In Sickness and in Health:
Same-Sex Marriage Laws and Sexually Transmitted Infections

Andrew M. Francis, Hugo M. Mialon, and Handie Peng*

This paper analyzes the relationship between same-sex marriage laws and sexually transmitted infections in the United States using state-level data from 1981 to 2008. We hypothesize that same-sex marriage laws may directly affect risky homosexual behavior; may affect or mirror social attitudes toward gays, which in turn may affect homosexual behavior; and may affect or mirror attitudes toward non-marital sex, which may affect risky heterosexual behavior. Our findings may be summarized as follows. Laws banning same-sex marriage are unrelated to gonorrhea rates, which are a proxy for risky heterosexual behavior. They are more closely associated with syphilis rates, which are a proxy for risky homosexual behavior. However, these estimates are smaller and less statistically significant when we exclude California, the state with the largest gay population. Also, laws permitting same-sex marriage are unrelated to gonorrhea or syphilis, but variation in these laws is insufficient to yield precise estimates. In sum, the findings point to a modest positive association—if any at all—between same-sex marriage bans and syphilis.

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* Andrew Francis, Hugo Mialon, and Handie Peng, Department of Economics, Emory University, Atlanta, GA 30322-2240 (andrew.francis@emory.edu, hmialon@emory.edu, hpeng4@emory.edu). We are extremely grateful to the Editor, Joanna Coast, two anonymous referees, Dave Frisvold, Mike Grossman, Dan Hamermesh, Ted Joyce, Bob Kaestner, Darius Lakdawalla, Sara Markowitz, Josh Robinson, and seminar participants at the 2011 NBER Health Economics Spring Meeting for wonderfully helpful comments.

I. Introduction

In this paper, we investigate the relationship between same-sex marriage laws and sexually transmitted infections. Today, most U.S. states prohibit marriage between two people of the same sex. For example, Michigan's same-sex marriage ban reads:

> "Marriage is inherently a unique relationship between a man and a woman. As a matter of public policy, this state has a special interest in encouraging, supporting, and protecting that unique relationship in order to promote, among other goals, the stability and welfare of society and its children. A marriage contracted between individuals of the same sex is invalid in this state." (Michigan Compiled Laws Annotated § 551.1)

We hypothesize that same-sex marriage laws may affect homosexual behavior directly, affect it indirectly by changing social attitudes toward gays, or simply reflect changing social attitudes towards gays, which in turn may affect homosexual behavior. We also hypothesize that same-sex marriage laws may affect heterosexual behavior indirectly by changing attitudes toward non-marital sex or reflect changing attitudes toward non-marital sex, which in turn may affect heterosexual behavior. Using a state-level panel dataset from 1981 to 2008, we estimate the connections between same-sex marriage laws and syphilis and gonorrhea. In the paper, syphilis is a proxy for risky homosexual behavior, since syphilis is particularly concentrated among men who have sex with men. 64% of syphilis cases in the US and 79.3% of syphilis cases in California are attributable to men who have sex with men (CDC, 2010a,b; California Department of Public Health, 2010). Gonorrhea is a proxy for risky heterosexual behavior, since more than 90% of gonorrhea cases are attributable to sex between men and women (CDC, 1997).

We summarize our findings as follows. First, there is no association between same-sex marriage bans and gonorrhea. Bans are more closely associated with syphilis. Second, of the different legal measures, bans on both same-sex marriage and civil union are most consistently associated with syphilis. These are the most restrictive type of ban because they deny same-sex

couples access not only to marriage but also to any legal status analogous to marriage. Third, the estimates for same-sex marriage bans are smaller and less significant when we exclude California, the state with the largest gay population. Fourth, there is no evidence of any association between laws permitting same-sex marriage and syphilis or gonorrhea, although there is insufficient variation in these laws to yield precise estimates. Fifth, exploring the causal pathways by which same-sex marriage laws may influence STIs, most evidence suggests that same-sex marriage laws reflect social attitudes toward gays, and some evidence suggests that they may also affect social attitudes. Lastly, there is some evidence that laws affect self-reported sexual behaviors, but these findings are consistent with several interpretations. In sum, the results point to a modest positive association—if any at all—between syphilis and same-sex marriage bans.

This paper contributes to research on risky sexual behavior and STIs (e.g., Ahituv, Hotz, and Philipson, 1996; Cornwell and Cunningham, 2012a, 2012b; Francis and Mialon, 2010; Johnson and Raphael, 2009; Kremer, 1996; Landsburg, 2007; Oster, 2005, 2009; Philipson and Posner, 1994; Portelli, 2004). It also contributes to a burgeoning literature on laws concerning sexual behavior (e.g., Burris and Cameron, 2008; Delavande et al., 2010; Francis and Mialon, 2008; Lazzarini et al., 2002). In particular, a number of studies examine the history and legal attributes of same-sex marriage laws (Brandenburg, 2005; Gonen, 2001; Koppelman, 2005; Kramer, 1997; Metzger, 2007; Ruskay-Kidd, 1997; Schacter, 2009; Schroeder, 2005), while other studies examine the politics and correlates of such laws (Burnett and Salka, 2009; Fleischmann and Moyer, 2009; McVeigh and Diaz, 2009; Soule, 2004).

Dee (2008) is the first study to rigorously evaluate the effects of same-sex marriage laws on STIs. Using panel data on European countries, Dee estimates the effect of the legalization of

same-sex partnerships on the incidence of STIs and finds that same-sex marriage laws decreased the incidence of syphilis but not HIV or gonorrhea. He concludes that the evidence suggests that same-sex marriage laws may promote sexual fidelity. Focusing on the US, Langbein and Yost (2009) find that laws permitting same-sex marriage raised the marriage rate and lowered the abortion rate and percentage of children in female-headed households, while laws prohibiting same-sex marriage lowered the divorce rate, abortion rate, and percentage of children in female-headed households. While this study represents an advance, it uses data from only three years (1990, 2000, and 2004); does not estimate the effects of the laws on STIs; and does not take advantage of available information about the laws, e.g., precise year of passage, whether they were prohibitions by statute or constitutional amendment, or whether they prohibited only same-sex marriage or both marriage and civil union.

Francis and Mialon (2010) examine the relationship between tolerance for gays and the spread of HIV. Using a panel of US states from the mid-1970s to the mid-1990s, they find that tolerance is negatively associated with the HIV rate. The HIV rate is estimated using data on the AIDS rate and the median number of years between HIV infection and the onset of AIDS, prior to the development of highly active antiretroviral therapy (HAART) in 1996. Tolerance is quantified using the measure of attitudes toward homosexuals in the GSS. To complement the GSS measure, state bans on gay marriage are used as a proxy for intolerance. However, the study is far from a rigorous evaluation of the effects of same-sex marriage bans. Many state bans on same-sex marriage were introduced in the post-HAART era, which the study does not analyze, and the study does not take advantage of a wealth of information about the laws.

The remainder of the paper is organized as follows. Section II discusses the theoretical framework. Section III describes the data and empirical strategy. Section IV presents the empirical results. Section V concludes.

II. Theory

In light of previous research, there are several reasons to believe that same-sex marriage laws may induce changes in behavior that impact the spread of STIs, even if same-sex couples did not have the positive right to marry or enter into civil union prior to the passage of the laws.

Same-sex marriage laws may directly affect homosexual behavior. Dee (2008) argues that allowing same-sex marriage can alter the behavioral incentives of homosexuals who aspire to form long-term partnerships. He provides evidence that extending marriage to same-sex couples in Europe resulted in a significant reduction in syphilis, which bolsters the notion that same-sex marriage may raise the gains to forming a committed partnership and reduce the gains to engaging in sexual promiscuity. Conversely, same-sex marriage bans might undermine the incentives to behave monogamously by lowering the expectation that gays will be able to enjoy the economic and emotional benefits of marriage in the near future. By discouraging monogamy, same-sex marriage bans may accelerate the spread of STIs. Alternatively, same-sex marriage bans may affect gays' sense of self-worth or value of life by sending them the message that they are not equal to others or that they are not deserving of the rights enjoyed by others (Kawata, 2010). In the context of the HIV epidemic in Africa, Oster (2005, 2009) finds that the lower is the economic value of life, the greater is the willingness to participate in risky behavior. If this principle may be extended to self-worth, then marriage bans may raise the prevalence of risky sex among gays.

