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DOES RELIGION CONSTRAIN RISKY SEXUAL BEHAVIOR ASSOCIATED WITH HIV/AIDS?

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Abstract

Faith-based public health interventions designed to reduce risky sexual behaviors associated with HIV/AIDS are likely to be effective if there are conformist-driven peer effects induced by the actual behavior of individuals who already conform to the norms governing sexual behavior engendered by religion. This paper explores whether religion favorably and causally conditions actual risky sexual behavior. With data from the General Social Survey (GSS), we estimate the parameters of an explicit economic model of sexual behavior where religion causally conditions individual sexual activity. Our results show that with the exception of gay males, religion favorably constrains risky sexual behavior. This suggests that if conformist peer group effects are operative in Faith-based HIV/AIDS public health interventions, they are likely to be effective in reducing the incidence of HIV/AIDS among all demographic at-risk groups except for gay males.

JEL Classification: *I2, J0, Z1*

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1. Introduction

The provision of tax-subsidized outreach and prevention education programs for Faith-Based Organizations (FBOs) has been one of the many responses of federal, state, and local public health agencies to contain the transmission of sexually transmitted diseases (STDs)—particularly the Human Immunodeficiency Virus (HIV), which leads to Acquired Immune Deficiency Syndrome (AIDS). Such programs are presumed to be an effective way to reduce the incidence of HIV/AIDs by encouraging safe and less risky sexual practices–including abstinence.

While there are possibly many reasons why FBOs are likely to be effective mechanisms for containing the spread of STDs, (Liebowitz, 2002), one reason is the fact that FBOs such as churches are established social institutions that have the trust of its members, and presumably of the nonmembers that live in, or are proximate to, the community where the church is located. At least part of this trust is derived from the church being viewed as having historical jurisdiction over, and being arbiters of, acceptable moral behavior. As sexual activity is a behavior with moral implications from the perspective of the Christian faith, church jurisdiction over sexual morality is a fundamental channel through which as FBOs, churches can have an effect upon the sexual behaviors that contribute to the spread and transmission of STDs in general, and HIV/AIDS in particular.

To the extent that individuals cede moral authority to the church as arbiters of sexual morality and morally acceptable sexual activity, their interactions with nonmembers through behavioral intervention programs designed to alter risky sexy behavior are likely to be effective through so-called "peer effects". A peer effect occurs when an individual behavioral outcome is a function of the behavior of some reference group. While there are many theoretical and empirical approaches to rationalizing peer effects, the behavioral effects of religion appear consistent with the conformist model of Akerlof (1997).[1] In a conformist model of individual behavior, peer effects emerge as

[1]The canonical approach to peer effects is provided by Manski (1993). Other theoretical and empirical examples include Brock and Durlauf (2001), Sacerdote (2001), Zimmerman (2003), and Kawaguchi (2004).

a result of individuals deriving utility from behaving like an average member of some reference group.

If the church is at least perceived as a reference group with particular and actual sexual mores and behaviors conditioned by religion, public-health interventions designed to change risky sexual behavior associated with HIV/AIDS could be effective. In this paper, we estimate an explicit economic model of risky sexual behavior to determine if religion causally conditions sexual behavior. If religion does causally condition actual sexual behavior, then it is plausible that church-based public health interventions designed to modify risky sexual behavior can be effective through peer effects whereby program participants conform to the perceived behavior of actual church members. The existence of such peer effects requires that religion must first causally condition the risky sexual behavior that is associated with HIV/AIDS. The central aim of this paper is to determine if religion does indeed condition such sexual behavior.

The remainder of this paper is organized as follows. Section 2 provides consideration of how religion and religiosity of can condition sexual behavior with an identification of how Christianity imposes costs on certain sexual behavior. In Section 3, we introduce an economic model of sexual behavior that justifies the existence of demand functions for sexual activity, with unobservable costs imposed by religious beliefs and participation. We report our results in section 3. The last section concludes.

2. Religion and Sexual Behavior

Many studies, primarily in the sociology literature, have explored the effect of religiosity on individual sexual behavior. Sexual permissive attitudes appear to be inversely related to the degree of individual religiosity (Thornier and Camburn 1987, Thornier and Camburn 1989, Whitbeck et. al 1999, Meir, 2003), suggesting that religiosity constrains risky sexual behavior. Religiosity has also been found to be associated with delaying the age at which adolescents first have sex (Resnick et. al 1997, Lammers et. al 2000), suggesting that religiosity constrains

risky sexual behavior among a segment of the population particularly prone to risk behavior. While the sociological literature on religiosity and sexual behavior is suggestive of the causal pathways by which religiosity conditions sexual behavior, none of the samples are representative of the population as a whole, and the correlation between religiosity and sexual behavior are not rationalized within an explicit theoretical framework.

Granger and Price (2006) note that, with the exception of explaining religion as a form of social interaction by individuals (Sacerdote and Glaeser, 2001), and how religion explains behaviors conducive to economic growth (Barro and McCleary, 2003, Guiso, Sapeinza, and Zingales, 2003) the effects of religion on individual self-interested behavior has been relatively unexamined by economists. For example, of the approximately 200 papers identified by Iannaccone (1998) as constituting the economics of religion literature, the few that consider the effects of religion/religiousity on individual behavior include Heineck (2002), Sander (2002), Berggren (1997), Steen (1996), Lehrer (1995), and Tomes (1984). The aversion to examining the effects of religion on individual behavior may result in part from the fact that religious beliefs are potentially correlated with unobserved individual characteristics which undermines parameter identification (Iannaccone, 1998), and/or the absence of a coherent theoretical framework in which religion emerges as a causal determinant of individual behavior.

