The Effect of Abortion Legalization on Sexual Behavior: Evidence from Sexually Transmitted Diseases

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Abstract

The risk of an unwanted pregnancy represents one of the major costs of sexual activity. When abortion was legalized in a number of states during the late 1960s and early 1970s (and nationally with the 1973 Supreme Court case of *Roe v. Wade*), this cost was reduced as women gained the option of terminating an unwanted pregnancy. We predict that abortion legalization generated incentives leading to an increase in sexual activity, accompanied by an increase in sexually transmitted diseases. Using CDC data on the incidence of gonorrhea and syphilis by state, we test the hypothesis that judicial and legislative decisions to legalize abortion lead to an increase in sexually transmitted diseases. We find that gonorrhea and syphilis incidences are significantly and positively correlated with abortion legalization. Further, we find a divergence in STD rates among early legalizing states and late legalizing states starting in 1970 and a subsequent convergence after the *Roe v. Wade* decision, indicating that the estimated correlation between STD rates and abortion legalization is a causal relationship. According to our estimates, abortion legalization might account for as much as one fourth of the average disease incidence, suggesting that sexual behavior is very responsive to changes in incentives.

I. Introduction

Scholars often focus on general changes in social attitudes, changing demographics, and changing public health practices when investigating sexual behavior and sexually transmitted diseases (STDs), effectively disregarding the importance of incentives for individual behavior. This focus might stem from the general practice, found in most of the non-economic literature on sexuality, of attributing sexual decision-making to primarily biological and environmental influences. For example, Hardy and Zabin (1991) model adolescent pregnancy as being determined by biological make-up and development, as well as family structure and community characteristics. While these forces are important, they do little to shed light on how changing costs and benefits of sexual activities cause individuals to change their behavior. Analyses of sexual practices relying on this non-economic approach often offer no better explanation for changes in behavior than attributing it to a general change in social tastes and preferences.

Analysis of these incentive effects with respect to sexual activity can provide valuable insights that have eluded many public health scholars seeking to understand sexual behavior and its attendant health consequences. STDs represent epidemics of "enormous health and economic consequence in the United States (Institute of Medicine 1997, p.43)." Because of this, the medical community has exhibited great interest in trying to understand the physiological and behavioral determinants of STD incidence. While there are hundreds of articles that examine the characteristics of those people most likely to contract STDs, very little research has been done on how changes in the cost of sexual behavior affect STD infections.

For example, in a report discussing the rise of gonorrhea among teenagers during the early 1970s, the Centers for Disease Control (CDC) suggest that the increase occurred partially because "teenagers became more sexually active (Mascola, Cates, Reynolds, Blount, and Albritton 1983, p.29ss)." While this is a plausible explanation, it provides little insight into what generated the underlying change in sexual activity that led to the increase in gonorrhea. Without probing more deeply, epidemiological models have little chance of explaining changes in the patterns of STDs. This general point is reflected in Kremer's (1996) work on AIDS. He points out that the general epidemiological assumption that behavior is exogenous to environment can lead to incorrect conclusions about the cause of disease patterns and, consequently, to misguided public health policy decisions.

In this paper, we examine whether abortion laws introduced in the early 1970s had an impact on sexual behavior, as measured by the proxy of STD incidence. We hypothesize that legalizing abortion lowered the cost of sexual activity, leading individuals to engage in more sex, causing an increase in STDs. Specifically, we examine the effect on the incidence of gonorrhea and syphilis.

Lately, several researchers have examined the ways in which access to abortion might affect social conditions and behavioral decisions. For example, Donohue and Levitt (2001), Lott and Whitley (2001), and Joyce (forthcoming) examine the relationship between abortion legalization and the decrease in crime in the 1990s. Gruber, Levine, and Staiger (1999) find that individuals who have had abortions would have been forty percent more likely to live in poverty and fifty percent more likely to receive welfare had they instead become single parents. Akerlof, Yellen, and Katz (1996) relate abortion legalization to the decline in shotgun marriages. That abortion legalization had a large social impact is also evidenced in findings that state abortion reforms in 1970 led to a decrease in teen marriage, teen fertility, and teen out-of-wedlock childbearing (Angrist and Evans 1996).

Despite this wave of interest in the effects of abortion legalization, no previous work has examined the public health effects of abortion legalization. We attempt to fill this gap by examining the consequences of abortion legalization with respect to STDs. We use the judicial and legislative decisions to legalize abortion in five states during the period 1969-1970 and the national legalization that occurred with the 1973 Supreme Court decision in *Roe v. Wade* as exogenous changes in the cost of sexual activity. Using state-level panel data for the period 1963-1980, our difference-in-difference analysis allows us to control for environmental factors and identify a causal abortion effect on STDs.[1] We find that much of the change in STD incidence during the 1970s can be attributed to a simple price effect. Abortion legalization accounts for as much as a quarter of the average syphilis and gonorrhea incidence during the period.

To strengthen the claim that this relationship is causal, we exploit the double quasi-experiment provided by abortion legalization. That is, we find that STD rates among early legalizing states diverge from the rates in late legalizing states in about 1970, but the rates for gonorrhea subsequently converge when abortion is legalized nationally in 1973.

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[1]This use of state level panel data to identify a causal relationship is similar to that used by Donohue and Levitt (2001) to determine the causal relationship between these abortion law changes and the decrease in crime rates witnessed during the 1990s.

In Section II below, we present a model predicting that abortion legalization leads to an increase in STDs. Section III describes the empirical model and data. We present our results in Section IV and conclude in Section V.

II. Conceptual framework

We use the standard assumption that individuals consider the costs and benefits of sexual activities before engaging in sexual intercourse (Posner 1992, Levine 2000). Costs include an unplanned pregnancy, and we will focus on this cost in order to develop our key predictions.[2]

There are numerous costs associated with a pregnancy, in addition to the financial costs of giving birth to and raising a child. For example, a pregnancy might lead the mother to forego educational opportunities and achieve lower benefits in the labor market (Angrist and Evans 1996). Additional costs accrue to mothers who have children from unwanted pregnancies, as these children might be more prone to health problems (Gruber, Levine, and Staiger 1999). Even in the case where the child is given up for adoption, the mother pays the physical costs of pregnancy and delivery, as well as the emotional costs that might arise when the baby is given to the adopting parents.

As an unplanned pregnancy is one of the costs of sexual activity, the effect of contraception availability is similar to the effect of abortion availability. If contraception is used, the probability of pregnancy decreases and thus the expected costs decline, leading to an increase in the quantity of sex demanded.[3, 4]

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[2]We derive our predictions assuming heterosexual sexual activities. The implications of relaxing this assumption will be discussed below.

[3]One could also think of the use of contraceptives as leading to an increase in the quantity supplied, if both parties to a sexual event are simultaneously producers and consumers.

[4]Levine (2000) presents a review of the economic literature on downward sloping demand curves for sexual activity, as well as empirical results supporting the claim that demand curves for sexual activity are downward sloping.