Same-sex marriage laws may also affect homosexual behavior indirectly by changing social attitudes toward gays or, alternatively, may simply reflect changing attitudes towards gays, which in turn, may affect behavior. The law can move as well as mirror social attitudes. Recent research documents evidence that laws can influence attitudes (Alesina and Fuchs-Schündeln, 2007; Fong et al. 2006; Gallus et al., 2006; Kotsadam and Jakobsson, 2011; Soss and Schram, 2007; Svallfors, 2009; Tang et al., 2003). For example, Tang et al. (2003) find that a California smoke-free bar law increased support for smoke-free bars among patrons, while Kotsadam and Jakobsson (2011) find that a Norwegian law criminalizing prostitution made people's attitudes toward prostitution more negative.

Theoretical research proposes several potential causal pathways by which laws might impact attitudes. Laws can affect social costs and benefits underlying the creation of social norms; codify as well as signal social values, which people may internalize to gain cooperation opportunities; signal the prevalence of certain attitudes, which may affect the behavior of those who are concerned with approval; and change social norms by providing a focal point (Carbonara, Parisi, and Wangenheim, 2008; Cooter, 1998; McAdams, 2000; Khan and Stinchcombe, 2010; McAdams and Rasmusen, 2007; Posner, 1998, 2000). Hence, same-sex marriage bans may either reflect attitudes towards homosexuality or influence them by signaling socially-unacceptable and socially-acceptable behaviors, magnifying the stigma associated with same-sex partnerships, and/or conveying information about the prevalence of intolerance toward gays in society.

Whether same-sex marriage laws make or mirror social attitudes toward gays, it remains to establish the link between these attitudes and homosexual behavior. Intolerant attitudes toward gays and social stigma associated with homosexuality may increase the spread of STIs among

gay men. Increasing social costs of same-sex partnerships may induce some men who have had male partners to have only female partners or no partners at all. If such men at the extensive margin of homosexual behavior are of "low-activity" type, as they exit the pool of same-sex partners, it is possible that the overall rate of STI transmission among gays might rise (Francis and Mialon, 2010; Kremer, 1996; Landsburg, 2007). Moreover, intolerance may drive homosexual behavior underground causing gay men to substitute from relatively safe, open, and socially-mediated interactions toward relatively risky, secret, and socially-disconnected interactions (Francis and Mialon, 2010). Also, intolerance may raise the incentives for gays to cluster in urban areas, which reduces search costs for partners and potentially increases the spread of STIs (Müller, 2002).

Furthermore, by codifying traditional family norms and signaling the prevalence of traditional family values, same-sex marriage bans may affect general attitudes toward non-marital sex, or they may simply reflect such attitudes, which may affect the spread of STIs among heterosexuals. Lastly, it has been suggested that same-sex marriage bans may uphold the concept of marriage as an institution committed to sexual fidelity (Girgis, George, and Anderson, 2010; George and Elshtain, 2006; Family Research Council, 2010a, 2010b). If men who have sex with men tend to have sexual partnerships of shorter duration than men who have sex with women, and if they tend to have greater propensity for infidelity, then permitting same-sex couples to marry might weaken expectations of marital fidelity generally, thereby increasing the spread of STIs among heterosexuals. Generally against this hypothesis, Graham and Barr (2008) demonstrate empirical evidence that an increase in same-sex households did not lead to a decrease in heterosexual marriage or an increase in heterosexual cohabitation.

III. Data and Empirical Strategy

A. State Laws on Same-Sex Marriage and Civil Union

Today, 39 states prohibit marriage between two people of the same sex by statute, constitutional amendment, or both; 15 permit same-sex marriage or civil union; and 2 do not have any laws explicitly allowing or disallowing same-sex marriage or civil union. Taking advantage of legal resources (Lexis-Nexis Legal and Hein Online Session Laws Library), we reviewed state statutory law, constitutional law, and court decisions in order to compile a comprehensive database of state laws on same-sex marriage and civil union. Table 1 summarizes the history of these laws. The table lists the year of enactment for statutes prohibiting/allowing same-sex marriage/civil union, constitutional amendments prohibiting same-sex marriage/civil union, and supreme court rulings allowing same-sex marriage. For legal references and notes, please see the Legal Appendix, which the reader can find on the corresponding author's website. Table 1 illustrates that most states (36) currently have statutory bans on same-sex marriage, all of which were enacted since 1973. More than half of states (29) have constitutional bans on same-sex marriage, all of which were enacted since 1998. About half (26) have both statutory and constitutional bans. 18 states prohibit both same-sex marriage and civil union, while 6 states allow civil union. Six states allow same-sex marriage by statute (District of Columbia, Maryland, New Hampshire, New York, Vermont, Washington) and three by court ruling (Connecticut, Iowa, Massachusetts). Only one of these laws was enacted prior to 2008.

In the empirical analysis, we employ six different sets of legal variables. The first (Regression A) is a binary indicator for whether a particular state in a particular year had prohibited same-sex marriage by statute or constitutional amendment. The second (Regression B) consists of binary indicators for whether a state had prohibited same-sex marriage only by

statute or by both statute and constitutional amendment. Of the two measures, the latter is the stronger type of ban because not only was it approved by the state legislature (statute) but also by a majority of voters (constitutional amendment). The third (Regression C) consists of binary indicators for whether a state had prohibited only same-sex marriage or both marriage and civil union. Of the two measures, the latter is the stronger type of ban because not only does it deny same-sex couples access to marriage but also to any legal status analogous to marriage. The fourth (Regression D) is analogous to Regression B but uses the percentage by which the constitutional amendment passed instead of a binary indicator. Information about ballot measures was gathered from the National Conference of State Legislatures (NCSL, 2010). Note that the extent by which the measures passed varied from 52% to 86%, and that every ballot measure put to a public vote was approved. The fifth (Regression E) consists of a set of binary variables indicating the number of years since the passage of a same-sex marriage ban. This is used to investigate the dynamic effects of the bans—whether the effects are temporary or permanent, immediate or delayed. The sixth (Regression F) distinguishes a fuller range of laws from the least permissive (prohibition of both same-sex marriage and civil union) to the most permissive (legalization of same-sex marriage).

B. State Panel Analysis: Dependent Variables

Using a state-level panel dataset from 1981 to 2008, our objective is to estimate the association between same-sex marriage bans and STIs. The top panel of Table 2 displays summary statistics. Except in this table, both dependent variables are logged in order to normalize their distributions, a practice that follows the emerging precedent in the literature on

STIs (e.g., Carpenter, 2005; Chesson et al., 2000; Cornwell and Cunningham, 2012a, 2012b; Dee, 2008).

Dependent variables are the number of syphilis cases per 100,000 population aged 15-44 and the number of gonorrhea cases per 100,000 population aged 15-44 (CDC, 2009).[1] The CDC receives reports of notifiable diseases, including syphilis and gonorrhea, from all state health departments, which obtain data from health care providers and clinical laboratories. Completeness and accuracy of the data depend on factors that determine if and when diagnosis occurs (CDC, 2009). A crucial assumption in this paper is that syphilis is a proxy for risky homosexual behavior. Estimates from 2006 suggest that 64% of all syphilis cases are attributable to men who have sex with men, and the rate of syphilis among men who have sex with men is more than 46 times that of other men and more than 71 times that of women (CDC, 2010a,b). In California, syphilis is even more concentrated among men who have sex with men. Estimates from 2009 indicate that they account for 82.8% of male syphilis cases and 79.3% of cases overall (California Department of Public Health, 2010). In contrast, gonorrhea is a proxy for risky heterosexual behavior since more than 90% of gonorrhea cases are attributable to sex between men and women (CDC, 1997). Figure 1 illustrates trends in syphilis and gonorrhea. With standard deviations of 25 and 477, respectively, their extreme variability across the period is testament to the fact that these are social diseases spread through networks.

C. State Panel Analysis: Controls

State panel regressions include state fixed effects, year effects, and are weighted by state population share. Many include state-specific linear time trends or state-specific linear and

quadratic time trends. Robust standard errors are adjusted for clustering on states (Bertrand, Duflo, and Mullainathan, 2004).

We include a number of state controls in the regressions. The percentage of people aged 25-49 who completed high school, the percentage who completed some college, and the percentage who completed college or more are controls for education, constructed using IPUMS-CPS (King et al., 2010). The percentage of working-age people in the labor force who were unemployed and average real personal income are also constructed using IPUMS-CPS. The percentage urban, based on the Statistical Abstract of the United States, is interpolated between census years (US Census Bureau, 1981-2005). The percentage of the population that was black, the percentage between ages 15 and 29, and the percentage between ages 30 and 44 are derived from data provided by the US Census Bureau (2010). Since religious attitudes may influence the passage of same-sex marriage laws and sexual behavior, we calculate from the GSS the percentage of people who believed the Bible was the literal word of God, the percentage of people who attended religious services nearly every week or more, and the percentage of people who were Protestant, Catholic, Jewish, and other religion (Davis et al., 2010).