Given the benefits of sexual activity, an economic approach to sexual behavior can explain it's variation conditioned on the costs. As we are interested in how religious belief and/or participation can explain individual variation in risky sexual behavior, we follow the recent approach of Granger and Price (2006), and appeal to the Christian Holy Bible as a source of costs for sexual behavior and activity.[2] Granger and Price (2006) posit that the Holy Bible, a collection of canonized texts, lends itself to interpretations that specify the costs associated with particular secular behaviors.

[2]In this sense our paper, following Granger and Price (2006) considers the effects of Christian religious beliefs and religiosity on sexual behavior. While there are many religious faiths in the United States (e.g. Buddhists, Moslems, Hindus), our model and empirical results will be general to the extent that other religions impose, through their beliefs and practice, costs similar to those in Christianity.

The basic idea is that given individual religious beliefs about the afterlife, and whether or not he believes the Bible is the "literal" word of God, secular behaviors that are prohibited in the Bible may vary according to individual beliefs about the afterlife and the literal truth of the Bible. Given individual belief in hell, the afterlife costs for certain secular behavior may be infinite.

As sexual activity is motivated by desire, Christian and biblical categorizations of desire as sinful can impose costs on sexual activity. One broad Christian–albeit Catholic– religious context for categorizing behavior as sinful follows from the notion of the "seven deadly sins"—-a legacy of medieval Christianity, and codified within the Catechism of the Catholic Church.[3] Of the seven deadly sins, four are categorized as "sins of the flesh": Lust, Gluttony, Greed and Sloth, of which the first three, in order of severity, are relevant to sexual desire and activity. The sexual analogues are straightforward: Sexual lust is overindulgence in sexual intercourse, Sexual gluttony is excessive love of sexual pleasure, and Sexual greed is having more sex than one has need for. Violation of each of these sexual sins manifests itself in the either the frequency of sexual intercourse, and/or the number of sexual partners.

As for the costs of engaging in particular sins of the flesh, the legacy of medieval Christianity associated each transgression with a specific punishment in purgatory.[4] Contemporary Catholicism avoids the imagery of graphic and narrowly tailored punishments, yet articulates substantial costs for engaging in the seven deadly sins. Catechism 1866 describes the seven deadly sins as "venial sins" in that they engender other more severe "mortal sins". [5] As indulging in "mortal sin" results in damnation, the fact that indulging in "venial sin" increases the risk of "mortal sin" is sufficient incentive to avoid participation in "venial sin". Thus, to the extent that sexual greed, gluttony and lust impose afterlife costs, given belief in the afterlife and in the theology/dogma of the seven deadly sins, it is plausible that individual sexual behavior varies across such beliefs.

For Protestants, the Catholic theology/dogma of the seven deadly sins seems an unlikely source

[3]For a historical overview of the origins and evolution of the seven deadly sins, see Panati (1996).

[4]In Dantes *Purgatorio* the second book of his *Divine Comedy*, purgatory has seven terraces, one for each of the deadly sins.

[5]See Catechism 1865.

of variation in individual sexual behavior. Nonetheless, the distinction between Protestants and Catholics in this context is perhaps a subtle one regarding the nature of sin. Unlike Catholics, Protestants do not make a distinction between venial and mortal sin—sin is sin without a hierarchical ranking. In other words for Protestants, "venial sin" and "mortal sin" are perfect substitutes, and are perfectly correlated. As both Protestants and Catholics share similar views on the notion and primacy of original sin, shared beliefs between the two groups about the authority of the Bible on permissible sexual behavior will result in individual Protestant sexual behavior that varies as if though the theology/dogma of the seven deadly sins is transmitted and appealed to during Protestant religious practice and participation.

Beliefs among Catholics and Protestants about the authority of the Bible on permissible sexual activity could follow from interpretations of scripture that articulate certain sexual practices and activity as being sinful, and as such, imposing afterlife costs. There are many passages in the Bible that imply divine prohibition, and perhaps afterlife costs for , certain sexual practices and activities. The type of sexual practices and activities subject to divine prohibition in the Bible include for example, adultery (*Exodus* 20:14), homosexual sex (*Leviticus* 20:13), prostitution (*Genesis* 38: 15-17), and sex outside of the institution of marriage (*1 Corinthians* 7:2-9).[6] To the extent that Catholics and Protestants perceive these and other prohibitions on certain sexual activities to be associated with divine penalties, variation in individual sexual activity could vary with beliefs, and religious participation–as religious beliefs are probably developed and reinforced through participation. For individuals in general, the Christian legacy of sexual activity being subject to the scrutiny of the seven deadly sins, and biblical prohibitions against certain sexual practices suggest that individual variation in sexual behavior can be explained by individual religious belief and participation—an idea we pursue formally below.

[6]Other Biblical scripture relevant to sexual practices and activities include those that address incest (*Leviticus* 20:11-12), sexual lust (*1 Thessalonians* 4:2), Lesbianism (*1 Romans* 26-38), Transvestitism (*Deuteronomy* 22:5), and sex frequency (*Genesis* 1:28, *1 Corinthians* 7:5).