The availability of abortion lowers the expected cost of sexual intercourse because the pregnancy can be aborted in the event of undesired conception, thus avoiding many of the costs mentioned above. There are, of course, additional costs associated with the abortion, such as the financial cost of the procedure itself, the physical and/or emotional discomfort induced by the abortion, social or familial opprobrium, and the like. However, the availability of abortion unambiguously lowers the expected cost of sexual intercourse for heterosexual couples relative to a situation in which no abortion option is available.[5]

The legalization of abortion, which occurred nationally in the U.S. with the 1973 Supreme Court case of *Roe v. Wade*, further reduces the expected cost of sexual activity relative to a situation where abortion is available but illegal. Expected costs fall because abortion legalization reduces the search costs for pregnant women in finding an abortion provider. Further, legalization also reduces the penalties for both receiving and providing abortions, thus increasing the supply of abortions and possibly lowering the monetary price of the procedure. Moreover, legalization is likely to lead to improvements in the safety of the procedure.

Since abortion legalization reduces expected costs of sexual activities, we predict that the legalization leads to an increase in the quantity of sexual activity among heterosexual couples. This is not to say that every women or man will increase their sexual activities. For example, some women who would not consider an abortion may not be affected by the decrease in expected costs.[6] It suffices for

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[5]We use the term "couple" generically to designate any pair of individuals who engage in sexual activities.

[6]However, even for these women the cost of rejecting sexual activities rises when abortion is legalized (Akerlof, Yellen, and Katz 1996). Thus these women may increase their sexual activities

our argument that the decrease in expected costs of sexual activities, due to the noted law change, induces a change in behavior for at least some individuals.

STD infection rates are dependent on, among other things, the volume of sexual activity taking place. Since we predict that abortion legalization leads to increased sexual activities, we also predict a positive effect of abortion legalization on STD incidence.

Formally, if utility is a function of the quantity of sexual activity undertaken (S) and a composite good (X), and the cost of sex ©) includes the total expected cost of giving birth to (or alternatively, for the man, bearing responsibility for) an unwanted child, an individual chooses S to maximize total utility, generating the condition

$$\frac{\partial U(S,X)}{\partial S} = \frac{\partial C}{\partial S} \ . \qquad (1)$$

Assuming U(S,X) is concave in S and that the cost of sexual activity is increasing as the quantity rises,[7] equation (1) predicts that when the cost of sexual activities decline, individuals will increase these

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because the cost of rejecting sexual activities rises, but not because the cost of an unplanned pregnancy falls.

[7]This assumption seems reasonable if an individual's chances of having an unwanted pregnancy rise as the level of sexual activity increases.

activities.[8] Essentially, this is an application of the moral hazard concept, or, more fundamentally, the concept of downward sloping demand curves.[9]

In summary, we predict that the decrease in costs due to legalization of abortion leads to an increase in sexual activity. As the primary way to contract a sexually transmitted disease is by sexual activity, the model predicts that abortion legalization leads to an increase of individuals with sexually transmitted diseases.

III. Empirical Methods

Abortion legalization provides a natural quasi-experiment to determine the effect of abortion availability on STD incidence. Analysis of this natural quasi-experiment requires incidence data before and after the legalization period, which occurred between 1969 and 1973. To capitalize on the variation offered by different legalization dates in different states, analysis of this quasi-experiment also requires incidence data by state. Comprehensive incidence data by state fulfilling these criteria are only available for gonorrhea and syphilis.

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[8] A more elaborate model, which generates the same outcome, can be found in Levine and Staiger (2002). In their model, the individual makes decisions sequentially. At the last stage, the individual will have an abortion if the abortion costs are lower than the costs of giving birth. Since the abortion option is available, the individual is less likely to use alternate forms of contraception when engaging in sexual activities.

[9] It is also possible to generate this prediction with a simple model of condom use. If we assume that individuals use condoms to prevent conception and to prevent STD infection but that condoms are costly, abortion availability lowers the contraceptive benefits of condoms without changing the STD prevention value of condoms. This implies that once abortion becomes available, individuals will be less likely to use condoms. As does our model, this model predicts an increase in risky sexual activity due to abortion legalization.

We examine the effect of abortion legalization on both of these STDs. Syphilis is more difficult to treat than gonorrhea, and the U.S. government and medical community have engaged in rigorous efforts to eliminate syphilis cases. These efforts have included increased screening and an expanded treatment network (Gayle and Counts 2001). These efforts have minimized the importance of syphilis in epidemiological terms, as the average incidence of syphilis is 9 cases per 100,000 population over the 1963 to 2000 period, compared with the 280 cases of gonorrhea per 100,000 population over the same period. In 1999, a total of 6,657 syphilis cases in the U.S were reported, compared with a total of 360,076 gonorrhea cases (CDC 2000).

While, in principle, our key prediction applies to both diseases, there are reasons to suspect that the magnitude of the abortion effect might differ between the two. In this regard, of particular importance is the finding that syphilis incidence is more heavily influenced by homosexual sexual activity than is gonorrhea (Gayle and Counts 2001). Since our model and hypotheses do not apply to homosexual couples (for which unintended pregnancy is not an issue), we expect a smaller relative effect of abortion legalization on syphilis rates than on gonorrhea rates.[10]

We estimate the regression equation

$$STDRate_{it} = \beta A_{it} + X_{it}\gamma + \lambda_i + v_t + \varepsilon_{it}, \qquad (2)$$

where the dependent variable $STDRate_{it}$ measures the number of new cases diagnosed with either syphilis or gonorrhea per 100,000 individuals in state *I* during year *t*. The indicator A_{it} equals 1 if abortion is legal for state *I* during year *t* and zero otherwise. Our model predicts a positive sign on the

[10]See, for example, Fox, Whittington, Levine, Moran, Zaidi, and Nakashima (1998) and Hamers, Peterman, Zaidi, Ransom, Wroten, and Witte (1995).

coefficient β. $\mathbf{X}_{it}$ is a vector of time-varying state characteristics and (its vector of coefficients. The term 8_i the state effect, v_t the year effect, and $,_{it}$ is the error term.

As with previous work that uses the state legalization of abortion and *Roe v. Wade* as natural quasi-experiments when examining state incidences of particular variables, we estimate our empirical model by weighted least squares (Donohue and Levitt 2001). Consistent with previous work, we weight our variables with the state population in all of our regressions. We will also examine the sensitivity of our results when we use an ordinary least square model with unweighted variables.

Equation (2) includes both state and time fixed effects. State effects allow us to control for state specific characteristics, such as moral norms, which are otherwise difficult to quantify.[11] Allowing for individual year effects controls for trends which might exist in STD incidence, and for nationwide effects such as changes in sexual awareness or changes in guidelines for reporting cases. Moreover, our year indicators capture other variables that influence STDs nationwide, such as condom use and the use of the pill, which was introduced in the 1950s. As long as the use of these birth control methods does not systematically vary across states and over time, year and state indicators will capture the effects of

[11]One possibility could be to include moral proxies, such as religious membership in our regression equations. Comprehensive state data such as these are not available, but Posner (1992) cites a number of articles suggesting that, once economic variables are included, religious affiliation has little effect on abortion rates.

these methods on STDs.[12] In some specifications, we also control for state specific time trends to check for robustness.