We also add several controls to address specific alternative hypotheses. First, other state laws may be related both to the passage of same-sex marriage laws and to sexual behavior. For this reason, we include in the regressions an indicator for whether states had a law that required sex education programs in school to stress abstinence. We also include indicators for whether states either had a law that required parental notification to legally perform an abortion upon a minor or had a law that required parental consent.

Second, illegal drug use represents a potential confounding influence, since it is positively correlated with STIs. In order to account for this, we control for the drug arrest rate as

well as the property crime rate, which is known to be closely associated with patterns of illegal drug use (ONDCP, 2000). Both variables are derived from the Uniform Crime Reports (FBI, 2011; NCOVR, 2011).

Third, same-sex marriage laws may have been passed in response to changes in perceived risky homosexual behavior or changes in visibility of the gay community. Undoubtedly, the observable features of the AIDS epidemic most influence perceived risky homosexual behavior. To some extent, the AIDS epidemic may reflect or affect risky behaviors of gay men. Therefore, we include in regressions the number of AIDS cases per 100,000 population, the principal AIDS statistic publicly reported at the state level (CDC, 1982-2008). Also, the relative size of the gay population may influence perceived homosexual risky behavior and visibility of the gay community. To measure this, we gathered data from historical editions of Damron Men's Travel Guide, the longest and most complete gay men's travel guide (Damron, 1981-1992, 1993-1998, 1999-2008). We include in regressions the state share of total entries (e.g., gay bars, bookstores, restaurants, and churches) listed in the guide.

Fourth, cross-state migration of gay men in response to changes in laws or attitudes might subsequently impact STI rates. Gay men may move from states that pass laws prohibiting same-sex marriage and to states that pass laws permitting same-sex marriage. The inclusion of the state share of total entries listed in the Damron Men's Travel Guide, as described above, can address this issue.

Fifth, it is crucial to consider the emergence of Highly Active Antiretroviral Therapy (HAART) in the mid-1990s. These medical advances significantly extended the life expectancy of those infected with HIV and led to an upsurge of risky sexual behavior among men who have sex with men (Katz et al., 2002; Lakdawalla et al., 2006). It may be important to control for

access to HAART even beyond the set of year indicators included in the regressions. AIDS Drug Assistance Programs (ADAPs) provide HIV-related prescription drugs to low income people living with HIV (US Department of Health and Human Services, 2003). The scale and scope of ADAPs grew substantially during the HAART era. Indicative of this trend, total ADAP funding increased from $204 million in 1996 to $1.5 billion in 2008. We make use of the substantial heterogeneity in ADAP financial eligibility across states and time. In the regressions, we include a measure of access to HAART, which before 1996 is zero and after 1996 is ADAP financial eligibility as a percentage of the Federal Poverty Level (NASTAD, 1998-2009).

D. Individual-Level Analysis

To complement the state panel analysis, we explore the potential causal mechanisms underlying the relationship between same-sex marriage laws and STIs using the GSS, a nationally representative repeated cross-sectional survey of adults (Davis et al., 2010). The bottom panel of Table 2 displays summary statistics for the individual-level dataset. First, we test whether laws reflect or affect social attitudes toward sex. Measures of tolerance for same-sex sex and tolerance for teen sex are constructed from 1982 to 2008. The GSS provides the longest and most consistent measure of society-wide attitudes towards gays. Tolerance for same-sex sex equals one if a respondent believes sexual relations between two adults of the same sex is "not wrong at all" or "wrong only sometimes" and equals zero if a respondent believes it is "almost always wrong" or "always wrong" (Francis and Mialon, 2010). Tolerance for teen sex is defined analogously. Second, we test whether laws reflect or affect sexual behavior. Measures of sexual behavior are limited in the GSS. Three measures are constructed from 1988 to 2008: whether the respondent had same-sex sex in the past year, had multiple sexual partners in the past year, and

had an extra-marital affair ever. Leads of same-sex marriage laws are utilized to examine the possibility that laws reflect social attitudes/sexual behavior, while lags of laws are utilized to examine the possibility that they affect social attitudes/sexual behavior. Since the GSS is conducted roughly every two years, it makes sense to use leads and lags of t+2 and t-2, respectively. Additionally, all individual-level regressions include state fixed effects, year effects, age, gender, race, education, and religious attendance.

E. Empirical Models

In the analysis, we employ OLS and dynamic panel models. Following the literature (e.g., Dee, 2008; Chesson et al., 2000), we implement dynamic panel specifications. In the case of sexually transmitted infections, it may be important to introduce a lagged dependent variable as regressor because the contemporaneous incidence of an infectious disease depends heavily on its prior incidence. We estimate the following equation:

$$s_{i,t} = \gamma s_{i,t-1} + \boldsymbol{\beta}' \boldsymbol{X_{i,t}} + \alpha_i + \mu_t + \varepsilon_{i,t}.$$

The dependent variable, $s_{i,t}$, is the natural log of the syphilis or gonorrhea rate in state *i* and year *t*, α_i and μ_t are state and year fixed effects, respectively, $\boldsymbol{X_{i,t}}$ includes legal variables and state-year controls, and $\varepsilon_{i,t}$ is the error term. Although the inclusion of a lagged dependent variable can create a bias, the magnitude of the bias decreases with the length of the panel, and the least squares fixed effects model with a lagged dependent variable "performs just as well or better than many alternatives when T=30" (Judson and Owen, 1999). Additionally, reverse causality may not be a significant concern when the outcome variables are STIs. Investigating the effects of same-sex marriage laws on STIs in Europe, Dee (2008) argues that such laws were largely exogenous given that the public debates about them centered on issues of "fairness, equality, and

morality" but not on issues of public health. Moreover, the broader population is unaware that syphilis is highly concentrated among men who have sex with men, so reverse causality is unlikely. Syphilis has been around much longer than HIV, and many historical figures suspected or known to have had syphilis, including King Henry the 8th, Lord Byron, Al Capone, and Adolf Hitler, are not typically associated with homosexual behavior. Similarly, measurement error in STI rates may not be a concern, since passage of same-sex marriage laws is unlikely correlated with public awareness of STIs and state STI control policies.

IV. Results

Figures 2 and 3 illustrate the estimated change in syphilis and gonorrhea rates ten years before and ten years after the passage of same-sex marriage bans. To construct the figures, each of the dependent variables was regressed on a set of binary indicators for the number of years before and after enactment, state fixed effects, year effects, and controls. Dotted lines denote confidence intervals. As Figure 2 shows, there was an upward trend in syphilis 5 to 10 years prior to the passage of the laws but the trend was relatively flat 1 to 5 years prior. Following passage, syphilis increased and remained at an elevated level for about 5 years. As Figure 3 shows, there was an upward trend in gonorrhea throughout most of the period. Thus, it may be important to control for time trends.

Table 3 displays regressions of syphilis on bans, state fixed effects, year effects, state-level controls, and state-specific time trends using various measures of same-sex marriage bans. The top panel of the table includes the state of California, and the bottom panel excludes it. In the top panel, several regressions indicate that same-sex marriage bans are positively associated with syphilis. Notably, the coefficients on the various legal measures are significant in dynamic

panel models with linear time trends; and the coefficient on "both marriage & civil union ban" is significant in dynamic panel models with and without linear and quadratic time trends. In the bottom panel, the coefficients are positive but smaller and mostly insignificant; the coefficient on "both marriage & civil union ban" is significant in the dynamic panel model with linear time trends.[2] These findings are consistent with at least three explanations. Same-sex marriage laws may affect behavior directly, may affect behavior indirectly by changing attitudes toward gays, or may simply reflect changing attitudes towards gays, which in turn, affect behavior. Table 4 displays analogous regressions for gonorrhea. The table reveals that none of the coefficients on the legal measures are significant. This finding is inconsistent with the hypothesis that same-sex marriage bans reduce the spread of heterosexual STIs.

It is useful to examine the magnitudes of these estimates and place them in context. Our preferred specification is dynamic panel with time trends including California. Estimates suggest that having any same-sex marriage ban is associated with a 16.3% increase in the syphilis rate, which corresponds to a rise in about 2.2 cases of syphilis per 100,000 population aged 15-44. Having a ban on both marriage and civil union is associated with a 20.8% increase in syphilis, which corresponds to a rise in about 2.9 cases per 100,000 population aged 15-44. Estimates excluding California indicate that having a ban on both marriage and civil union is associated with a 12.9% increase in syphilis, which corresponds to a rise in about 1.8 cases per 100,000 population aged 15-44. These are reasonably-sized estimates given that syphilis had exhibited considerable variation during the study period. Between 2000 and 2008, syphilis increased by 215%, and between 1981 and 2008, the standard deviation of syphilis was 25 cases per 100,000 population.

