specifications, the estimated impact of early legal access to abortion is negative. While the pill and abortion are both viewed as fertility controls, the pill is prevents pregnancy while abortion does not. Thus, a possible explanation for their opposite effects on first-spouse cohabitation is that legal abortion reduced cohabitations formed to deal with unexpected pregnancies which could not be aborted previously. Consistent with the literature, non-whites, non-Catholics, the less educated, those who marry at later ages, and those whose parents divorced are more likely to cohabit. Interestingly, there is a strong positive correlation between living in a state different to one's birth state and cohabitation. As for the state-level controls, a higher proportion of women who have not married by age 28 and a lower female LFPR are associated with more first-spouse cohabitation, but other state-level variables play a statistically insignificant role.

5.2 Cohabitation as a Marriage Substitute and ELA

Having established and quantified a causal effect of pill access on first spouse cohabitation, I now turn to the impact of pill access on the likelihood a women substitutes marriage with cohabitation. Table 6 reports the average marginal effects from a probit model where robust standard errors, corrected for clustering in cohort-state cells, are reported in parentheses.

The specifications in columns 1-4 include cohort and state effects. Column 1 includes only the pill access variable, column 2 adds abortion access, and columns 3 and 4 add individual and state level controls, respectively. While all of these estimates are positive as predicted by the theory, none is statistically significant. This conclusion is not altered if we drop state fixed effects or include state-specific time trends, as shown in columns 5 and

Table 6: The Effect of ELA to the Pill on Substituting Cohabitation for Marriage.

Dependent variable: 1 = Substitutor						
Regressor	(1)	(2)	(3)	(4)	(5)	(6)
Access to fertility controls						
ELA to pill	.011	.010	.018	.016	.010	.018
	(.012)	(.012)	(.011)	(.012)	(.010)	(.014)
ELA to abortion		-.005	-.007	-.002	.003	.014
		(.016)	(.018)	(.019)	(.016)	(.016)
Individual controls						
Roman Catholic			-.010	-.011	-.009	-.015
			(.009)	(.009)	(.009)	(.006)
Black			.020	.022	.013	-.009
			(.018)	(.018)	(.016)	(.013)
White			-.043	-.041	-.040	-.022
			(.019)	(.019)	(.018)	(.017)
Less than HS			.028	.025	.019	.047
			(.013)	(.013)	(.012)	(.018)
High School			-.000	.000	-.001	-.003
			(.007)	(.007)	(.007)	(.008)
Born out of state			.016	.016	.017	.002
			(.007)	(.008)	(.008)	(.006)
Parents divorced before age 18			.006	.007	.012	.013
			(.010)	(.010)	(.010)	(.009)
State-level controls[a]						
Unilateral				.001	-.006	-.000
				(.014)	(.010)	(.016)
Divorce rate				-.013	.002	-.015
				(.009)	(.002)	(.010)
Pct of women unmarried by age 28				.440	.150	-.004
				(.240)	(.085)	(.487)
Sex ratio $\left(\frac{\text{single men 20-29}}{\text{single women 18-27}}\right)$				-.123	-.009	.337
				(.114)	(.038)	(.194)
Female LFPR				-.568	-.161	-2.36
(women 18 and over)				(.530)	(.110)	(1.20)
More than high school				.011	.109	.385
(women 30 and over)				(.380)	(.097)	(.662)
Fixed effects[b]	S,C	S,C	S,C	S,C	C	S,C
State-specific linear trends	No	No	No	No	No	Yes
Observations	3305	3305	3253	3019	3218	1452
Pseudo-R^2	.084	.084	.161	.162	.114	.710

Notes: Observations are weighted using NSFH individual weights (WEIGHT) and the coefficients are average marginal effects from a probit model. Robust standard errors, reported in parentheses, are corrected for clustering in cohort-state cells. [a]The values of state-level control variables are matched to the year and state in which the respondent was 21. [b]S, C, and Y are fixed effects for state of residence, year of birth, and year of first marriage. Year of birth is calculated as year of interview minus age.
Sample: Women born 1935-1960 who lived in the US at age 16.
Sources: NSFH, Wave I, 1950-1990 decadal censuses, and Wolfers (2006).