We use Donohue and Levitt's (2001) description of the changes in state abortion laws as our indicator of abortion legalization. While the U.S. Supreme Court effectively legalized abortion nationwide in 1973, a few states had taken this action previously. Specifically, the California Supreme Court legalized abortion in 1969, followed by the legislatures of Alaska, Hawaii, New York, and Washington in 1970. We list these changes in abortion laws in Table 2. In addition to this legalization, a number of states liberalized their abortion policies before 1973 to allow for legal abortions in cases where the mother's life was in danger.[13] We focus on the former cases since they represent a clear-cut reduction in the cost of sexual activity.

Using legalization as an independent variable (as opposed to number of abortions performed, for example) is attractive if the change in abortion laws is an exogenous shock. This assumption is reasonable, since it seems difficult to argue that the timing of the legal decisions was endogenous to

[12]We do not examine the effect of the use of contraceptives such as birth control pills or condoms, since, for most of the period under study, these data are only available at the national level and not at the state level. Given these data limitations and since we use year indicators in our specification, it would be impossible to identify precisely the effects of this contraceptive use. However, we do examine changes in laws concerning the availability of the pill for minors.

[13]Joyce (forthcoming) includes Washington, D.C. as an early legalizer since the D.C. statute limiting abortion to cases where the mother's life was in danger was declared to be unconstitutionally vague in the 1969 case of *U.S. v. Vuitch*, 305 F.Supp. 1032. However, the Supreme Court reversed this ruling in 1971 (91 S.Ct. 1294), declaring that the statute was constitutional. The Court's interpretation of the statute, however, put the burden of proof on the prosecution to show that the mother's life was not in danger. This creates some ambiguity in determining what the effective status of D.C. law was prior to *Roe v. Wade*. Joyce demonstrates that pre-Roe abortion rates in D.C. were higher than either the rate in New York or California, suggesting that D.C. was a *de facto* legalizer. The results presented in our tables were estimated assuming D.C. did not legalize. Our results, however, remain basically unchanged regardless of whether we code D.C. as an early legalizer or not.

STD incidence (or to sexual activity which is the underlying mechanism that generates STDs).[14] Thus, we assume that no unobserved variables simultaneously cause changes of the abortion laws and changes in state STD rates. If the assumption is correct, legalization is a natural quasi-experiment, which caused an exogenous decrease in the cost of sexual activity.

We estimate equation (2) for the 1963 to 1980 time period. We chose this time period because state STD data are available only from 1963 onwards. As a test for the robustness of our results, we will also examine the period between 1963 and 1975. Examining the shorter time period allows us to determine whether the hypothesized change in behavior occurred rapidly, or whether it occurred slowly over time.

As another check for the robustness of our results, we will estimate separate regression equations for males and females, and test for the equality of the abortion law coefficient in both equations. This will allow us to determine whether our results are driven by one sub-group of the population, or whether the change in relative prices of sexual activities, caused by changes in abortion laws, acted uniformly on males and females. If the coefficients on the abortion legalization indicators for males and females are of equal size, the hypothesis is supported that males and females respond equally in terms of changing their sexual activity in response to changes in its cost.

The list of our control variables in the X vector in equation (2) includes per capita income. The predicted relationship between STD incidence and income is ambiguous. The medical literature suggests that STD infections are concentrated among the poor. However, if sexual activity is a normal

[14]This assumption of exogeneity is consistent with previous empirical work on the effects of abortion legalization, such as Donohue and Levitt (2001).

good, we predict a positive relationship between incidence and income.[15] Moreover, STDs might increase with incomes if there is an implicit price involved in securing sexual activity.

We also include per capita transfer payments in our list of covariates.[16] Inclusion of this variable is motivated by evidence that transfer payments induce individuals to be less concerned about becoming pregnant since transfer payments often increase with the addition of a child (Moffitt 1998). We also examine the effect of per capita medical transfer payments. The expected effect of medical transfer payments is ambiguous. These payments might lower the cost of STD treatment, which should limit the amount of infection taking place in a given area; however, higher medical transfer payments might allow for more rigorous screening, reducing the amount of under-diagnoses. Thus, areas with more accurate diagnoses might report more STD cases than states with missed diagnoses. Each of these variables might be endogenously determined.

The medical literature suggests that young people are more likely to contract an STD than older people (Fox, Whittington, Levine, Moran, Zaidi, and Nakashima 1998).[17] We therefore include

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[15]Work by Turner, Rogers, Miller, Miller, Gribble, Chromy, Leone, Cooley, Quinn, and Zenilman (2002) indicates that under-diagnosis among the young is a large problem, especially among black women. Their research suggests that undiagnosed infections might equal the number of diagnosed infections. Fortenberry (1997) reports that, for women, the lag between the time when symptoms of STDs are first recognized and the time when medical care is sought is greater for those with lower household incomes. Each of these findings suggests a “diagnosis” effect, which might be related to income.

[16]Transfer payments represent all payments from federal and state government agencies to individuals.

[17]The age data for inter-census periods are linearly interpolated. Although a smaller age range might be more appropriate to use, the range 15 to 34 is the only one that can be consistently calculated given changes in Census reporting procedures over the period from 1963 to 2000.

demographic variables such as the fraction of state population between the ages of 15 and 34. Since the CDC reports that blacks account for a large proportion of STD cases (CDC 2000), we include percent of population that is black as one of our control variables.[18]

Further, we include the percent of population with a secondary education in our regressions because educated individuals may be more knowledgeable about the fact that sexual activities have the risk of contracting a sexual disease.[19] However, more highly educated individuals might face a lower search cost, leading to more sexual activities and related STDs. Education rates could also be endogenously determined.

We also include per capita alcohol consumption in some of our regressions, since there is evidence that alcohol consumption is highly correlated with STD incidence (CDC 2000 and Shrier, Harris, Sternberg, and Beardslee 2001).[20] This covariate might be problematic though, as alcohol consumption and STD incidence could be simultaneously determined.

Additionally, we include an indicator variable for states that make divorce easier through no-fault divorce rules. A few states changed their rules regarding the grounds necessary for divorce during the same time period that abortion laws were changing. In order to avoid conflating the two changes, we control for changing state divorce rules. Easier divorce rules will generate more divorces which could lead to less monogamy and an accordingly higher level of risky sexual behavior. We report the means and standard deviations of our data in Table 1.

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[18]For inter-census years we linearly interpolated the race variable.

[19]For inter-census years we linearly interpolated the education variable.

[20]Alcohol consumption data for 1963 to1969 are linearly extrapolated.

IV. Results

The results for gonorrhea are reported in Table 3 and the results for syphilis are reported in Table 4. In each table we present four sets of estimates for two time periods, which are 1963-1980 and 1963-1975. In each set of the estimates the first column and its corresponding regression include only the abortion legalization indicator,[21] the second column includes all covariates, the third column excludes the potentially endogenous regressors (education, alcohol consumption, transfer payments, and medical payments), and the last column adds a state-specific time trend.[22]

The legalization coefficient is positive and statistically significant in all specifications of the gonorrhea regressions (Table 3). For the 1963-1980 period the marginal effect of the law change is estimated to be between 5 and 82 extra cases of gonorrhea per 100,000 people. This represents an increase of between 16 and 25 percent, relative to the average state incidence over the time period.[23]

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[21]All of our primary results are robust to using a measure of the number of abortions as an indicator of the cost of obtaining an abortion, instead of the legalization indicator. We do not report those results because of concerns that using that measure would induce a simultaneity bias and that these data are a poor indicator of the true abortion rate, since data on illegal abortions are generally unavailable.