Table 5 makes use of information about the margin by which the constitutional bans were passed. Note that voter approval ranged from 52% to 86% with mean approval of 68%. The coefficients on "only statutory ban" are consistent with those we found in Tables 3 and 4. Additionally, the sign and significance of the coefficients on "vote in favor of constitutional ban" closely mirror those on "both constitutional and statutory ban" in Tables 3 and 4. As before, the regression results vary considerably with California. When California is excluded, most of the coefficients are insignificant. While the findings in this table might suggest that social attitudes relate to STIs, they do not inform us about how they do so. Using a Regression Discontinuity design would be much more informative, because it would enable us to distinguish the effect of the passage of the law from the effect of underlying voter attitudes. However, we cannot use this technique since every ballot measure on same-sex marriage put to a public vote was approved. Following our state panel analysis, we use GSS individual-level data to distinguish whether laws affect attitudes or attitudes affect laws.

To investigate the dynamic effects of the laws—whether the effects are temporary or permanent, immediate or delayed—we regress each of the dependent variables on a set of binary variables indicating the number of years since the passage of a same-sex marriage ban. Regressions also utilize state fixed effects, year effects, state-specific trends, and state-year controls. Table 6 displays the results. The evidence suggests that when California is included, bans have a statistically significant effect on syphilis in the short and medium term, while bans do not have any effect on gonorrhea at all.

Table 7 examines a range of same-sex marriage laws from the least permissive to the most permissive. Four types of laws were identified: laws that prohibit both same-sex marriage and civil union; those that prohibit same-sex marriage but neither prohibit nor allow same-sex

civil union; those that prohibit same-sex marriage but allow same-sex civil union; and those that allow same-sex marriage or allow same-sex civil union but neither prohibit nor allow same-sex marriage. As of 2012, states that prohibit same-sex marriage but allow same-sex civil union include California, Hawaii, Illinois, Nevada, and Oregon. States that allow same-sex marriage, or allow same-sex civil union but neither prohibit nor allow same-sex marriage, include Connecticut, District of Columbia, Iowa, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Vermont, and Washington. As the table shows, the coefficient on the most permissive type of law, "allow marriage or allow civil union & not ban marriage," is never significant. In contrast, when syphilis is the dependent variable, the coefficient on the least permissive type of law, "ban marriage & civil union," is positive and significant across dynamic panel models that include California. Nevertheless, without California, most of the estimates in the table are smaller and less significant.

Using GSS individual-level data, we investigate the causal pathways by which same-sex marriage laws may influence STI rates. Table 8 displays regressions of attitudes toward same-sex sex and teen sex on state laws, state fixed effects, year effects, and individual-level controls including age, gender, race, education, and religious attendance. To test whether laws reflect social attitudes, the specifications in columns (1) and (2) involve leads of the laws (t+2); to test whether laws affect social attitudes, the specifications in columns (3) and (4) involve lags of the laws (t-2). First, let us consider tolerance for same-sex sex. Although the coefficients on leads of laws permitting same-sex marriage or civil union are not statistically significant, most of the coefficients on leads of laws prohibiting same-sex marriage or civil union are negative and significant. The more restrictive the ban, the larger is the coefficient. Nevertheless, most of the coefficients on lags of the laws remain insignificant. Only the coefficient on "both marriage &

civil union ban" is negative and significant, and only the one on "ban marriage & allow civil union" is positive and significant. In contrast to tolerance for same-sex sex, tolerance for teen sex does not appear to be statistically associated with any leads or lags of same-sex marriage laws. All in all, the evidence is largely consistent with the notion that same-sex marriage laws reflect social attitudes toward gays, but some evidence indicates that they may affect social attitudes as well.

Table 9 displays regressions of measures of sexual behavior on state laws, state fixed effects, year effects, and individual-level controls. To test whether laws reflect changes in sexual behavior, regressions in the first three columns use leads of the laws (t+2); to test whether laws affect sexual behavior, regressions in the last three columns use lags of the laws (t-2). The top panel includes male respondents and the bottom panel female respondents. As the table shows, almost none of the coefficients on leads of the laws are statistically significant. For both men and women, many of the coefficients on lags of bans are negative and significant when the dependent variable is same-sex sex in the past year. The more restrictive the ban, the larger is the coefficient. When the dependent variable is multiple partners, only one coefficient is significant at the 5% level, the one on "allow marriage or allow civil union & not ban marriage" for male respondents, which is positive and significant. Additionally, when the dependent variable is extra-marital affairs, a number of coefficients on same-sex marriage bans are negative and significant for men and women. It is challenging to interpret these findings because they are consistent with several explanations. It could be that laws prohibiting same-sex marriage caused a decrease in same-sex sex and extra-marital affairs, whereas laws permitting same-sex marriage caused an increase in multiple partners for male respondents. However, it also could be that laws

merely influenced cross-state migration and/or reporting of sexual behaviors, since unlike the state panel data, the individual-level data is especially vulnerable to selection and reporting bias.

V. Conclusion

In this paper, we examined the relationship between same-sex marriage laws and sexually transmitted infections. We summarize the evidence as follows. First, there is no evidence of any association between laws prohibiting same-sex marriage/civil union and gonorrhea, a proxy for risky heterosexual behavior. Bans are positively associated with syphilis, a proxy for risky homosexual behavior. Second, of the different legal measures, bans on both same-sex marriage and civil union are most consistently associated with syphilis. These are the most restrictive type of ban because they deny same-sex couples access not only to marriage but also to any legal status analogous to marriage. Third, all the estimates are smaller and less significant when we exclude California, the state with the largest gay population. Fourth, there is no evidence of any association between laws permitting same-sex marriage/civil union and syphilis or gonorrhea, although there is insufficient variation in these laws to yield precise estimates. Fifth, exploring the causal pathways by which same-sex marriage laws may influence STIs, most findings suggest that same-sex marriage laws reflect social attitudes toward gays, and some findings suggest that they may also affect social attitudes. Lastly, there is some evidence that laws affect self-reported sexual behaviors, but these results are consistent with several interpretations.

Thus, the results point to a modest positive association—if any at all—between syphilis and same-sex marriage bans. While we are confident that the effects on syphilis are not large, we remain unsure as to whether or not they are positive. The fragility of the results to the inclusion of California may indicate that there is actually no association between the laws and syphilis or

may indicate that there is too little power to determine whether there is an association. In future research, it may be worthwhile to investigate the association between same-sex marriage laws and STIs in California more specifically. Given that most laws permitting same-sex marriage were enacted toward the end of our study period, it may be fruitful to revisit this question in a few years when additional data become available.

