Teen Childbearing and Community Religiosity

Professor Linda Loury
Economics Department
Tufts University
Medford, MA 02155

I. Introduction

Since the initial studies showing that neighborhood as well as family background affects later socioeconomic status (e.g. Datcher, 1982 and Case and Katz, 1991), many have questioned the importance of neighborhood effects. The main criticism is that many important family characteristics that alter outcomes may be unobservable and correlated with parents' residential choices. In this case, measured neighborhood effects would capture such family unobservables rather than causal neighborhood influences. Other recent empirical work counters this skepticism by pointing out that some dimensions of neighborhood quality that affect later socioeconomic status may have been overlooked. This paper supports this assertion. It shows that the fraction of religious adherents in a community who were Catholic has a large and significant negative effect on teen births independent of individual and other community characteristics. It also shows that this measure of religiosity may reflect negative views of peers about the appropriateness of teen births. This research suggests more generally that policy, environmental, or technological changes that affect the costs and benefits on teen births for certain individuals will have spillover effects on others if they alter the attitudes about teen births. In particular, such policies may change the range of options that individuals are willing to consider as acceptable.

II. Previous Research

Previous research on teen pregnancy and births finds mixed evidence of peer or community effects on teen pregnancy and births. On one hand, Brooks-Gunn et al (1993) and Crane (1991) found that "good" neighborhoods as measured by the fraction of families with high incomes or the fraction of workers who held professional or managerial jobs significantly reduced the likelihood of teen out-of-wedlock births and childbearing. On the other hand, Evans et al (1992) indicated that large and significant initial effects of peers[1] on teen pregnancy disappeared when peer effects were treated as endogenous. Similarly, Plotnick and Hoffman (1995) showed that, while cross section estimates of neighborhood effects[2] on non-marital teen births were large and significant, fixed effects estimates were insignificant. These fixed effects estimates were made by comparing sisters who lived in different neighborhoods with different characteristics. In related work, Hogan and Kitagawa (1985) found only

marginally significant effects of neighborhood quality[3] on black teen pregnancy when controlling for a standard set of family background characteristics. These effects became insignificant when the analysis included parental control of dating. Similarly, An et al (1993) indicated that county median income and county average unemployment rate had no significant effect on teen out-of-wedlock births. The work reported later here supports the conclusions of these studies since it also finds that most standard measures of socioeconomic characteristics of neighborhoods similar to those used in these studies have little effect on teen birthrates. However, percentage Catholic in the community, which is not captured by such variables, does have a large and significant influence.

III. Theoretical Model

Akerlof's (1997) conformity model rests on the idea that

> the key difference between social decisions and conventional economic decisions (e.g. the choice of fruits) is that social decisions have social consequences whereas economic decisions do not. [Social decisions] will affect who I am in an important way, and thus how I associate with my friends and relatives as well as who those friends may be.

This analysis of community religiosity adapts Akerlof's conformity model to examine teen birthrates. Individuals choose the level of the variable x (for example, education or teen pregnancy prevention[4]) which has intrinsic economic value and which affects the social distance between oneself and others. The choice of x (x_{si}) for person type i depends on the individual's inherited social position or endowment (x_{ei}) and how far she chooses to deviate from this endowment. For simplicity, assume that there are only three types of individuals. The endowment levels of type 1, 2, and 3 individuals are x_{e1}, x_{e2}, and x_{e3} respectively where $x_{e1}<x_{e2}<x_{e3}$. These endowments depend on family background characteristics and on social norms. The utility of type 1 individuals is given by:

$$(1)\qquad U_1 = [m_{11}/f][1/(g+|x_{s1}-x_{e1}|)]+[m_{21}/(f+|x_{e1}-x_{e2}|)][1/(g+|x_{s1}-x_{e2}|)]]+[m_{31}/(f+|x_{e1}-x_{03}|)][1/(g+|x_{s1}-x_{e3}|)] +[-ax_{s1}^2+bx_{s1}+c].$$

The m_{j1} alter the values of conforming to type j individuals, the first product is the conformist component of utility relative to others at the type 1 location, the second product is the conformist component of utility relative to type 2 individuals, the third product is the conformist component of utility relative to type 3

individuals[5] and the last term is the intrinsic value of x. The utilities of type 2 and 3 individuals are similarly defined.