[22]Prior to estimating equation (2) we compared the STD means of abortion-allowing states and abortion prohibiting states for the entire time period (i.e., controlling for no covariates, year, or state effects) in a weighted least squares regression. We found that the mean gonorrhea incidence for state periods in which abortion was legal was 77 cases per 100,000 population higher, representing a 35 percent increase over the average in state periods where abortion was illegal. For syphilis incidence, the mean for periods in which abortion was allowed was higher by 0.1 cases per 100,000 population, representing an increase of 1 percent over the weighted average incidence during periods where abortion was illegal. Thus, our hypothesis finds support in a simple comparison of STD means of before and after abortion legalization.

[23]We also estimated regressions for all time periods in which we interacted the abortion indicator with a time trend to discern whether this effect grew with time, implying perhaps that behavior

The coefficient on the abortion legalization indicator is also positive and statistically significant in all specifications when we examine the 1963 to 1975 time period. We find that the marginal effect of abortion legalization (between 56 and 73 extra cases per 100,000 population) is comparable in this time period relative to the 1963-1980 estimate. This suggests that our findings are not driven by later periods and that the inclusion of later periods actually decreases the marginal effect of abortion legalization.

The estimates for the syphilis regressions in Table 4 show that for the 1963 to 1980 period, the statistical significance of the abortion effect is sensitive to specification of the regression equation, though we do uniformly find the hypothesized positive sign. This may reflect the confounds for syphilis that we discussed above. When we examine the shorter 1963 to 1975 time period, all abortion legalization coefficients have the hypothesized positive sign and are statistically significant. The results for the 1963-1975 period suggest that abortion legalization leads to an increase of about two cases of syphilis per 100,000 population. This represents about a twenty percent increase over average incidence.[24]

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changed slowly. We did not find such an effect. Specifically, it appears as though behavior changed quickly with abortion legalization leading to an immediate and relatively constant increase in baseline incidence.

[24]The results for gonorrhea incidence are qualitatively similar if an OLS model is estimated. For syphilis, the significance of the abortion coefficient is sensitive to which covariates are included in the specification. Also, the results for gonorrhea and syphilis were qualitatively similar if we used ln(incidence) as our dependent variables. The relationship between abortion legalization and incidences of gonorrhea and syphilis are positive in all specifications, though, in some of the time periods, the relationship was not statistically significant at the 5 percent level.

The 1963-1975 period may provide the clearest picture of the effect of abortion legalization, because it minimizes the possibility that there are missing variables in our regressions, as some variables may become important in later years, but are of no importance in the earlier time period. Moreover, because there is no additional variation in the abortion indicator after 1973, later years shed little light on the effect of abortion on STD incidence if the change in behavior occurred rapidly, as opposed to gradually over time.[25]

As for our covariates, income is uniformly positively correlated with both diseases during the longer time period, but for the 1963-1975 period, the result is negative for syphilis, though it is not statistically significant. In most specifications, the positive correlation is statistically significant. This finding is consistent with the hypothesis that sexual activity is a normal good.[26]

In accord with indications from the medical literature, gonorrhea incidence is positively correlated with alcohol consumption. The relationship is statistically significant and positive in every

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[25]By examining the effects of abortion legalization prior to the national legalization in *Roe v. Wade*, we can determine whether the national change in 1973 is driving our results. For both syphilis and gonorrhea, the abortion effect is significantly positive for the period 1963-1972.

[26]Another explanation might be a diagnosis effect. If wealthier people were more likely to have gonorrhea diagnosed than are poorer people, our dependent variable would be measured with error because gonorrhea among the poor goes largely undetected. Since access to healthcare services, including regular doctor visits, is positively correlated with income, this might be plausible. However, much of the CDC's sample comes from sources other than diagnoses in private medical facilities. Specifically, the CDC's data sources include public clinics, Jail STD Monitoring Projects, the U.S. Army, and the Indian Health Service, whose clientele is likely to represent a relatively high proportion of lower income individuals (CDC 2000). Thus, it is unlikely that a diagnosis effect is causing the positive correlation between income and STD rates.

specification.[27] Alcohol is negatively related to syphilis incidence, though the coefficient is not statistically significant.

The results for most of our other covariates are sensitive to the time period and STD examined. For example, a coefficient on the fraction of young people in the population is negative in the gonorrhea regressions but positive in many of the syphilis regressions. In both cases, statistical significance depends on the specification.

The relationship between secondary education and STD incidence is sensitive to the specification. This might reflect the theoretical ambiguity of education's effect on STDs. That is, while schooling increases general health awareness, more educated individuals may face lower search costs in the sex market, leading to increased sexual activity.

We noted above that the predictions derived from the changing cost of sexual activities do not apply for homosexual sexual activities. Assuming that homosexual behavior did not change at the same time that abortion laws changed and that heterosexual matching is roughly proportional (i.e., it is not the case that a relatively small number of men engage in sexual activity with a large number of women, or vice versa), our model predicts that the relationship between STD incidence and abortion legalization is the same for men and women. In particular, we predict the same marginal effect of legalizing abortion for men and for women.

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[27]The alcohol consumption variable measures gallons of per capita consumption of ethanol via beer, wine, and liquor by state. These data are only available beginning in 1970, so we constructed the alcohol consumption variable for the years 1963 to 1969 by both linear extrapolation and by using the 1970 observation for prior years. The magnitude and significance of the relationship between incidence and alcohol consumption was largely independent of which method was used extrapolate the alcohol data.

To test this hypothesis, we examined the data for male and female state gonorrhea and syphilis rates separately. The seemingly unrelated regression (SUR) model allows us to test for the equality of the legalization coefficients in the male STD equation and female STD equation. We report the male and female abortion legalization coefficients from the SUR model for gonorrhea in Table 5. Regardless of the time period or the gender gonorrhea rate examined, all coefficients on abortion legalization are positive and statistically significant. In most specifications the chi-square test for equality of the legalization coefficient in the male and female regressions does not allow us to reject equality at the five percent level.

Table 6 reports the legalization coefficients for both genders in the syphilis regressions. We do not reject equality of the coefficients in the male and female regressions in most of the regressions. For some of the specifications limited to analyzing the period 1963-1975, we reject the equality of legalization coefficients. In these cases, the male infection rate associated with legalization is higher than that of women.

Overall, we therefore find that once we control for other factors that influence STDs, besides abortion legalization, the marginal effect of legalization on STD rates is the same for women and for men. Thus both genders respond equally to a fall in the cost of sexual activities.