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Figure 1

Trends in Syphilis and Gonorrhea, 1981-2008

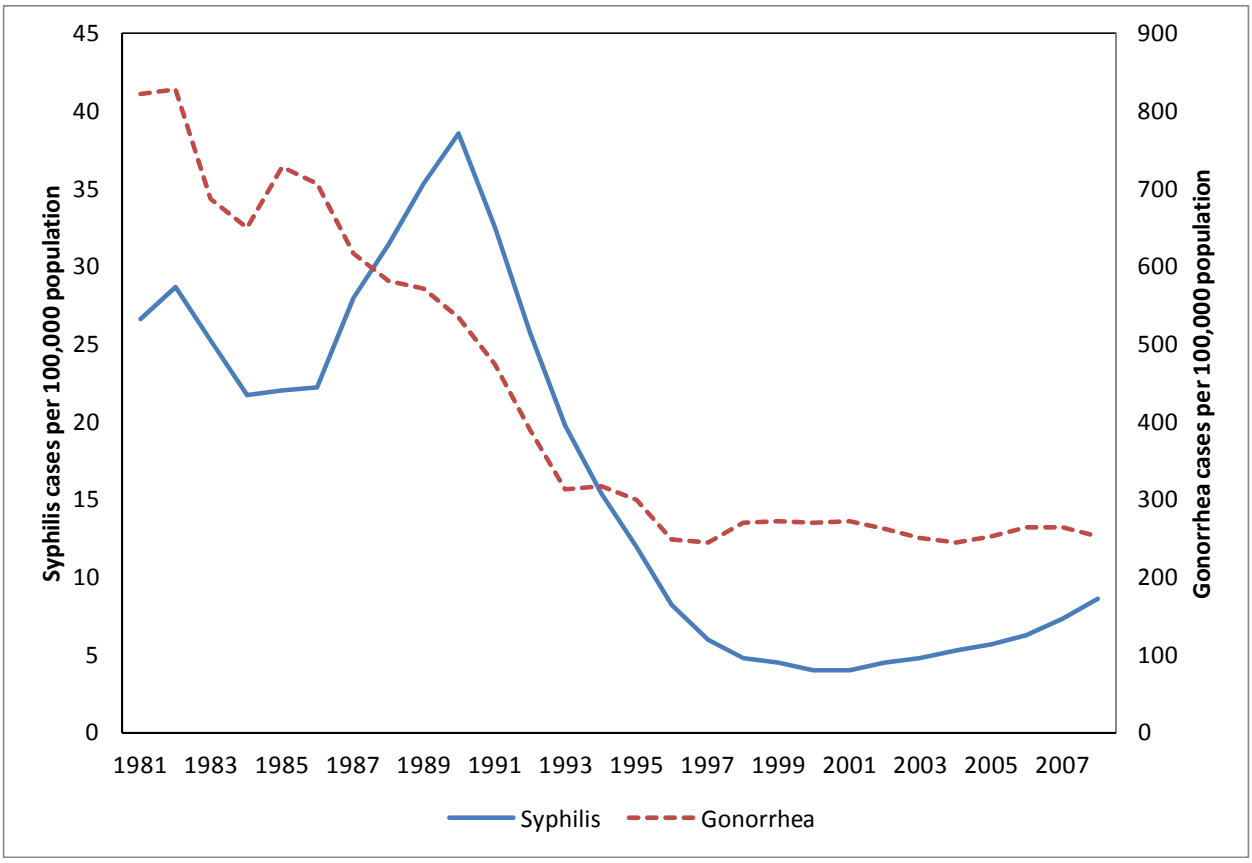

Figure 2

Estimated Change in Syphilis Rates Relative to Timing of Same-Sex Marriage Bans

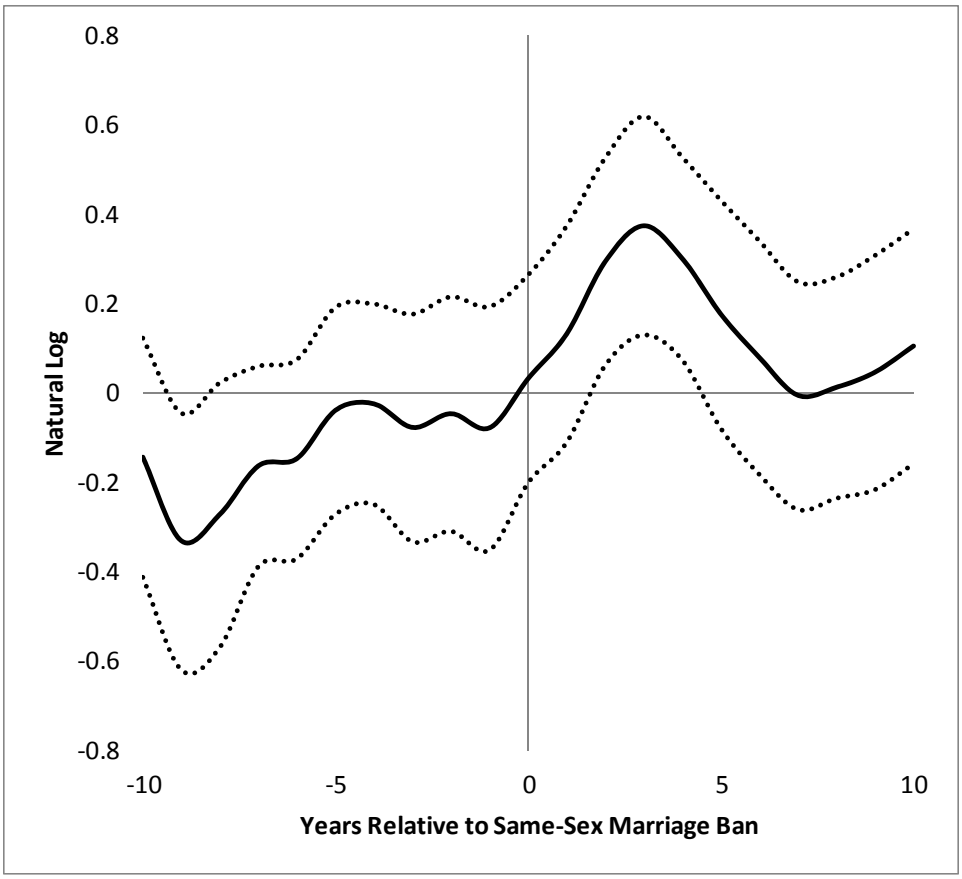

Figure 3

Estimated Change in Gonorrhea Rates Relative to Timing of Same-Sex Marriage Bans

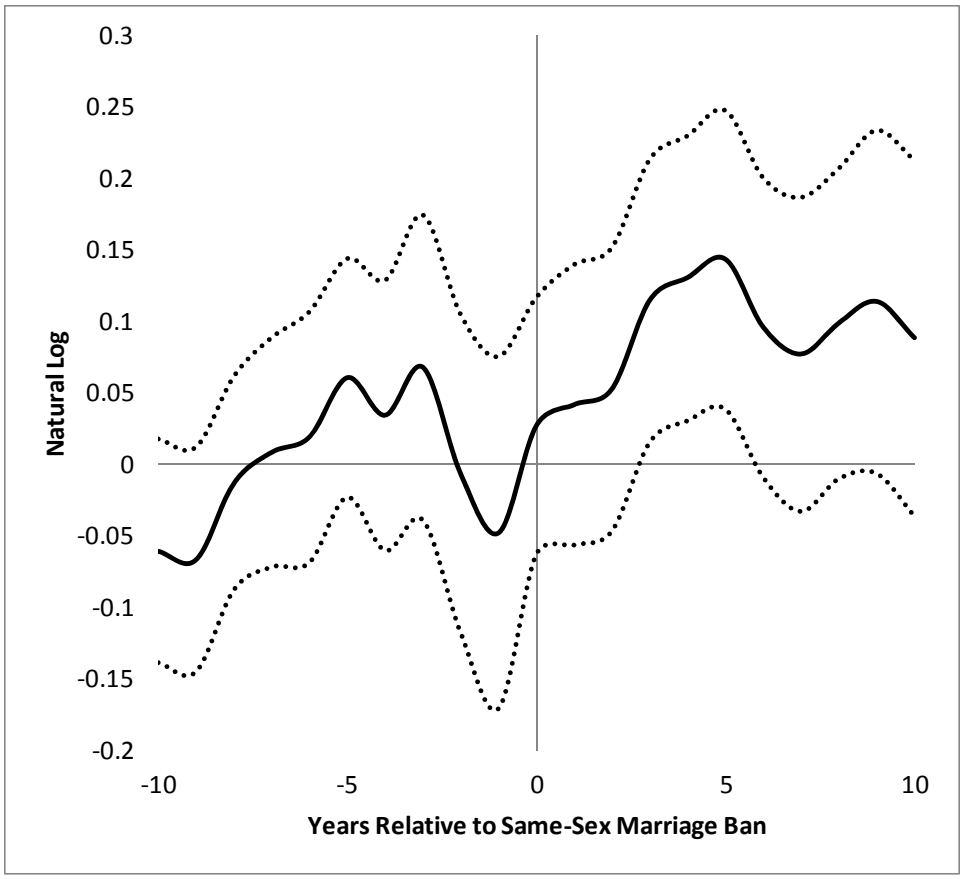

Table 1
State Laws on Same-Sex Marriage and Civil Union

	STATE STATUTES				STATE CONSTITUTIONAL AMENDMENTS		STATE SUPREME COURT RULINGS
State	Prohibit Marriage	Prohibit Civil Union	Allow Marriage	Allow Civil Union	Prohibit Marriage	Prohibit Civil Union	Allow Marriage
Alabama	1998				2006	2006	
Alaska	1996	1996			1998		
Arizona	1996				2008		
Arkansas	1997				2004	2004	
California	2000-2008			2003	2008		
Colorado	2000				2006		
Connecticut	2000-2007			2005-2008			2008
Delaware	1996						
DC			2010	2002-2010			
Florida	1977				2008	2008	
Georgia	1996	1996			2004	2004	
Hawaii	1994			2011			
Idaho	1996				2006		
Illinois	1996			2011			
Indiana	1997						
Iowa	1998-2008						2009
Kansas	1996				2005	2005	
Kentucky	1998				2004	2004	
Louisiana	1988	1988			2004	2004	
Maine	1997						
Maryland	1973-2011		2012				
Massachusetts							2003
Michigan	1996				2004	2004	
Minnesota	1997						
Mississippi	1997				2004		
Missouri	1996-98, 2001				2004		
Montana	1997	1997			2004		
Nebraska					2000	2000	
Nevada				2009	2002		