3. A Model of Sexual Behavior

We model sexual behavior by considering the implications of both hominid evolution and utility maximization by self-interested individuals (Rogers 1994, Hansoon and Stuart 1990). That individuals engage in sexual activity implies they have a preference for it, implying that sexual activity is an argument of an individual's utility function. That utility or well-being is a function of sexual activity can be defended on evolutionary grounds. Current preferences for sexual activity exist among individuals because they are the descendants of individuals who had a preference for sexual activity. As such, the current population of individuals were favored by natural selection—humans in the distant past who did not have a preference for sexual activity were selected against as they left no offspring.

For any species, evolution selects against those for which over time, the number of offspring asymptotically decreases. Species who are selected for are said to have achieved reproductive success whereby each successive generation has maximized Darwinian fitness–defined as the expected number of offspring. Viewed in this context, modern contemporary humans have sexual activity as an argument in their utility functions because that is what is necessary for reproductive success, and natural selection favors species that maximize the number of offspring.

Given the evolutionary logic of individuals maximizing reproductive success, Bergstrom (1994a, 1994b) constructed an economic model of polygamy that rationalizes why in an nontrivial number of societies, men maximize reproductive success through marrying and having offspring with multiple wives. Male preferences are defined over commodity consumption, and the expected number of offspring, which is an increasing function of the number of wives. One key result that emerges is that in equilibrium, the number of wives demanded by men decreases as the cost of wives increases. This suggests that the sexual activity generated by the fitness maximizing behavior of individuals has laws of motion identical to the ordinary commodities of economic analysis.

We extend, but modify Bergstrom's modelling approach. Our modification considers repro-

ductive success as measured by the number of sexual partners, in addition to the frequency. This is a sensible modelling strategy, as it would characterize options for reproductive success in the U.S and most western societies where polygamy is illegal. It also allows, in contrast to Bergstrom (1994a, 1994b) who considers just the reproductive success of heterosexual males, a consideration of the sexual activity of heterosexual females, and homosexual males and females. Extension of the model to females is straightforward—if heterosexual males have multiple sex partners, there will be some females with multiple sex partners. Rationalizing sex between partners of the same gender seems counterintuitive in a model that motivates sexual activity on Darwinian grounds. If sex between two individuals of the same gender results in no reproduction, how could a utility function with sexual activity as an argument, have an evolutionary justification in the case of homosexuals?

As phenotypes are selected for by natural selection, an individual preference for sex with those of the same gender is a particular phenotype. Optimality requires that sex phenotypes match the environment relevant to the genotype. A phenotype for both heterosexual and homosexual sex seems suboptimal. However, Miller (1997) has argued that variation and randomness in phenotype can be an optimal response to uncertain future environments that a genotype may face. Miller (1997) suggests that analogous to rules for finding an optimal portfolio of assets, natural selection will optimally select for sets of phenotypes that have low covariances with respect to their associated reproductive success–which maximizes reproductive success in a uncertain and varying environment.

We can imagine for example, that a sexual preference phenotype that is both homosexual and heterosexual can diversify against the risks to reproductive success posed by different environments. Suppose for example that the human genotype can face either an environment where food is scarce, or where it is abundant. Relative to individuals that produce offspring with only the heterosexual phenotype, individuals that produce both types of offspring, heterosexual and homosexual, will realize higher fitness. Given kin selection (Hamilton, 1964), individuals that produce offspring with both the heterosexual and homosexual phenotype will have smaller kin groups in

scarce food environments.[7] A father with two heterosexual sons who each bear him one grandson in a scarce food environment, can provide less food assistance to his grandchildren on average, than say a father with two sons, one heterosexual with a child, and one homosexual, without a child. As reproductive value is plausibly proportional to food supply, there will be more food per kin group, which translates into higher levels of extended or inclusive fitness for individuals that produce offspring with both sexual preference phenotypes.

Given a variable environment, and that natural selection favors phenotypes that maximize reproductive success, modern preferences for commodity consumption and sexual partners have an evolutionary basis. As securing commodities and sexual partners impose costs on individuals, choices for each must be optimized given the costs. Usually these costs, especially for commodities, are explicit and can be measured in a market. With the exception of the market for prostitution, the costs for securing sexual partners are not observable, and not always explicit–some are implicit. For sexual partners, one source of implicit costs are the folkways and mores engendered by cultural evolution. In the west, a significant cultural source of folkways and mores regarding sex is religion—-especially Christianity and its various denominations.

To the extent that religion imposes possibly infinite afterlife costs for certain sexual behaviors, observed variation in modern sexual behavior and activity can plausibly be explained by variation in religious beliefs and participation. To examine this empirically, we construct an economic model of sexual behavior on the basis of the following assumptions:

Assumption 1. *Each individual has a utility function U[C, P(n,f)] where C is commodity consumption, P is an index of sexual activity, n is the number of sexual partners, and f is the frequency of sex.* $U(\cdot)$ *is strictly quasi concave and increasing in C and P, and P is nondecreasing in n and f.*

[7]Hamilton's (1964) theory of kin selection posits that natural selection selects for phenotypes that maximize a weighted average of an individual's own reproductive success and that of relatives or kin. This is known as inclusive or extended fitness, in contrast to individual Darwinian fitness. The weight on the kin is simply the coefficient of relationship define as the probability that the individual and the kin have a common ancestor.

Assumption 2. *Utility is weakly separable in C and P, and P is weakly separable in n and f.*

Assumption 3. *Each individual has a degree of religious beliefs* λ_i*, and religious participation* θ_i *that condition the cost of the number of sexual partners* $c_n(\lambda_i, \theta_i)$ *and the frequency of sex* $c_f(\lambda_i, \theta_i)$*.*

Assumption 4. $c_n(0,0) = 0$, $c_n(\infty,\infty) = \infty$, $c_n(0,\infty) = \infty$, $c_n(\infty,0) = \infty$, $c_f(0,0) = 0$, $c_f(\infty,\infty) = \infty$, $c_f(0,\infty) = \infty$, *and* $c_f(\infty,0) = \infty$.