This result is interesting in another respect. Specifically, it rules out the possibility that the abortion legalization effect is merely an artifact of increased diagnoses due to abortion. That is, if abortion providers generally perform STD tests on their patients, we might see a relationship between abortion and STD incidence that is related merely to an increased probability of diagnosis rather than a change in sexual activities. Since this form of diagnosis occurs only for women, and if a diagnostic effect were driving our result, we would find a bigger effect for women's incidence than for men's. Since we find no such difference, we can reject this possibility.

As discussed previously, data on the use of contraceptive pills is only available at the national level for most of the period studied. Since we use year fixed effects, it is not possible to net out the effect of possible changes in pill use. Presumably this is not troublesome since birth control pills were available nationally prior the period we examine in this paper.[28] However, there was variation in state laws regarding the ability of young women to obtain the pill, as detailed in Goldin and Katz (2002). To avoid confounding the effect of these law changes with the abortion effect, we use information on these laws to check for robustness of our results. We construct a series[29] on the earliest legal age to obtain contraceptive services without parental consent in each state for the period 1963-1978 and included this variable in the regressions presented in Table 7. As the results indicate, including the pill availability measure does not change our primary result. The abortion coefficients for all specifications for both gonorrhea and syphilis remain positive and statistically significant.

The pill variable measures the earliest age at which a woman can receive contraceptive services without parental consent. We expected a negative relationship between this indicator and STD rates, since a lower age implies that young individuals may obtain contraception more easily, lowering the cost

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[28]The FDA approved the use of norethynodrel as an oral contraceptive for women in 1960 (Goldin and Katz 2002).

[29]To construct this series, we used the information in Goldin and Katz's (2002) Table 2, imputing that the legislated earliest age to obtain contraceptive services for the years 1963-1968 were the same as those existing in 1969. We also assumed that the laws did not change during the period 1975-1978. The results are largely unchanged if we reduce the period of analysis so as to require less interpolation.

of sexual activity to them. The sign and statistical significance of the coefficient was dependent upon the specification.[30]

While our results are certainly suggestive of a causal relationship between abortion legalization and increased sexual behavior, as well as increased STD incidence, they do not fully exploit the quasi-experiment that legalization provides. Following the research design in Levine, Staiger, Kane, and Zimmerman (1999),[31] we can examine what are effectively two separate legalization quasi-experiments. That is, states that legalized prior to the *Roe v. Wade*, decision can be used as a treatment group, with the non-legalizing states serving as the control, for the first quasi-experiment in 1969-1970. Secondly, we can analyze the quasi-experiment provided by the Supreme Court's decision in *Roe v. Wade* as a second quasi-experiment where the early legalizers serve as the control group. If the increase in STD rates is causally related to abortion legalization, we should find a relative increase in STD rates in 1970 among the states that legalize early, but that differential should disappear when other states are forced to legalize in 1973.

Figure 1 shows this 1970 divergence and 1973 convergence quite clearly for gonorrhea. The figure plots the population weighted average gonorrhea incidence of the early legalizing states against the population weighted average for the non-legalizers. We see a sharp divergence in the two rates in

[30]The same qualitative results were estimated when the pill variable took the form of a (0,1) series indicating whether or not a 16 year old (or alternately an 18 year old) could obtain the pill without parental consent.

[31]Their research examines the effect of abortion legalization on fertility rates. They attribute a statistically significant decrease in American birth rates to the availability of abortion.

1970 that subsequently dissipates in 1973. While not quite as clear, Figure 2 suggests a similar pattern of divergence and convergence for syphilis rates.

We can examine this double quasi-experiment more rigorously, however, through the use of regression methods. Again following Levine, Staiger, Kane, and Zimmerman (1999), we create two indicator variables to measure the divergence/convergence relationship. For the early legalizing states, we create an indicator variable equaling one during the years 1970-1972 (1969-1972 for California) and zero for all other years, and zero for all years in the other states. The second indicator variable equals one for the early legalizing states in the years 1973-1980, and zero for all other observations. If the divergence/convergence pattern exists, we should estimate a positive coefficient for the pre-Roe legalization dummy, capturing the fact that those states experienced an increase in STD rates, and we should find no effect from the other dummy since the late legalizing states' STD rates will have converged with those of the early legalizers.

As shown in table 8, we find the predicted relationship for gonorrhea rates, with the early legalizers exhibiting relatively higher gonorrhea rates after legalization, but the statistically significant differential disappears once the other states legalize. This result is consistent for rates among both men and women.

The result does not exist for syphilis rates. While we do indeed find relatively higher syphilis rates among the early legalizers before *Roe v. Wade*, this significantly higher rate does not disappear after the 1973 decision. We offer two partial explanations for this unexpected result. First, as discussed earlier, the importance of homosexual infections for syphilis weakens the predictive power of our theoretical argument for that disease. As our results indicate, the case for convergence is much weaker in male syphilis rates (where the post-Roe differential among early legalizing states is especially big) than for female rates (though convergence is still rejected among women too). Potentially, we are detecting some systematic change in male homosexual behavior that confounds our estimate of the abortion effect.

Secondly, while both gonorrhea and syphilis can be cured with penicillin, syphilis is still contagious for a significant period after treatment, whereas gonorrhea is not contagious after treatment. This lingering effect of syphilis could generate the on-going differential we observe, as the relatively large pool of diagnosed (and presumably treated) but still contagious individuals with syphilis in the early legalizing states continue to spread the disease through their sexual activities.

V. Conclusion

The legalization of abortion in the United States led to many changes socially, economically, and medically. While much recent attention has focused on its effect with respect to the reduction in unwanted pregnancies, there has been little work that examines the consequences of the increase in sexual activity that likely followed legalization.

We investigate the natural quasi-experiment provided by state abortion legalization laws to determine the effect of changing the expected costs of sexual activity on the incidence of sexually transmitted diseases. Changes in abortion laws present a double quasi-experiment since a number of states legalized abortion in various years prior to the national legalization that came with *Roe v. Wade* in 1973. Legalizing abortion provided extra incentives to engage in risky sexual activity.

Legalization led to a lowering of the cost of abortions and this has a qualitatively and quantitatively important effect on STD rates. Our regression results show that abortion legalization led to an increase of sexually transmitted diseases; this result is robust to a wide range of time periods and covariates and is constant across the sexes. The point estimates indicate that legalization caused an increase in the gonorrhea and syphilis rates potentially as large as 25 percent.

In addition to providing further evidence that sexual behavior responds to economic incentives, the results provide an insight into the epidemiology of gonorrhea and syphilis specifically, and, perhaps, STDs in general. Our results attribute a large increase in gonorrhea and syphilis rates to changing sexual behavior, which was induced by abortion law changes. This increase resulted in additional expenditures for the treatment of gonorrhea and syphilis on the order of $300 million per year.[32] If a similar abortion effect exists for other STDs which we could not examine due to data limitations, additional treatment expenditures might amount to more than $4 billion annually.[33]

What is clear, however, is that CDC and medical authorities in general have not considered this abortion effect on STD infection rates, nor that changes in institutions can cause changes in the relative prices faced by individuals. Instead, the medical community tends to attribute the changes in STD rates to fluctuating social mores, changing demographics, and changing diagnosis patterns.[34] As indicated by

[32]The Institute of Medicine (1997) estimated that $1.1 billion was spent in 1994 to treat gonorrhea infections, and an additional $106 million went for syphilis treatments. We estimated the abortion effect as accounting for roughly one third of total incidence.