6, respectively. Finally, the results are robust to using alternative definitions to identify substitutors (not reported).

I conclude from these results that pill access played at most a minor role among the fifties-born cohort in increasing the proportion of substitutors. This finding is consistent with the theory if substitutors are in the deep in the upper tail of the distribution of preferences for unmarried cohabitation over marriage. In this case, pill access would have a small positive, but perhaps unmeasurable, effect on the proportion of women who are substitutors, as depicted in Figure 2.

The effects of variables other than pill access on substitution probabilities (Table 6) are largely consistent with their effects on the likelihood of first spouse cohabitation (Table 5). One notable exception is that the coefficient on *Black* is positive, but this is consistent with the finding that cohabitations among blacks last longer on average (Manning and Smock, 1995).

6 Interpretation and Discussion

The results show that early legal access to the pill played a significant role in making premarital cohabitation a more common experience among young women. This is consistent with the notion that the pill made it easier for couples to have regular sex without the fear of unwanted pregnancy. As a consequence, couples, and most significantly women because of the double standard, were more willing to publicly defy premarital sex norms by cohabiting. This experience allowed them to better assess their compatibility prior to marriage. Of course, other factors played a role in increasing premarital cohabitation; ELA to the pill can explain just over 25 percent of the increase in cohabitation between the forties-born cohort and the fifties-born cohort. The measured effects of ELA to the pill are positive but insignificant when we turn to its impact on the likelihood a woman is classified as a substitutor.

I interpret these findings to mean that the pill played a strong and immediate role in making cohabitation part of the mate selection process, but did not immediately cause more women to substitute marriage with cohabitation. Recall that ELA to the pill can explain a 5.4 percentage point increase in first-spouse cohabitation between the forties- and fifties-born cohorts. Since 4.7 percent of the forties-born cohort cohabited with their first-spouse, ELA to the pill would have more than doubled the percentage of women cohabiting with their first-spouse if early legal access were the only thing that distinguished the cohorts. The theoretical model in this paper categorized women into three groups—non-cohabitors, learners, and substitutors. Thus, while acknowledging that people do not fit neatly into this

typology in real life, the empirical findings roughly indicate that the pill caused the size of the learners group to double. In contrast, the estimates imply the pill had little to no effect on the size of the substitutors group.

These findings are consistent with the four stages of cohabitation through which Kiernan (2002) suggests societies evolve. Only a small minority of nonconformists and the very poor cohabit in the first stage—everyone else marries without first living together. In the second stage, cohabitation jockeys its way into the mainstream as precursor to marriage, and almost everyone marries in the event of an unwanted pregnancy that is brought to term. The third stage arrives when couples feel free to make their cohabitation known to family, friends, and colleagues. Marriage no longer immediately follows as a matter of course in the event of an unwanted pregnancy, but typically does in time if the couple stay together or have more children. Some couples may be regarded as substituting marriage with cohabitation. In the fourth stage, marriage and cohabitation are socially and legally viewed as nearly one in the same.

The US currently appears to be in stage three (Coontz, 2005). This paper demonstrates the vital role the pill played in the US transition from stage one to stage two. The superior fertility control that the pill bestowed to women may have been a prerequisite for a transition from stage two to stage three, but stage three was not an immediate consequence of the pill.

7 Concluding Remarks

This paper adds to the existing body of literature that demonstrates the extent to which the birth control pill helped transform culture and society into what it is today. The pill was a catalyst for more women to obtain professional degrees and participate more in the labor force (Goldin and Katz, 2002 and Bailey, 2006). I have shown that, and quantified the extent to which, the pill helped transform cohabitation from a relatively obscure practice to one that is increasingly common. There are surely more effects of the pill yet to be uncovered. It is truly one of the most influential medical advancements of our time.