Table 1
State Laws on Same-Sex Marriage and Civil Union (continued)

	STATE STATUTES				STATE CONSTITUTIONAL AMENDMENTS		STATE SUPREME COURT RULINGS
State	Prohibit Marriage	Prohibit Civil Union	Allow Marriage	Allow Civil Union	Prohibit Marriage	Prohibit Civil Union	Allow Marriage
New Hampshire	1987-2008		2009	2007-2009			
New Jersey				2006			
New Mexico							
New York			2011				
North Carolina	1995						
North Dakota	1997				2004	2004	
Ohio	2004	2004			2004	2004	
Oklahoma	1975				2004		
Oregon	1975			2007	2004		
Pennsylvania	1996						
Rhode Island							
South Carolina	1996				2006	2006	
South Dakota	1996				2006	2006	
Tennessee	1996				2006		
Texas	1997	2003			2005	2005	
Utah	1977	2004			2004	2004	
Vermont	2000-2008		2009	1999-2009			
Virginia	1997	2004			2006	2006	
Washington	1998-2011		2012	2009-2011			
West Virginia	2000						
Wisconsin	1979				2006	2006	
Wyoming	1977						

NOTE. Please see the Legal Appendix, which the reader can find on the corresponding author's website, for legal references and notes.

Table 2
Summary Statistics, 1981-2008

Variable	Sample Size	Mean	Standard Deviation
STATE PANEL DATASET			
Syphilis cases per 100,000 population aged 15-44	1372	13.72	25.14
Gonorrhea cases per 100,000 population aged 15-44	1372	405.02	477.20
AIDS cases per 100,000 population	1372	11.94	22.25
High school %	1372	37.04	6.26
Some college %	1372	25.22	6.07
College %	1372	26.41	6.18
Bible literal word of God %	1372	36.91	25.20
Church attendance nearly every week or more %	1372	38.84	22.26
Protestant %	1372	60.62	25.04
Catholic %	1372	26.20	23.65
Jewish %	1372	1.28	3.76
Other religion %	1372	6.92	14.87
State share of entries in Damron %	1372	2.01	2.64
Abstinence-stressed sex education law	1372	0.27	0.45
Parental consent abortion law	1372	0.39	0.49
Parental notification abortion law	1372	0.25	0.43
ADAP eligibility (% of Federal Poverty Level)	1372	307.53	95.51
Drug arrests per 100,000 population	1372	443.96	293.87
Property crimes per 100,000 population	1372	4142.82	1220.19
Unemployment %	1372	6.40	2.32
Average real personal income (thousands)	1372	18.14	3.09
Black %	1372	11.29	12.08
Urban %	1372	70.34	15.35
Population aged 15-29 %	1372	22.71	2.63
Population aged 30-44 %	1372	22.46	2.12
INDIVIDUAL-LEVEL DATASET			
Tolerance for same-sex sex	23191	0.29	0.45
Tolerance for teen sex	19000	0.13	0.34
Same-sex sex in past year (men)	9090	0.04	0.19
Multiple partners in past year (men)	10778	0.18	0.39
Extra-marital affair ever (men)	6711	0.23	0.42
Same-sex sex in past year (women)	10283	0.03	0.16
Multiple partners in past year (women)	13885	0.09	0.29
Extra-marital affair ever (women)	9411	0.14	0.34

NOTE. Mean ADAP eligibility is calculated for the HAART era, 1996 and later. All individual-level variables are binary. Same-sex sex, multiple partners, and extra-marital affair are only available from 1988 to 2008.

Table 3
Same-Sex Marriage Bans and Syphilis

	Dependent Variable: Syphilis rate					
	OLS			DYNAMIC PANEL		
	(1)	(2)	(3)	(4)	(5)	(6)
Regression A						
Any ban	0.245	0.305	0.237	0.081	0.151	0.123
	(0.128) *	(0.150) **	(0.129) *	(0.055)	(0.082) *	(0.084)
N	1317	1317	1317	1236	1236	1236
Regression B						
Only statutory ban	0.256	0.307	0.234	0.080	0.150	0.121
	(0.128) *	(0.150) **	(0.127) *	(0.055)	(0.082) *	(0.083)
Both constitutional &	0.116	0.254	0.329	0.083	0.179	0.159
statutory ban	(0.145)	(0.212)	(0.201)	(0.066)	(0.094) *	(0.115)
N	1317	1317	1317	1236	1236	1236
Regression C						
Only marriage ban	0.263	0.313	0.229	0.077	0.145	0.110
	(0.138) *	(0.155) **	(0.129) *	(0.059)	(0.085) *	(0.083)
Both marriage & civil	0.149	0.250	0.306	0.101	0.189	0.228
union ban	(0.120)	(0.190)	(0.200)	(0.050) **	(0.084) **	(0.121) *
N	1317	1317	1317	1236	1236	1236
State-Specific Trend	No	Yes	Yes	No	Yes	Yes
State-Specific Trend ^2	No	No	Yes	No	No	Yes
Includes California	Yes	Yes	Yes	Yes	Yes	Yes
	OLS			DYNAMIC PANEL		
	(1)	(2)	(3)	(4)	(5)	(6)
Regression A						
Any ban	0.171	0.152	0.174	0.048	0.061	0.079
	(0.124)	(0.139)	(0.140)	(0.050)	(0.071)	(0.083)
N	1289	1289	1289	1209	1209	1209
Regression B						
Only statutory ban	0.182	0.151	0.169	0.048	0.059	0.077
	(0.125)	(0.138)	(0.135)	(0.051)	(0.070)	(0.081)
Both constitutional &	0.068	0.160	0.345	0.047	0.110	0.134
statutory ban	(0.144)	(0.226)	(0.234)	(0.062)	(0.087)	(0.121)
N	1289	1289	1289	1209	1209	1209
Regression C						
Only marriage ban	0.186	0.150	0.162	0.043	0.048	0.067
	(0.136)	(0.143)	(0.139)	(0.055)	(0.074)	(0.082)
Both marriage & civil	0.105	0.159	0.262	0.069	0.121	0.166
union ban	(0.115)	(0.190)	(0.202)	(0.044)	(0.069) *	(0.109)
N	1289	1289	1289	1209	1209	1209
State-Specific Trend	No	Yes	Yes	No	Yes	Yes
State-Specific Trend ^2	No	No	Yes	No	No	Yes
Includes California	No	No	No	No	No	No

NOTE. Dependent variables are logged. All regressions include state fixed effects, year effects, and state-year controls and are weighted by state population share. Numbers in parentheses are robust standard errors adjusted for clustering on states. A double asterisk indicates significance at the 5% level, and a single asterisk indicates significance at the 10% level.

Table 4
Same-Sex Marriage Bans and Gonorrhea

	Dependent Variable: Gonorrhea rate					
	OLS			DYNAMIC PANEL		
	(1)	(2)	(3)	(4)	(5)	(6)
Regression A						
Any ban	0.073	0.031	-0.002	0.019	0.032	0.010
	(0.058)	(0.063)	(0.046)	(0.028)	(0.038)	(0.037)
N	1372	1372	1372	1323	1323	1323
Regression B						
Only statutory ban	0.074	0.031	-0.002	0.018	0.031	0.010
	(0.057)	(0.064)	(0.047)	(0.028)	(0.039)	(0.038)
Both constitutional &	0.061	0.031	0.003	0.032	0.059	0.016
statutory ban	(0.094)	(0.069)	(0.054)	(0.041)	(0.041)	(0.045)
N	1372	1372	1372	1323	1323	1323
Regression C						
Only marriage ban	0.077	0.038	0.002	0.018	0.030	0.009
	(0.057)	(0.066)	(0.050)	(0.028)	(0.041)	(0.041)
Both marriage & civil	0.054	-0.011	-0.036	0.025	0.042	0.014
union ban	(0.090)	(0.065)	(0.051)	(0.041)	(0.040)	(0.039)
N	1372	1372	1372	1323	1323	1323
State-Specific Trend	No	Yes	Yes	No	Yes	Yes
State-Specific Trend ^2	No	No	Yes	No	No	Yes
Includes California	Yes	Yes	Yes	Yes	Yes	Yes
	OLS			DYNAMIC PANEL		
	(1)	(2)	(3)	(4)	(5)	(6)
Regression A						
Any ban	0.037	-0.065	-0.034	-0.003	-0.024	-0.019
	(0.058)	(0.051)	(0.047)	(0.023)	(0.033)	(0.037)
N	1344	1344	1344	1296	1296	1296
Regression B						
Only statutory ban	0.035	-0.067	-0.036	-0.005	-0.026	-0.020
	(0.058)	(0.052)	(0.047)	(0.022)	(0.035)	(0.037)
Both constitutional &	0.054	-0.004	0.043	0.024	0.038	0.034
statutory ban	(0.094)	(0.079)	(0.054)	(0.040)	(0.044)	(0.046)
N	1344	1344	1344	1296	1296	1296
Regression C						
Only marriage ban	0.038	-0.066	-0.033	-0.005	-0.031	-0.021
	(0.059)	(0.054)	(0.052)	(0.023)	(0.037)	(0.041)
Both marriage & civil	0.032	-0.060	-0.043	0.009	0.010	-0.000
union ban	(0.085)	(0.067)	(0.052)	(0.036)	(0.037)	(0.035)
N	1344	1344	1344	1296	1296	1296
State-Specific Trend	No	Yes	Yes	No	Yes	Yes
State-Specific Trend ^2	No	No	Yes	No	No	Yes
Includes California	No	No	No	No	No	No