[33]The Institute of Medicine (1997) estimated that $17 billion was spent on the treatment of all sexually transmitted diseases in 1994.

[34]See, for example, Mascola, Cates, Reynolds, Blount, and Albritton (1983).

our results, ignoring the effects of changing incentives precludes an accurate understanding and modeling of this epidemiological phenomenon.

References

Akerlof, George, Janet Yellen, and Michael Katz (1996). "An Analysis of Out-of-Wedlock Childbearing in the United States." *Quarterly Journal of Economics,* 111(2): 277-317.

Angrist, Joshua and William Evans (1996). "Schooling and Labor Market Consequences of the 1970 State Abortion Reforms." NBER Working Paper: 5406.

CDC (2000). *Sexually Transmitted Disease: Surveillance 1999* (Atlanta, GA: Centers for Disease Control and Prevention).

Cohen, M, I. Hoffman, R. Royce, P. Kazembe, J. Dyer, C. Daly, D. Zimba, P. Vernazza, M. Maida, S. Fiscus, and J. Eron (1997). "Reduction of concentration of HIV-1 in semen after treatment of urethritis: implications for prevention of sexual transmission of HIV-1." *Lancet*, 349(9069): 1868-1873.

Donohue, John and Steven Levitt (2001). "The Impact of Legalized Abortion on Crime." *Quarterly Journal of Economics*, 116(2): 379-420.

Edlund, Lena and Rohini Pande (2002). "Why Have Women Become Left-Wing: The Political Gender Gap and The Decline in Marriage." *Quarterly Journal of Economics*, 117(3): 917-961.

Fortenberry, J. Dennis (1997). "Health Care Seeking Behaviors Related to Sexually Transmitted Diseases among Adolescents." *American Journal of Public Health*, 87(3): 417-420.

Fox, Kimberley, William Whittington, William Levine, John Moran, Akbar Zaidi, and Allyn Nakashima (1998). "Gonorrhea in the United States, 1981-1996: Demographic and Geographic Trends." *Sexually Transmitted Diseases*, 25(7): 386-393.

Gayle, Helene and George Counts (2001). "Syphilis Elimination: A Unique Time in History." *Journal of the American Medical Women's Association*, 56(1): 2-3.

Goldin, Claudia, and Lawrence Katz (2002). "The Power of the Pill: Oral Contraceptives and Women's Career and Marriage Decisions." *The Journal of Political Economy*, 110(4): 730-770.

Gruber, Jonathan, Phillip Levine, and Douglas Staiger (1999). "Abortion Legalization and Child Living Circumstances: Who Is the 'Marginal Child?'" *Quarterly Journal of Economics*, 114(1): 263-291.

Hamers, F., T. Peterman, A. Zaidi, R. Ransom, J. Wroten, and J. Witte (1995). "Syphilis and Gonorrhea in Miami: Similar Clustering, Different Trends." *American Journal of Public Health*, 85(8): 1104-1108.

Hardy, Janet and Laurie Zabin (1991). *Adolescent Pregnancy in an Urban Environment* (Washington, DC: Urban Institute Press).

Institute of Medicine (1997). *The Hidden Epidemic: Confronting Sexually Transmitted Diseases* (Washington, D.C.: National Academy Press).

Joyce, Ted (forthcoming). "Did Legalized Abortion Lower Crime?" *The Journal of Human Resources*.

Kremer, Michael (1996). "Integrating Behavioral Choice into Epidemiological Models of AIDS." *Quarterly Journal of Economics*, 11(2): 549-573.

Levine, Phillip (2000). "The Sexual Activity and Birth Control Use of American Teenagers." NBER Working Paper: 7601.

Levine, Phillip and Douglas Staiger (2002). "Abortion as Insurance." NBER Working Paper: 8813.

Levine, Phillip, Douglas Staiger, Thomas Kane, and David Zimmerman (1999). "Roe v. Wade and American Fertility." *American Journal of Public Health*, 89(2): 199-203.

Lott, John and John Whitley (2001). "Abortion and Crime: Unwanted Children and Out-of-Wedlock Births." *Yale Law and Economics Research Paper*: 254.

Mascola, Laurene, Willard Cates, Gladys Reynolds, Joseph Blount, and William Albritton (1983). "Gonorrhea and Salpingitis Among American Teenagers, 1960-1981." *Mortality and Morbidity Weekly Report: Surveillance Summaries*, 32(3ss): 25ss-30ss.

Moffitt, Robert (1998). "The Effect of Welfare on Marriage and the Family," in Moffitt (ed.) *Welfare, the Family, and Reproductive Behavior* (Washington, DC: National Academy Press).

Posner, Richard (1992). *Sex and Reason* (Cambridge, MA: Harvard University Press).

Posner, Richard (1998). *Economic Analysis of Law*, 5th ed. (New York: Aspen Law & Business).

Shrier, Lydia, Sion Harris, M. Sternberg, and William Beardslee (2001). "Associations of Depression, Self-Esteem, and Substance Use with Sexual Risk among Adolescents." *Preventive Medicine*, 33: 179-189.

Turner, Charles, Susan Rogers, Heather Miller, William Miller, James Gribble, James Chromy, Peter Leone, Phillip Cooley, Thomas Quinn, and Jonathan Zenilman (2002). "Untreated Gonococcal and Chlamydial Infection in a Probability Sample of Adults." *JAMA*, 287(6): 726-733.

Table 1
Summary Statistics

Variable	Description	Mean	Std.dev.	Source
Gonorrhea Incidence	gonorrhea cases per 100,000 population	325.05	320.07	CDC
Female Gonorrhea Incidence	gonorrhea cases per 100,000 women	235.45	213.54	CDC
Male Gonorrhea Incidence	gonorrhea cases per 100,000 men	420.52	469.85	CDC
Syphilis Incidence	syphilis cases per 100,000 population	9.34	13.05	CDC
Female Syphilis Incidence	syphilis cases per 100,000 women	6.33	9.03	CDC
Male Syphilis Incidence	syphilis cases per 100,000 men	12.55	18.23	CDC
Abortion Legal	Abortion Indicator = 1 if abortion is legal	0.46	0.50	Donohue & Levitt (2001)
Early Legalizer Before Roe	Indicator = 1 if state has legalized and year < 1973	0.02	0.13	Levine, et. al. (1999)
Early Legalizer After Roe	Indicator = 1 if state is early legalizer and year > 1972	0.04	0.20	Levine, et. al. (1999)
Pill Age	Earliest Legal Age to Obtain Contraceptive Services without Parental Consent	18.72	2.54	Goldin & Katz (2002)
Secondary Education	percent of population with secondary schooling (inter-census years linearly interpolated)	55.49	10.31	U.S.Census
Personal Income	per capita personal income adjusted by CPI-W	10,352	2,210	BEA, BLS
Transfer Payments	per capita transfer payments adjusted by CPI-W	0.92	0.35	BEA, BLS
Medical Transfers	per capita medical transfer payments adjusted by CPI-W	0.07	0.06	BEA, BLS
Population 15 to 34	percent of state population aged 15-34 (1963-1969 linearly interpolated)	0.31	0.03	U.S. Census
Alcohol Consumption	per capita ethanol consumption (gal); 1963-1969 linearly interpolated	2.54	1.00	NIH