Assumption 5. *An individual with income I chooses consumption C, the number of sexual partners, and the frequency of sex to maximize U[C, P(n,f)] subject to the constraint:* $pC + c_n n + c_f f = I$*, where p is the cost of C.*

Assumption 6. *The number of sexual partners and the frequency of sex is a normal good.*

The six assumptions establish the existence of demand functions for sex partners and sex frequency, for both heterosexuals and homosexuals:

$$n^* = \phi[c_n(\lambda_i, \theta_i), I_n] \tag{1}$$

$$f^* = \phi[c_f(\lambda_i, \theta_i), I_f] \tag{2}$$

where $\phi(\cdot)$ is some function, I_n is the share of income allocated to sexual partners, and I_f is the share of income allocated to the frequency of sex. The appearance of I_n and I_f in the demand functions follow from Assumption 2. However given Assumption 6, both I_n and I_f are proportional to total income I, and each demand function can be expressed as a function of total income I.

There are two major testable implications of the model. First, the stronger are religious beliefs about say sexual gluttony, fornication, and adultery, we would expect both the number of sexual partners and sexual frequency to be inversely related to such beliefs. Finally, to the extent that religious participation, say through the frequency of church attendance, engenders and/or reinforces religious beliefs about sexual behaviors, it is also plausible that high levels of religious participation are inversely related to the number of sexual partners, and the frequency of sex.

4. Results

The existence of demand functions for sexual activity implied by the reduced forms in (1) and (2) that are a function of income and religious costs, suggest the existence of empirical demand functions for, the number of sexual partners, sex frequency, sex without a condom, extramarital sex, and gay male sex without a condom. We estimate these empirical demand functions for risky sex with data from the General Social Survey (GSS). GSS data are a nationally representative sample of adults living in the United States.[8] Conducted by the National Opinion Research Center (NORC) at the University of Chicago, the GSS was initiated in 1972, with surveys in 1973-1978, 1980-1993, 1994, 1996, 1998, 2000 and 2002. The first 19 surveys were annual, and each has samples of approximately 1500 adults. Starting in 1994, the GSS is biennial with a sample of approximately 3,000 adults per survey. GSS data are generated by in-person interviews and are based on questions relating to various demographic and attitudinal variables. There are also collections of variables relating to topics of special interest—so-called topical module questions– that are included on a rotational basis in particular years of the GSS.

Our sample is selected on the basis of GSS respondents providing valid responses to questions regarding the number of sexual partners in the last 12 months (PARTNERS) and the frequency of sex within the past 12 months (SEXFREQ). We also construct explicit measures of risky sex: a binary variable indicating whether or not a condom was used during the last time the respondent

[8]GSS data are available at www.icpsr.umich.edu:8080/GSS/homepage.html

had sex (NOCOND), a binary variable indicating whether or not a respondent ever had sex with someone other than their spouse (EMSEX), and a binary variable indicating whether or not a gay male respondent use a condom the last time he had sex (GAYMSEX). Similar to PARTNERS and SEXFREQ, each of these measures are also particular demands for sexual activity–albeit more risky.

As (1) and (2) specify the demand for sex partners and frequency as a function of the costs conditioned on religious beliefs religious participation, and income, we will also obtain measures of these from the GSS. Our measures of religious belief is whether or not the respondent believes the Bible is the literal word of God (LWGOD). We measure religious participation based upon whether the respondent was raised as a Catholic (RCATH), is currently a Catholic (CATH), and the frequency of which he attends church services (ATTEND). Income was measured as the respondents self-reported income in 1986 dollars (INCOME).

To mitigate unobserved heterogeneity which could bias parameter estimates of sex demand functions based on (1) and (2), we deployed a stepwise regression on each dependent variable on a host of personal characteristics, and retained those were significant at the .10 level.[9] This strategy resulted in identifying the following individual characteristics that significantly explain our measures of individual sexual behavior/demand: the respondents age (AGE), years of education (EDUC), a binary variable for being black American (BLACK), a binary variable for being male (MALE), and a binary variable for being married (MARRIED).

Our estimation strategy proceeds from a recognition that our dependent variables on sexual activity are either count data (PARTNERS, SEXFREQ), or binary/discrete (NOCOND, EMSEX,

[9]We considered from the GSS, a set of 18 personal individual and personal demographic variables that could explain variation in the number of sexual partners. These were: the 4 regions of the country covered by the GSS, number of children, total household income, number of household members less than 6 years old, hours worked in a typical week, whether or not the respondent owns his home, hours spent per week in recreation, respondents socioeconomic index, whether or not the respondent reports health status as excellent, whether or not the respondent reports being very happy, respondent's age, years of education, whether or not the respondent is black, whether or not the respondent is a male, and whether or not the respondent is married.

GAYMSEX). As such, we assume that PARTNERS and SEXFREQ follow a Poisson distribution, and the binary measures of sexual activity follow a standard normal distribution. These two assumptions permit a Poisson regression framework for estimating the parameters of the demand for sexual partners and sex frequency, and a Probit specification for estimating the parameters of the binary sexual activity measures.[10]

We limit our analysis to the 1996 GSS. The real income measure does not go beyond 1996, after that it is categorical, and 1996 is a year in which all the variables of interest are available for GSS respondents. Table 1 reports on the definition of the variables constructed and utilized in our empirical specifications of (1) and (2). The sample means, and other summary information are reported in Table 2.