NOTE. Dependent variables are logged. All regressions include state fixed effects, year effects, and state-year controls and are weighted by state population share. Numbers in parentheses are robust standard errors adjusted for clustering on states. A double asterisk indicates significance at the 5% level, and a single asterisk indicates significance at the 10% level.

Table 5
Vote in Favor of Same-Sex Marriage Bans

	Dependent Variable: Syphilis rate					
	OLS			DYNAMIC PANEL		
	(1)	(2)	(3)	(4)	(5)	(6)
Regression D						
Only statutory ban	0.219	0.307	0.261	0.080	0.160	0.141
	(0.127) *	(0.150) **	(0.127) **	(0.055)	(0.081) *	(0.082) *
Vote in favor of	0.000	0.004	0.006	0.001	0.003	0.003
constitutional ban	(0.002)	(0.003)	(0.003) *	(0.001)	(0.001) **	(0.002) *
N	1317	1317	1317	1236	1236	1236
State-Specific Trend	No	Yes	Yes	No	Yes	Yes
State-Specific Trend ^2	No	No	Yes	No	No	Yes
Includes California	Yes	Yes	Yes	Yes	Yes	Yes
Regression D						
Only statutory ban	0.147	0.151	0.190	0.047	0.069	0.094
	(0.126)	(0.142)	(0.137)	(0.051)	(0.071)	(0.082)
Vote in favor of	-0.000	0.002	0.006	0.001	0.002	0.003
constitutional ban	(0.002)	(0.003)	(0.003) *	(0.001)	(0.001)	(0.002)
N	1289	1289	1289	1209	1209	1209
State-Specific Trend	No	Yes	Yes	No	Yes	Yes
State-Specific Trend ^2	No	No	Yes	No	No	Yes
Includes California	No	No	No	No	No	No
	Gonorrhea rate					
	OLS			DYNAMIC PANEL		
	(1)	(2)	(3)	(4)	(5)	(6)
Regression D						
Only statutory ban	0.058	0.027	0.005	0.015	0.033	0.016
	(0.058)	(0.066)	(0.049)	(0.028)	(0.041)	(0.039)
Vote in favor of	0.000	0.000	0.000	0.000	0.001	0.000
constitutional ban	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
N	1372	1372	1372	1323	1323	1323
State-Specific Trend	No	Yes	Yes	No	Yes	Yes
State-Specific Trend ^2	No	No	Yes	No	No	Yes
Includes California	Yes	Yes	Yes	Yes	Yes	Yes
Regression D						
Only statutory ban	0.020	-0.074	-0.035	-0.009	-0.027	-0.018
	(0.058)	(0.055)	(0.047)	(0.022)	(0.036)	(0.038)
Vote in favor of	0.000	-0.000	0.001	0.000	0.001	0.001
constitutional ban	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
N	1344	1344	1344	1296	1296	1296
State-Specific Trend	No	Yes	Yes	No	Yes	Yes
State-Specific Trend ^2	No	No	Yes	No	No	Yes
Includes California	No	No	No	No	No	No

NOTE. Dependent variables are logged. All regressions include state fixed effects, year effects, and state-year controls and are weighted by state population share. Numbers in parentheses are robust standard errors adjusted for clustering on states. A double asterisk indicates significance at the 5% level, and a single asterisk indicates significance at the 10% level.

Table 6
Dynamic Effects of Same-Sex Marriage Bans

	Dependent Variable					
	Syphilis rate					
	(1)	(2)	(3)	(4)	(5)	(6)
Regression E						
First 2 years after ban	0.219	0.229	0.178	0.176	0.106	0.121
	(0.104) **	(0.135) *	(0.128)	(0.111)	(0.126)	(0.133)
Years 3-6	0.300	0.306	0.152	0.181	0.084	0.053
	(0.171) *	(0.230)	(0.222)	(0.154)	(0.203)	(0.234)
Year 7 onwards	0.147	0.179	0.075	0.080	-0.009	-0.007
	(0.188)	(0.269)	(0.248)	(0.184)	(0.257)	(0.258)
N	1317	1317	1317	1289	1289	1289
State-Specific Trend	No	Yes	Yes	No	Yes	Yes
State-Specific Trend ^2	No	No	Yes	No	No	Yes
Includes California	Yes	Yes	Yes	No	No	No
	Gonorrhea rate					
	(1)	(2)	(3)	(4)	(5)	(6)
Regression E						
First 2 years after ban	0.036	0.023	-0.004	0.017	-0.045	-0.023
	(0.052)	(0.059)	(0.044)	(0.055)	(0.062)	(0.049)
Years 3-6	0.117	0.068	0.005	0.044	-0.069	-0.050
	(0.083)	(0.102)	(0.070)	(0.074)	(0.091)	(0.059)
Year 7 onwards	0.090	0.022	0.007	0.054	-0.077	-0.005
	(0.082)	(0.117)	(0.078)	(0.084)	(0.130)	(0.077)
N	1372	1372	1372	1344	1344	1344
State-Specific Trend	No	Yes	Yes	No	Yes	Yes
State-Specific Trend ^2	No	No	Yes	No	No	Yes
Includes California	Yes	Yes	Yes	No	No	No

NOTE. Dependent variables are logged. All regressions include state fixed effects, year effects, and state-year controls and are weighted by state population share. Numbers in parentheses are robust standard errors adjusted for clustering on states. A double asterisk indicates significance at the 5% level, and a single asterisk indicates significance at the 10% level.

Table 7
Same-Sex Marriage and Civil Union Laws

	Dependent Variable: Syphilis rate						Gonorrhea rate					
	OLS			DYNAMIC PANEL			OLS			DYNAMIC PANEL		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Regression F												
Ban marriage & civil union	0.149	0.247	0.312	0.095	0.185	0.227	0.042	-0.017	-0.033	0.021	0.040	0.015
	(0.115)	(0.199)	(0.206)	(0.049) *	(0.087) **	(0.120) *	(0.090)	(0.070)	(0.052)	(0.041)	(0.041)	(0.040)
Ban marriage & not ban	0.210	0.237	0.215	0.065	0.129	0.113	0.046	-0.011	-0.005	0.007	0.011	0.005
or allow civil union	(0.130)	(0.138) *	(0.128) *	(0.059)	(0.084)	(0.081)	(0.055)	(0.057)	(0.049)	(0.024)	(0.036)	(0.039)
Ban marriage & allow	0.806	1.015	0.630	0.153	0.307	0.032	0.295	0.474	0.214	0.109	0.217	0.146
civil union	(0.253) **	(0.305) **	(0.307) **	(0.094)	(0.115) **	(0.142)	(0.113) **	(0.102) **	(0.134)	(0.069)	(0.083) **	(0.120)
Allow marriage or allow civil	0.218	0.115	-0.077	-0.025	-0.085	-0.086	-0.033	0.006	-0.042	0.000	0.015	0.023
union & not ban marriage	(0.215)	(0.252)	(0.281)	(0.096)	(0.126)	(0.174)	(0.079)	(0.109)	(0.096)	(0.038)	(0.040)	(0.055)
N	1317	1317	1317	1236	1236	1236	1372	1372	1372	1323	1323	1323
State-Specific Trend	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
State-Specific Trend ^2	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Includes California	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	OLS			DYNAMIC PANEL			OLS			DYNAMIC PANEL		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Regression F												
Ban marriage & civil union	0.121	0.162	0.263	0.063	0.119	0.170	0.022	-0.062	-0.041	0.005	0.011	0.003
	(0.113)	(0.190)	(0.204)	(0.045)	(0.069)*	(0.110)	(0.086)	(0.069)	(0.051)	(0.037)	(0.037)	(0.035)
Ban marriage & not ban	0.197	0.149	0.167	0.039	0.051	0.075	0.031	-0.072	-0.028	-0.007	-0.030	-0.017
or allow civil union	(0.135)	(0.145)	(0.140)	(0.056)	(0.074)	(0.081)	(0.061)	(0.055)	(0.051)	(0.024)	(0.037)	(0.041)
Ban marriage & allow	0.289	0.190	0.058	0.005	-0.027	-0.124	0.065	0.181	-0.158	-0.058	-0.058	-0.174
civil union	(0.320)	(0.217)	(0.512)	(0.134)	(0.098)	(0.221)	(0.147)	(0.223)	(0.121)	(0.059)	(0.097)	(0.087) *
Allow marriage or allow civil	0.150	0.088	-0.149	-0.051	-0.104	-0.187	-0.095	0.008	-0.070	-0.034	0.004	-0.015
union & not ban marriage	(0.202)	(0.259)	(0.283)	(0.098)	(0.128)	(0.146)	(0.088)	(0.104)	(0.085)	(0.036)	(0.037)	(0.041)
N	1289	1289	1289	1209	1209	1209	1344	1344	1344	1296	1296	1296
State-Specific Trend	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
State-Specific Trend ^2	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Includes California	No	No	No	No	No	No	No	No	No	No	No	No