Black Population	percent of state population that is black (inter-census years linearly interpolated)	0.10	0.12	U.S. Census
No-Fault Divorce	no fault divorce indicator = 1 if state allowed	0.34	0.47	Edlund and Pande (2002)

Table 2
States Legalizing Abortion

1969	1970	1971	1972	1973
California	Alaska Hawaii New York Washington			Nationwide

Table 3
Panel Estimation Relating Abortion Legalization to Gonorrhea Incidence
(standard errors in parentheses below coefficient estimates)

	1963-1980				1963-1975			
	(I)	(ii)	(iii)	(iv)	(I)	(ii)	(iii)	(iv)
Abortion Legal	57.71	81.71	53.17	54.81	55.90	72.97	58.76	65.05
	(14.35)	(13.12)	(13.15)	(8.84)	(13.89)	(13.23)	(13.26)	(9.18)
Secondary Education	–	-24.93	–	–	–	-33.56	–	–
		(3.79)				(5.55)		
Personal Income	–	0.06	0.07	0.03	–	0.05	0.06	0.01
		(0.01)	(0.01)	(0.01)		(0.01)	(0.01)	(0.01)
Transfer Payments	–	-23.52	–	–	–	-13.53	–	–
		(42.65)				(61.06)		
Medical Transfers	–	-101.18	–	–	–	-29.68	–	–
		(121.38)				(150.38)		
Population 15-34	–	-5,888.45	-4,822.27	-527.59	–	-3,181.77	-2,237.95	-1,844.47
		(618.54)	(624.31)	(833.75)		(840.91)	(848.99)	(1,057.79)
Alcohol Consumption	–	84.48	–	–	–	72.92	–	–
		(12.34)				(14.22)		
Black Population	–	1,411.92	-200.74	-702.31	–	164.01	-1,414.94	310.39
		(394.89)	(339.93)	(579.26)		(508.82)	(425.41)	(886.83)
No-Fault Divorce	–	20.50	40.67	23.76	–	15.53	34.83	20.05
		(8.51)	(8.61)	(8.48)		(9.55)	(9.63)	(9.28)
State Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Trend	No	No	No	Yes	No	No	No	Yes
Adjusted R^2	0.89	0.92	0.91	0.96	0.88	0.91	0.90	0.96

Note: The dependent variable is the number of individuals per 100,000 who are diagnosed with gonorrhea in year *t* in state *I*. N=918 for 1963-1980, N=663 for 1963-1975. Each regression is estimated with population weights.

Table 4
Panel Estimation Relating Abortion Legalization to Syphilis Incidence
(standard errors in parentheses below coefficient estimates)

	1963-1980				1963-1975			
	(I)	(ii)	(iii)	(iv)	(I)	(ii)	(iii)	(iv)
Abortion Legal	1.01	1.66	0.47	2.30	2.33	1.93	1.73	2.45
	(0.80)	(0.81)	(0.78)	(0.71)	(0.81)	(0.84)	(0.82)	(0.74)
Secondary Education	–	-1.19	–	–	–	-1.40	–	–
		(0.23)				(0.35)		
Per Capita Income	–	0.001	0.001	0.001	–	-0.000	-0.001	-0.001
		(0.000)	(0.000)	(0.001)		(0.001)	(0.001)	(0.001)
Transfer Payments	–	-4.55	–	–	–	7.37	–	–
		(2.63)				(3.89)		
Medical Transfers	–	7.07	–	–	–	-21.19	–	–
		(7.47)				(9.58)		
Population 15-34	–	209.74	225.21	-156.80	–	112.41	74.43	-387.82
		(38.07)	(37.08)	(66.52)		(53.58)	(52.21)	(85.53)
Alcohol Consumption	–	-1.09	–	–	–	-1.63	–	–
		(0.76)				(0.91)		
Black Population	–	14.24	14.67	53.41	–	108.04	99.44	-155.32
		(24.31)	(20.19)	(46.22)		(32.42)	(26.16)	(71.71)
No-Fault Divorce	–	0.06	0.04	-1.60	–	-0.06	0.12	-1.11
		(0.52)	(0.51)	(0.68)		(0.61)	(0.59)	(0.75)
State Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Trend	No	No	No	Yes	No	No	No	Yes

Adjusted R^2	0.81	0.83	0.82	0.87	0.83	0.84	0.84	0.88

Note: The dependent variable is the number of individuals per 100,000 who are diagnosed with gonorrhea in year *t* in state *I*. N=918 for 1973-1980, and N=663 for 1963-1975. Each regression is estimated with population weights.

Table 5
Male-Female Comparison of SUR Results for Gonorrhea Incidence
(standard errors in parentheses below coefficient estimates)

	1963-1980		1963-1975	
	No Covariates	All Covariates	No Covariates	All Covariates
Abortion Legal				
Male	45.67	35.67	57.04	54.79
	(17.38)	(16.04)	(17.86)	(17.17)
Female	68.90	69.50	54.39	61.62
	(13.15)	(12.20)	(11.25)	(10.78)
Test of equality of coefficients				
Chi-square statistic	3.08	6.99	0.04	0.27
p-value	(0.08)	(0.01)	(0.84)	(0.60)

Note: The SUR estimation involves a two-equation system with annual male and female gonorrhea infections per 100,000 of the male, respectively female population as the dependent variables. All specifications include state and year fixed effects. In each system the independent variables are identical. (With the exception of the abortion legalization coefficient, we do not report the individual coefficient estimates). The SUR estimation provides a convenient way to test for the quality of the abortion legalization coefficient in the male and female gonorrhea equations. The covariates in the “All Covariates” regressions are: per capita personal income; population 15-34; black population; and no fault divorce law. N=918 for 1973-1980, and N=663 for 1963-1975. Each regression is estimated with population weights.

Table 6
Male-Female Comparison of SUR Results for Syphilis Incidence
(standard errors below coefficients estimates)

	1963-1980		1963-1975	
	No Covariates	All Covariates	No Covariates	All Covariates
Abortion Legal				
Male	0.91	0.11	2.99	2.08
	(1.02)	(0.99)	(0.99)	(1.00)
Female	1.21	0.90	1.78	1.47
	(0.62)	(0.60)	(0.63)	(0.63)
Test of equality of coefficients				
Chi-square statistic	0.21	1.54	4.32	1.09
p-value	(0.65)	(0.22)	(0.04)	(0.30)

Note: The SUR estimation involves a two-equation system with annual male and female gonorrhea infections per 100,000 of the male, respectively female population as the dependent variables. All specifications include state and year fixed effects. In each system the independent variables are identical. (With the exception of the abortion legalization coefficient, we do not report the individual coefficient estimates). The SUR estimation provides a convenient way to test for the quality of the abortion legalization coefficient in the male and female syphilis equations. The covariates in the "All Covariates" regressions are: per capita personal income; population 15-34; black population; and no fault divorce law. N=918 for 1973-1980, and N=663 for 1963-1975. Each regression is estimated with population weights.