8 Appendix

Proof of Lemma 1. First consider a woman who is dating and observes $x_1 = l$. If she chooses to marry or cohabit with her partner, her payoff would be $-\infty$. Continually dating her partner gives a lifetime utility of $\frac{k+\varepsilon_i}{1-\delta} > -\infty$. But breaking up and searching for a new partner is the best option because she receives $k + \varepsilon_i$ in every period of dating and there is a strictly positive probability that $x_1 = h$ with the next person she dates. When this happens, she can increase her expected flow payoff to $\max\{pq_h + (1-p)q_l + k + \varepsilon_i, pq_h + (1-p)q_l\} > k + \varepsilon_i$ by choosing cohabitation or marriage. (Recall that $pq_h + (1-p)q_l > 0$).

Now consider a woman who is dating and observes $x_2 = h$. If she chooses to break up (or to continually date), she receives $\frac{k+\varepsilon_i}{1-\delta}$ in lifetime expected utility. Marriage gives an expected lifetime utility of $\frac{pq_h+(1-p)q_l}{1-\delta}$, and cohabitation gives an expected lifetime utility of at least $\frac{pq_h+(1-p)q_l+k+\varepsilon_i}{1-\delta}$ since this would be the expected lifetime utility to cohabitation if cohabitation were irreversible. Hence, choosing cohabitation or marriage is optimal since this gives at least $\max\left\{\frac{pq_h+(1-p)q_l+k+\varepsilon_i}{1-\delta}, \frac{pq_h+(1-p)q_l}{1-\delta}\right\} > \frac{k+\varepsilon_i}{1-\delta}$.

Now consider a woman who observed $x_1 = h$ while dating, chose cohabitation and observes $x_2 = h$. The highest possible payoff any woman can achieve is $\max\{q_h + k + \varepsilon_i, q_h\}$, so it follows that any woman will lock in this payoff by choosing either a permanent cohabitation or to marry.

Finally, consider a woman who observed $x_1 = h$ while dating, chose cohabitation and observes $x_2 = l$. Breaking up results in a payoff equal to $V_i^d - c$ and continually cohabiting or marrying results in a payoff equal to $\max\left\{\frac{q_l+k+\varepsilon_i}{1-\delta}, \frac{q_l}{1-\delta}\right\}$. We must show $V_i^d - c > \max\left\{\frac{q_l+k+\varepsilon_i}{1-\delta}, \frac{q_l}{1-\delta}\right\}$.

First consider the case $k + \varepsilon_i \geq 0$. We must show $V_i^d - c > \frac{q_l+k+\varepsilon_i}{1-\delta}$. But $V_i^d \geq \frac{k+\varepsilon_i}{1-\delta}$ since one can guarantee $\frac{k+\varepsilon_i}{1-\delta}$ by continually dating, so it is sufficient to show $\frac{k+\varepsilon_i}{1-\delta} - c > \frac{q_l+k+\varepsilon_i}{1-\delta}$, or $-c \geq \frac{q_l}{1-\delta}$, but this is true by assumption.

Next consider the case $k + \varepsilon_i < 0$. We must show $V_i^d - c > \frac{q_l}{1-\delta}$. Suppose instead that $V_i^d - c \leq \frac{q_l}{1-\delta}$. Then a woman will convert her cohabitation to marriage regardless of the realization of x_2 since we know she will do so if $x_2 = h$. Consequently $V_i^c = \frac{pq_h+(1-p)q_l}{1-\delta} + k + \varepsilon_i$. But then $V_i^c < \frac{pq_h+(1-p)q_l}{1-\delta}$, and the individual would not be cohabiting in the first place. That is, she would have chosen marriage over cohabitation upon seeing $x_1 = h$ while dating, which is a contradiction since this scenario presupposes the woman has optimally chosen cohabitation. ■

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