NOTE. Dependent variables are logged. All regressions include state fixed effects, year effects, and state-year controls and are weighted by state population share. Numbers in parentheses are robust standard errors adjusted for clustering on states. A double asterisk indicates significance at the 5% level, and a single asterisk indicates significance at the 10% level.

Table 8
Tolerance for Same-Sex Sex and Teen Sex Using GSS Microdata

	Dependent Variable			
	Tolerance for same-sex sex	Tolerance for teen sex	Tolerance for same-sex sex	Tolerance for teen sex
	(1)	(2)	(3)	(4)
	Leads of Laws (t+2)		Lags of Laws (t-2)	
Regression A				
Any ban	-0.033	-0.006	-0.008	0.003
	(0.012) **	(0.010)	(0.013)	(0.011)
Regression B				
Only statutory ban	-0.033	0.003	-0.007	0.003
	(0.012) **	(0.011)	(0.012)	(0.011)
Both constitutional & statutory ban	-0.045	-0.009	-0.030	0.006
	(0.022) **	(0.016)	(0.026)	(0.020)
Regression C				
Only marriage ban	-0.032	-0.005	-0.000	0.005
	(0.012) **	(0.010)	(0.013)	(0.012)
Both marriage & civil union ban	-0.043	-0.014	-0.041	-0.007
	(0.020) **	(0.015)	(0.024) *	(0.017)
Regression F				
Ban marriage & civil union	-0.044	-0.010	-0.038	-0.006
	(0.020) **	(0.017)	(0.024)	(0.016)
Ban marriage & not ban or allow civil union	-0.038	-0.005	-0.005	0.013
	(0.012) **	(0.010)	(0.013)	(0.012)
Ban marriage & allow civil union	-0.002	0.012	0.038	-0.043
	(0.023)	(0.029)	(0.021) *	(0.028)
Allow marriage or allow civil union & not ban marriage	-0.022	0.012	-0.003	0.053
	(0.034)	(0.017)	(0.039)	(0.038)
N	22845	18674	22845	18674

NOTE. All specifications include state fixed effects, year effects, and individual-level controls, including age, gender, race, education, and religious attendance. Numbers in parentheses are robust standard errors adjusted for clustering on state-year. A double asterisk indicates significance at the 5% level, and a single asterisk indicates significance at the 10% level.

Table 9
Sexual Behaviors Using GSS Microdata

	Dependent Variable					
	Same-sex sex in past year	Multiple partn-ers in past year	Extra-marital affair ever	Same-sex sex in past year	Multiple partn-ers in past year	Extra-marital affair ever
	(1)	(2)	(3)	(4)	(5)	(6)
	Leads of Laws (t+2)			Lags of Laws (t-2)		
			Male respondents			
Regression A						
Any ban	-0.010	-0.009	0.012	-0.018 **	-0.010	-0.048 **
	(0.007)	(0.014)	(0.022)	(0.008)	(0.015)	(0.019)
Regression B						
Only statutory ban	-0.008	-0.021	-0.007	-0.017 **	-0.011	-0.049 **
	(0.007)	(0.014)	(0.023)	(0.008)	(0.015)	(0.019)
Both constitutional & statutory ban	-0.013	-0.025	0.007	-0.035 **	-0.003	-0.037
	(0.011)	(0.022)	(0.030)	(0.011)	(0.026)	(0.031)
Regression C						
Only marriage ban	-0.009	-0.007	0.015	-0.016 **	-0.011	-0.037 *
	(0.007)	(0.014)	(0.022)	(0.008)	(0.015)	(0.019)
Both marriage & civil union ban	-0.017	-0.018	-0.003	-0.030 **	-0.006	-0.111 **
	(0.012)	(0.020)	(0.025)	(0.011)	(0.023)	(0.024)
Regression F						
Ban marriage & civil union	-0.014	-0.014	-0.005	-0.031 **	0.003	-0.100 **
	(0.013)	(0.020)	(0.027)	(0.011)	(0.024)	(0.024)
Ban marriage & not ban or allow civil union	-0.010	-0.008	0.005	-0.016 **	-0.014	-0.044 **
	(0.007)	(0.014)	(0.023)	(0.008)	(0.014)	(0.019)
Ban marriage & allow civil union	0.004	0.007	0.054	-0.019 *	0.044	0.060
	(0.011)	(0.030)	(0.037)	(0.011)	(0.051)	(0.043)
Allow marriage or allow civil union & not ban marriage	0.013	0.017	-0.016	-0.013	0.085 **	0.085
	(0.015)	(0.030)	(0.032)	(0.015)	(0.030)	(0.054)
N	8956	10620	6618	8956	10620	6618
			Female respondents			
Regression A						
Any ban	-0.001	-0.007	0.011	-0.023 **	-0.013	-0.033 **
	(0.006)	(0.009)	(0.012)	(0.006)	(0.008)	(0.012)
Regression B						
Only statutory ban	-0.005	-0.009	0.017	-0.022 **	-0.013	-0.031 **
	(0.007)	(0.009)	(0.012)	(0.006)	(0.008)	(0.012)
Both constitutional & statutory ban	-0.013	-0.023 *	0.004	-0.037 **	-0.015	-0.063 **
	(0.010)	(0.014)	(0.021)	(0.012)	(0.017)	(0.020)
Regression C						
Only marriage ban	-0.002	-0.008	0.014	-0.022 **	-0.017 *	-0.030 **
	(0.006)	(0.009)	(0.012)	(0.007)	(0.009)	(0.012)
Both marriage & civil union ban	0.008	0.003	-0.004	-0.030 **	0.008	-0.047 **
	(0.008)	(0.013)	(0.020)	(0.010)	(0.015)	(0.023)
Regression F						
Ban marriage & civil union	0.013	0.007	-0.005	-0.031 **	0.011	-0.051 **
	(0.009)	(0.013)	(0.021)	(0.010)	(0.015)	(0.023)
Ban marriage & not ban or allow civil union	0.000	-0.006	0.016	-0.024 **	-0.015 *	-0.026 **
	(0.006)	(0.009)	(0.012)	(0.006)	(0.008)	(0.012)
Ban marriage & allow civil union	-0.002	-0.009	0.005	-0.005	-0.015	-0.089 **
	(0.016)	(0.019)	(0.023)	(0.028)	(0.039)	(0.017)
Allow marriage or allow civil union & not ban marriage	0.020	0.021	-0.000	-0.025 **	0.057	-0.031
	(0.016)	(0.016)	(0.029)	(0.012)	(0.037)	(0.026)

N	10134	13654	9247	10134	13654	9247

NOTE. All specifications include state fixed effects, year effects, and individual-level controls, including age, gender, race, education, and religious attendance. Numbers in parentheses are robust standard errors adjusted for clustering on state-year. A double asterisk indicates significance at the 5% level, and a single asterisk indicates significance at the 10% level.

Endnotes

[1] Unfortunately, we do not have sufficient data on HIV. Most states did not start reporting HIV until the late 1990s, and many of the large states, including California, New York, and Illinois, did not begin to report HIV until 2001 or later (CDC, 1982-2008).

[2] Note that we also employed Arellano and Bond's GMM technique in case the inclusion of a lagged dependent variable was problematic, and we found that most coefficients were not significant, but those that were significant corresponded to the most restrictive type of ban, "both marriage & civil union ban."