Table 7
Panel Estimation Including Pill Effect
(standard errors in parentheses below coefficient estimates)

	Gonorrhea				Syphilis			
	(I)	(ii)	(iii)	(iv)	(I)	(ii)	(iii)	(iv)
Abortion Legal	59.48	80.16	54.78	56.46	1.77	1.90	1.15	2.08
	(14.65)	(13.12)	(13.49)	(9.93)	(0.80)	(0.80)	(0.79)	(0.71)
Pill Age	0.04	-3.02	-1.41	0.08	0.33	0.20	0.32	-0.19
	(1.74)	(1.59)	(1.64)	(1.49)	(0.10)	(0.10)	(0.10)	(0.12)
Secondary Education	–	-30.94	–	–	–	-1.39	–	–
		(4.62)				(0.28)		
Per Capita Income	–	0.06	0.08	0.02	–	0.001	0.001	0.000
		(0.01)	(0.01)	(0.01)		(0.001)	(0.001)	(0.001)
Transfer Payments	–	-74.16	–	–	–	-0.30	–	–
		(48.87)				(2.99)		
Medical Transfers	–	-0.28	–	–	–	-6.81	–	–
		(132.47)				(8.12)		
Population 15-34	–	-5,368.20	-4,190.33	-541.40	–	203.77	186.07	-207.33
		(694.82)	(706.26)	(914.97)		(42.57)	(41.23)	(72.63)
Alcohol Consumption	–	87.16	–	–	–	-1.33	–	–
		(12.89)				(0.79)		
Black Population	–	1,047.28	-805.94	487.34	–	67.71	63.16	12.27
		(443.92)	(379.32)	(651.01)		(27.20)	(22.15)	(51.67)
No-Fault Divorce	–	20.95	41.21	16.91	–	0.03	0.01	-1.30
		(8.90)	(9.08)	(8.71)		(0.55)	(0.53)	(0.69)
State Trend	No	No	No	Yes	No	No	No	Yes
Adjusted R^2	0.88	0.92	0.91	0.96	0.82	0.84	0.83	0.88

Note: The dependent variable is the number of individuals per 100,000 who are diagnosed with the STD in year *t* in state *I*. N=816. All specifications include year and state fixed effects.

Table 8
Test for Divergence/Convergence
(standard errors in parentheses below coefficient estimates)

	Gonorrhea			Syphilis		
	Total	Male	Female	Total	Male	Female
Early Legalizers	49.56	40.29	57.24	3.51	5.29	1.90
Before 1973	(15.03)	(19.12)	(14.51)	(0.87)	(1.12)	(0.71)
Early Legalizers	-6.24	7.98	-21.18	5.27	8.95	1.72
After 1972	(12.58)	(15.99)	(12.14)	(0.72)	(0.94)	(0.59)

Note: The dependent variable is the number of individuals per 100,000 who are diagnosed with the STD in year *t* in state *I*. N=918. All specifications include year and state fixed effects.

Figure 1: Weighted Average of Gonorrhea Incidence

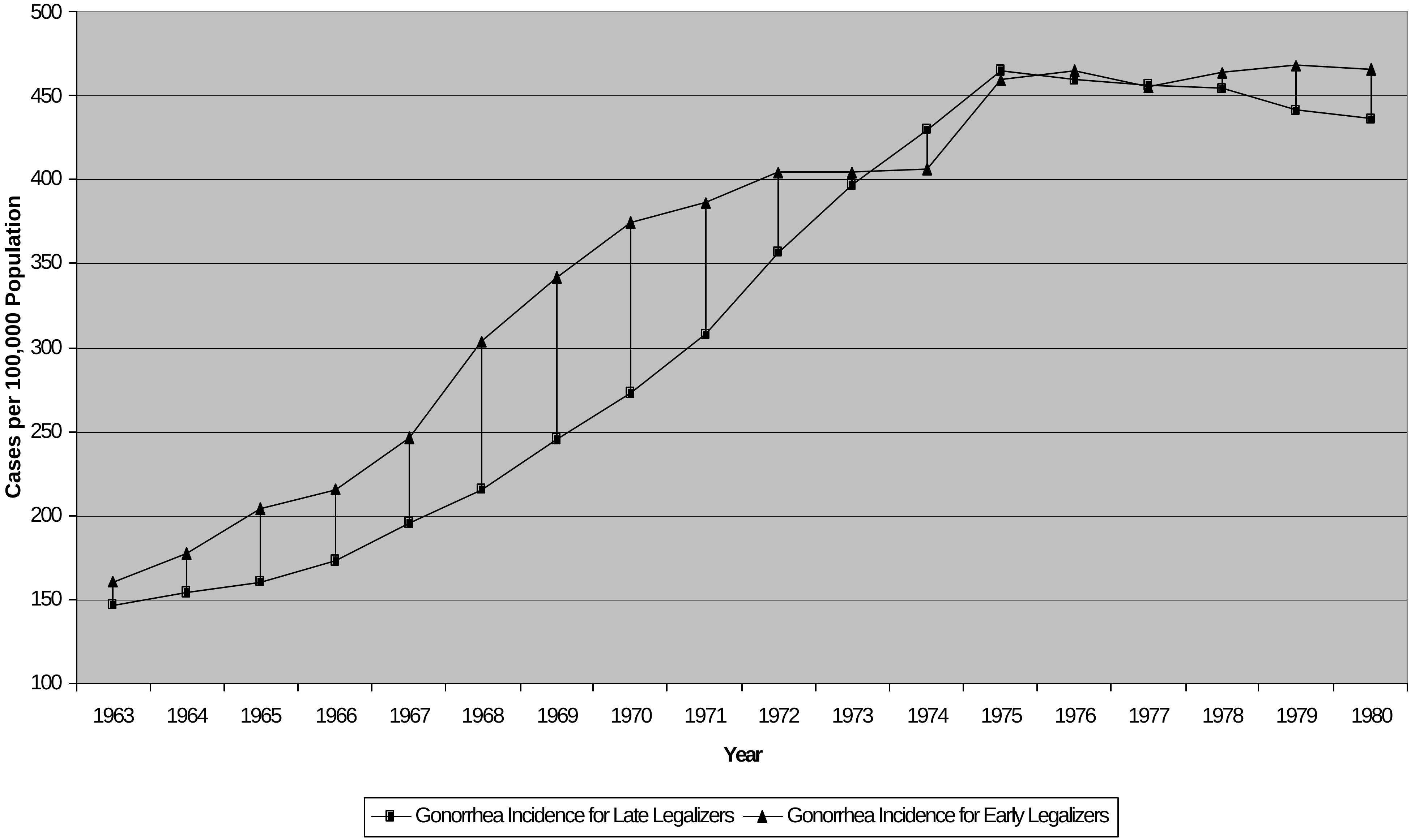

Figure 2: Weighted Average of Syphilis Incidence