Tables 3 - 4 report Poisson parameter estimates of the demand for sex partners and sex

[10] A Poisson regression model is formulated by assuming that the dependent variable is a Poisson random variable, and then specifying for some count measure of sexual activity S_i for individual i, the mean level λ_i, as a function of a vector of exogenous variables (θ):

$$ln\lambda_i = \beta'\theta$$

where β is a coefficient vector, and θ is a vector of exogenous variables that determine the expected value of say, sexual partners for an individual. The log-likelihood function L(β) has a gradient and hessian given by:

$$\frac{\partial L(\beta)}{\partial \beta} = \sum [\theta'(S_i - e^{\beta'\theta})] = 0$$

$$\frac{\partial^2 L(\beta)}{\partial \beta \partial \beta'} = \sum [-(S_i' S_i) e^{\beta'\theta})] < 0$$

Equating the gradient to zero solves for β, and the negativity of the Hessian ensures a global maximum of the log-likelihood estimator of the coefficients in β.

If the sexual activity in question is binary in that the individual engages in it ($S_i = 1$) or not ($S_i = 0$), then a Probit specification of S_i is:

$$Prob(S_i = 1 \mid x) = \phi(\beta'\theta)$$

where $\phi(\cdot)$ is a standard normal distribution. The log-likelihood function is $L(\beta) = \sum ln[(1 - \phi(\beta'\theta)] + \sum ln\ \phi(\beta'\theta)$.

frequency respectively. Probit parameter estimates of the demand for no condom sex, extramarital sex, and no condom gay sex are reported in Tables 5 - 7. In each case five specification are reported, with the results in appearing in row (1) being standard estimates. Rows (2) - (5) are estimates given clustering around each of the religious belief and participation variables. The standard estimates in row (1) assume that the effects of the exogenous variables on the given measure of sexual activity are independent across all individuals in the sample. If however, there is similar behavior within groups, say as a result of peer effects associated with participating in church and adopting shared religious beliefs, the effects of religious participation and belief will be correlated within groups. Given this possibility, we allow for clustering around the religious participation and belief variables.[11]

The results in Table 3 reveal that if the exogenous variables are independent across individuals, the demand for sexual partners is decreasing in religious beliefs as measured by LWGOD. Allowing for clustering across the 4 measures of religious belief and participation results in LWGOD and ATTEND always being negative and significant, whereas being raised as a Catholic is only negative and significant when clustering is on Catholics. The coefficient on income is always positive, but significant only when clustering on RCATH and LWGOD–suggesting that the number of sexual partners is a normal good. In general, the parameter estimates in Table 3 provide evidence that religious beliefs and participation are a source of costs for risky sexual behavior as measured by

[11]Correcting for clustering proceeds simply by modifying the robust covariance matrix as in Zorn(2000). Let V be the information matrix, and u_i an empirical and consistent estimate of the true population residuals, then for sample size N, a robust estimate of the covariance matrix (V_R) :

$$V_R = V \sum_{i=1}^{N} [u_i' u_i] V$$

If there are a total of C clusters, each with n_i observations, the robust estimate of the covariance matrix adjusted for clustering (V_C) is:

$$V_C = V \sum_{j=1}^{N} [(\sum_{i=1}^{n} u_{ij})'(\sum_{i=1}^{n} u_{ij})] V$$

the number of partners over a 12 month period.

Table 4 reports parameter estimates for the demand for sex frequency. In contrast to the demand for sex partners, religious beliefs as measured by LWGOD do not seem to matter–but being raised as a Catholic (RCATH), and being a Catholic currently (CATH) do matter. Church participation as measured by attendance is negative and significant in two of the clustered specifications. As with the number of sexual partners, the demand for sexual frequency increases with income. If the risk of STD's increases with sexual frequency, the results in Table 4 provide evidence that religious beliefs and participation—with the exception of being a Catholic— are a source of costs, and constrain such behavior.

In Tables 5 - 6 we report Probit parameter estimates for our binary measures of risky sexual behavior: sex without a condom, extramarital sex, and gay male sex without a condom. For all three measures, the risky behavior increases significantly with income in most of the specifications. For both sex without a condom and extramarital sex religious beliefs as measured by LWGOD are always negative and mostly significant. Risky sex by gay males does not appear to be constrained by religious beliefs or participation, as being Catholic has a positive effect on the behavior, and none of the other religious variables are significant.

Overall, the parameter estimates suggest that, consistent with a theory in which sex is an exogenous argument in individual utility functions, the demand for sex is conditioned on the costs engendered by religious beliefs and participation. In particular, our initial results suggest that risky sexy behavior by individuals is constrained by religious beliefs and participation—-at least for heterosexuals. In the case of gay males, our results suggest that their risky sexual behavior is not constrained by religious beliefs and participation.

5. Conclusions

If conformist peer effects are a likely mechanism by which Faith-based public health interventions work , their effectiveness depends upon whether religion actually conditions risky sexual

behavior. If actual risky sexy behaviors are constrained by religion, then it is possible that participants of Faith-based public health interventions will identify the church as constituting a peer reference group, and conform to the actual sexual behavior conditoned on the costs consistent with what the Christian church has historically sanctioned as legitimate, and morally acceptable. We find that except for gay males, religion actually constrains risky sexual behaviors. This suggests that if conformist peer effects are operative in Faith-based HIV/AIDS public health interventions, such interventions likely to be be effective in reducing the incidence of HIV/AIDS among all demographic groups at risk except gay males.

We are confident that our results are well-identified, as our empirical demand functions for sexual activity are derived from an explicit economic model in which hominid evolution exogenizes preferences for sexual activity, generating reduced forms with exogenous determinants. As such, our parameter estimates of the effects of religion and religiosity on sexual activity can be interpreted as causal effects. Our results suggest religion and religiosity as measured by frequency of church attendance, belonging the the Catholic denomination, and believing that the bible is the literal word of God have the effect of reducing the demand for sexual partners, sex frequency, and extra-marital sex–all risky behaviors associated with contracting HIV/AIDS.

That religion and religiosity have no effect on the risky sexy behavior or gay males suggest that Faith-based public-health interventions are not an effective way to reduce the HIV/AIDS risk among this demographic group. Of course, our results could reflect a reluctance of male GSS respondents to report if they actually had sex with another male, with or without a condom. As such, the insignificance of the religion and religiosity variables could be picking up insufficient or erroneous variation across respondents, biasing the parameter estimates.

While our results posit the existence of conformist peer effects, our parameter estimates do not identify any peer effects. Identification of religious peers effects while important, are beyond the scope of this paper, and GSS data as constituted do not permit identification of such effects. This of course is a limitation of the policy implications of our results. We do not know if there are actual conformist peer effects associated with the religion and religiosity of the Christian church.

As such, the fact that our results show that religion and religiosity constrain risky sexual behavior may not be relevant for Faith-based public-health interventions if there are no conformist peer effects associated with religion. At minimum, our results have policy implications contingent upon the existence of conformist peer effects. However, our results do suggest that for those who are already in religious reference groups, religion does favorably constrain risky sexual behavior for those who have already conformed.

Table 1
Definition of Variables

Variable	Definition: GSS Question: *GSS Coding*
AGE:	Age of respondent: Respondent's age: *Numeric value for age*
ATTEND:	Frequency of church attendance: How often do you attend religious services? *NEVER = 0, LESS THAN ONCE A YEAR = 1, ABOUT ONCE OR TWICE A YEAR = 2, SEVERAL TIMES A YEAR = 3, ABOUT ONCE A MONTH = 4, 2 - 3 TIMES A MONTH = 5, NEARLY EVERY WEEK = 6, EVERY WEEK = 7, SEVERAL TIMES A WEEK = 8*
BLACK:	Binary variable equal to one if the respondent is black: What race do you consider yourself? *WHITE = 1, BLACK = 2, OTHER = 3*
CATH:	Binary variable equal to one if the respondent was raised as a Catholic: What is your religious preference? *PROTESTANT = 1, CATHOLIC = 2, JEWISH 3, NONE = 4, OTHER = 5*
EDUC:	Highest year of school completed: What is the highest grade in elementary school or high school that you got credit for?: *Numeric value for years completed*
EMSEX:	Binary variable equal to one if the respondent ever had extramarital sex Have you ever had sex with someone other than your husband or wife while you were married? *YES = 1, NO = 2*
GAYMSEX[1]:	Binary variable equal to one if the respondent is a male that last had sex with another male without a condom Have your sex partners in the last 12 months been... *EXCLUSIVELY MALE = 1, EXCLUSIVELY FEMALE = 2, BOTH MALE AND FEMALE = 3, EXCLUSIVELY FEMALE = 4*
INCOME:	Respondent's annual income: Respondent's income in constant 1986 dollars: *Numeric Value*
LWGOD:	Binary variable equal to one if the respondent believes the Bible is the actual literal word of God: Which of these statements comes closest to describing your feelings about the Bible? (a) The Bible is the actual word of God and is to be taken literally (b) The Bible is the inspired word of God but not everything in it should be taken literally (c) The Bible is an ancient book of fables, legends, history, and moral precepts recorded by men *ACTUAL WORD = 1, INSPIRED WORD = 2, ANCIENT BOOK = 3, OTHER = 4*
MALE:	Binary variable equal to one if the respondent is a male: Code the respondents sex *Male = 1, Female = 2*
MARRIED:	Binary variable equal to one if the respondent is married: Marital status: *MARRIED = 1, WIDOWED = 2, DIVORCED= 3, SEPARATED = 4, NEVER MARRIED = 5*
NOCOND:	Binary variable equal to one if a condom was not use the last time the respondent had sex: The last time you had sex, was a condom used? *YES = 1, NO = 2*
PARTNERS:	Number of Sex partners in the last 12 Months: How many sex partners have you had in the last 12 months? *NO PARTNERS = 0, 1 PARTNER = 1, 2 PARTNERS = 2, 3 PARTNERS = 3, 4 PARTNERS = 4 5 - 10 PARTNERS = 5, 11 - 20 PARTNERS = 6, 21 - 100 PARTNERS = 7, MORE THAN 100 PARTNERS = 8 1+ PARTNERS = 9*
RCATH:	Binary variable equal to one if the respondent was raised as a Catholic: In what religion were you raised? *PROTESTANT = 1, CATHOLIC = 2, JEWISH = 3, NONE = 4*
SEXFREQ:	Frequency of Sex during the last 12 months: About how often did you have sex during the last 12 months? *NOT AT ALL = 0, ONCE OR TWICE = 1, ABOUT ONCE A MONTH = 2, 2 OR 3 TIMES A MONTH = 3 ABOUT ONCE A WEEK = 4, 2 OR 3 TIMES A WEEK = 5, MORE THAN 3 TIMES A WEEK = 6*

Notes

[1] This variable is an interaction of MALE, NOCOND, and having exclusively male sex partners over the past 12 months.

Table 2

Summary of Variables:

1996 General Social Survey

VARIABLE	*N*	*MEAN*	*STANDARD DEVIATION*
AGE	2497	43.93	834.50
ATTEND	2434	3.67	2.63
BLACK	2502	.128	.334
CATH	2500	.237	.425
EDUC	2497	13.45	2.82
EMSEX	2482	.144	.351
GAYMSEX	1952	.007	.084
INCOME	1732	21078.64	18929.39
LWGODD	1651	.306	.461
MALE	2502	.447	.497
MARRIED	2501	.481	.499
NOCOND	2385	.209	.407
PARTNERS	2502	1.08	.914
RCATH	2499	.292	.455
SEXFREQ	2502	14.82	10.56

Table 3
Demand For Sex Partners:
Poisson Regression Parameter Estimates

Specification:	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Clustering Variable:		*RCATH*	*CATH*	*LWGOD*	*ATTEND*
Regressand: PARTNERS					
Regressors:					
CONSTANT	.874 (.194)[a]	.874 (.212)[a]	.874 (.148)[a]	.874 (.107)[a]	.874 (.108)[a]
AGE	-.013 (.002)[a]	-.013 (.001)[a]	-.013 (.001)[a]	-.013 (.001)[a]	-.013 (.002)[a]
EDUC	-.014 (.012)	-.014 (.013)	-.014 (.006)[b]	-.014 (.004)[a]	-.014 (.003)[a]
BLACK	.169 (.085)[b]	.169 (.030)[a]	.169 (.014)[a]	.169 (.062)[a]	.169 (.064)[a]
MALE	.308 (.058)[a]	.308 (.005)[a]	.308 (.025)[a]	.308 (.075)[a]	.308 (.044)[a]
MARRIED	-.140 (.059)[b]	-.140 (.013)[a]	-.140 (.011)[a]	-.140 (.092)	-.140 (.061)[b]
RCATH	.005 (.089)	.005 (.050)	.005 (.050)	.005 (.101)	.005 (.069)
CATH	-.078 (.096)	-.078 (.078)	-.078 (.043)[c]	-.078 (.090)	-.078 (.090)
LWGOD	-.113 (.068)[c]	-.113 (.030)[a]	-.113 (.019)[a]	-.113 (.012)[a]	-.113 (.042)[a]
ATTEND	-.019 (.011)	-.019 (.008)[b]	-.019 (.002)[a]	-.019 (.004)[a]	-.019 (.009)[c]
INCOME	.074 (.072)	.074 (.038)[c]	.074 (.069)	.074 (.039)[c]	.074 (.071)
Pseudo-R^2	.561	.561	.561	.561	.561
N	1105	1105	1105	1105	1105

Notes:
Standard errors in parentheses
N = Number of observations
[a] Significant at the .01 level
[b] Significant at the .05 level
[c] Significant at the .10 level

Table 4
Demand For Sex Frequency:
Poisson Regression Parameter Estimates

Specification:	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Clustering Variable:		*RCATH*	*CATH*	*LWGOD*	*ATTEND*
Regressand: SEXFREQ					
Regressors:					
CONSTANT	3.21 (.075)^a	3.21 (.127)^a	3.21 (.059)^b	3.21 (.045)^a	3.21 (.052)^a
AGE	-.013 (.001)^a	-.013 (.001)^a	-.013 (.001)^a	-.013 (.002)^a	-.013 (.002)^a
EDUC	-.006 (.003)^c	-.006 (.004)	-.006 (.009)	-.006 (.005)	-.006 (.006)
BLACK	.017 (.024)	.017 (.035)	.017 (.036)	.017 (.018)	.017 (.077)
MALE	.084 (.015)^a	.084 (.030)^b	.084 (.025)^a	.084 (.010)^a	.084 (.026)^a
MARRIED	.250 (.015)^a	.250 (.018)^a	.250 (.019)^a	.250 (.057)	.250 (.052)^a
RCATH	-.080 (.024)^a	-.080 (.036)^b	-.080 (.023)^a	-.080 (.085)	-.080 (.041)^b
CATH	.076 (.026)^a	.076 (.055)	.076 (.017)^a	.076 (.044)^c	.076 (.053)
LWGOD	-.016 (.018)	-.016 (.082)	-.016 (.054)	-.016 (.021)	-.016 (.030)
ATTEND	-.010 (.003)^a	-.010 (.009)	-.010 (.010)	-.010 (.006)	-.010 (.005)^b
INCOME	.019 (.007)^a	.019 (.011)^c	.019 (.011)^c	.019 (.003)^a	.019 (.010)^c
Pseudo-R^2	.628	.628	.628	.628	.628
N	1105	1105	1105	1105	1105

Notes:
Standard errors in parentheses
N = Number of observations
[a] Significant at the .01 level
[b] Significant at the .05 level
[c] Significant at the .10 level

Table 5
Demand For Sex Without A Condom:
Probit Parameter Estimates

Specification:	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Clustering Variable:		*RCATH*	*CATH*	*LWGOD*	*ATTEND*
Regressand: NOCOND					
Regressors:					
CONSTANT	-.674 (.320)^b	-.674 (.038)^a	-.674 (.228)^a	-.674 (.041)^a	-.674 (.377)^c
AGE	-.008 (.003)^a	-.008 (.001)^a	-.008 (.001)^a	-.008 (.004)^b	-.008 (.004)^b
EDUC	.031 (.019)	.031 (.004)^a	.031 (.012)^b	.031 (.008)^a	.031 (.017)^b
BLACK	.678 (.132)^a	.678 (.087)^a	.678 (.013)^a	.678 (.124)^a	.678 (.189)^a
MALE	.208 (.094)^b	.208 (.128)	.208 (.044)^a	.208 (.036)^a	.208 (.095)^b
MARRIED	-.591 (.096)^a	-.591 (.155)^a	-.591 (.018)^a	-.591 (.012)	-.591 (.086)^a
RCATH	.338 (.144)^b	.338 (.072)^a	.338 (.049)^a	.338 (.117)^a	.338 (.094)^a
CATH	-.157 (.155)	-.157 (.061)^a	-.157 (.046)^a	-.157 (.065)^b	-.157 (.136)
LWGOD	-.163 (.113)	-.163 (.069)^b	-.163 (.023)^a	-.163 (.076)^b	-.163 (.047)^a
ATTEND	.003 (.019)	.003 (.005)	.003 (.001)^a	.003 (.006)	.003 (.026)
INCOME	.093 (.032)^a	.093 (.014)^a	.093 (.010)^a	.093 (.007)^a	.093 (.038)^b
Pseudo-R^2	.582	.582	.582	.582	.582
N	1067	1067	1067	1067	1067

Notes:
Standard errors in parentheses
N = Number of observations
[a] Significant at the .01 level
[b] Significant at the .05 level
[c] Significant at the .10 level

Table 6
Demand For Extra Marital Sex:
Probit Parameter Estimates

Specification:	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Clustering Variable:		*RCATH*	*CATH*	*LWGOD*	*ATTEND*
Regressand: EMSEX					
Regressors:					
CONSTANT	-1.57 (.337)^a	-1.57 (.277)^a	-1.57 (.106)^a	-1.57 (.139)^a	-1.57 (.385)^a
AGE	.024 (.004)^a	.024 (.002)^a	.024 (.002)^a	.024 (.003)^a	.024 (.005)^a
EDUC	-.036 (.020)^c	-.036 (.013)^a	-.036 (.005)^a	-.036 (.002)^a	-.036 (.021)^c
BLACK	.277 (.148)^c	.277 (.097)^a	.277 (.018)^a	.277 (.097)^a	.277 (.108)^a
MALE	.011 (.099)	.011 (.002)^a	.011 (.013)	.011 (.078)	.011 (.069)
MARRIED	-.066 (.100)	-.066 (.002)^a	-.066 (.025)^a	-.066 (.074)	-.066 (.099)
RCATH	.148 (.152)	.148 (.077)^c	.148 (.073)^b	.148 (.054)^a	.148 (.158)
CATH	-.174 (.163)	-.174 (.104)^c	-.174 (.039)^a	-.174 (.061)^a	-.174 (.105)^c
LWGOD	-.194 (.119)	-.194 (.030)^a	-.194 (.032)^a	-.194 (.032)^a	-.194 (.124)
ATTEND	-.023 (.019)	-.023 (.007)^a	-.023 (.004)^a	-.023 (.026)	-.023 (.022)
INCOME	.079 (.026)^a	.079 (.001)^a	.079 (.057)	.079 (.002)^a	.079 (.024)^a
Pseudo-R^2	.570	.570	.570	.570	.570
N	1101	1101	1101	1101	1101

Notes:
Standard errors in parentheses
N = Number of observations
[a] Significant at the .01 level
[b] Significant at the .05 level
[c] Significant at the .10 level

Table 7
Demand For Gay Sex Without Condom:
Probit Parameter Estimates

Specification:	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Clustering Variable:		*RCATH*	*CATH*	*LWGOD*	*ATTEND*
Regressand: GAYMSEX					
Regressors:					
CONSTANT	-3.06 (.981)[a]	-3.06 (.441)[a]	-3.06 (.445)[a]	-3.06 (1.64)[c]	-3.06 (1.11)[a]
AGE	.013 (.012)	.013 (.007)[b]	.013 (.009)	.013 (.008)	.013 (.009)
EDUC	.047 (.058)	.047 (.021)[b]	.047 (.019)[b]	.047 (.123)	.047 (.069)
BLACK	.322 (.367)	.322 (.309)	.322 (.303)	.322 (.359)	.322 (.443)
MARRIED	-.728 (.362)[b]	-.728 (.384)[c]	-.728 (.394)[c]	-.728 (.509)	-.728 (.218)[a]
RCATH	-.151 (.491)	-.151 (.486)	-.151 (.439)	-.151 (.198)	-.151 (.186)
CATH	.406 (.496)	.406 (.458)	.406 (.477)	.406 (.075)[a]	.406 (.113)[a]
LWGOD	-.194 (.398)	-.194 (.614)	-.194 (.622)	-.194 (.282)	-.194 (.252)
ATTEND	-.041 (.061)	-.041 (.047)	-.041 (.049)	-.041 (.070)	-.041 (.053)
INCOME	.098 (.101)	.098 (.046)[b]	.098 (.043)[b]	.098 (.085)	.098 (.029)[a]
Pseudo-R^2	.458	.458	.458	.458	.458
N	941	941	941	941	941

Notes:
Standard errors in parentheses
N = Number of observations
[a] Significant at the .01 level
[b] Significant at the .05 level
[c] Significant at the .10 level

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