It can be shown that, for type 1 individuals, the effects of the choice of x_{s1} on utility are given by :

(2) $$\partial U_1/\partial x_{s1} = -[m_{11}/f][1/(g+(x_{s1} - x_{e1}))^2]+[m_{21}/(f+(x_{e2} - x_{e1}))][1/(g-(x_{s1} - x_{e2}))^2]$$
$$+[m_{31}/(f+(x_{e3} - x_{e1}))][1/(g-(x_{s1} - x_{e3}))^2]+[-2ax_{s1}+b] \text{ for } x_{e1}<x_{s1}<x_{e2},$$

(3) $$\partial U_1/\partial x_{s1} = -[m_{11}/f][1/(g+(x_{s1} - x_{e1}))^2]-[m_{21}/(f+(x_{e2} - x_{e1}))][1/(g+(x_{s1} - x_{e2}))^2]$$
$$+[m_{31}/(f+(x_{e3} - x_{e1}))][1/(g-(x_{s1} - x_{e3}))^2]+[-2ax_{s1}+b] \text{ for } x_{e2}<x_{s1}<x_{e3} \text{ and .}$$

(4) $$\partial U_1/\partial x_{s1} = -[m_{11}/f][1/(g+(x_{s1} - x_{e1}))^2]-[m_{21}/(f+(x_{e2} - x_{e1}))][1/(g+(x_{s1} - x_{e2}))^2]$$
$$-[m_{31}/(f+(x_{e3} - x_{e1}))][1/(g-(x_{s1} - x_{e3}))^2]+[-2ax_{s1}+b] \text{ for } x_{e3}<x_{s1}.$$

In the absence of community effects ($m_{ji}=0$), all individuals i=1,2,3 would choose the social optimum, b/2a. Community effects introduce costs of moving toward the optimum and thus the possibility of different choices of x_{si} between different subgroups. Consider an example outlined by Akerlof. If the initial distance between type 1 and type 3 individuals is sufficiently large and if the intrinsic value of x is sufficiently small, type 1 individuals would select x_{s1} close to x_{e1}, their initial endowment, and type 3 individuals would choose x_{s3} close to the social optimum[6]. Type 2 individuals would choose x_{s2} somewhere in between. Types 1 and 2 individuals choose too little x relative to the optimum because the incentive to conform exceeds the incentive to choose x for its intrinsic benefit. Intuitively, the individual's choice of x depends in part on her initial endowment. As an individual moves toward b/2a, the utility derived from the intrinsic value of x increases. In addition, as an individual moves closer to (farther from) type j individuals, the utility due to conforming to type j's endowment increases (decreases). The size of the change in utility depends on $|x_{ej} - x_{ei}|$, the initial social distance along the x dimension and on the value of social exchange between a type j person and type i individuals as measured by m_{ji}. The value of the social exchange, m_{ji}, in turn, depends on the fraction of the population who are type j individuals and on the level of social interaction between type i and type j individuals along other dimensions than x.

Three implications of this model should be highlighted for this analysis. First, initial endowments depend, not only on socioeconomic characteristics such as income and education, but also on

historical conditions and social norms. Second, individuals with the same initial endowments may choose different x_{si} because their communities differ in the distribution of initial endowments. Third, individuals with the same initial endowments in the same community may choose different x_{si} because their m_{ji} (measuring their social interaction with type j individuals) are not the same.

Several examples of previous work on peer and neighborhood effects are consistent with these implications. For example, Wilson (1987) argues that, when successful middle class African-Americans move from inner city areas, the relatively isolated, homogeneous poor who are left behind tend to develop underclass characteristics that differentiate them from the rest of the population. In terms of the model above, the exodus of middle class African-Americans reduces the gain to type 1 individuals from associating with type 2 or type 3 African-Americans (m_{21} and m_{31}). Physical proximity and thus the value of social interaction may decline. As a result, type 1 individuals would choose a lower x_{s1} ceteris paribus.

Similarly, Cutler and Glaeser (1997) find that African-Americans in segregated cities have significantly lower high school graduation rates and earnings and are more likely to be "idle" and/or single mothers. They show that a one-standard deviation reduction in segregation would cut the racial gap in these outcomes by one-third. These results hold for those who are otherwise similar along a wide variety of family background and community characteristics[7]. Glaeser et al (1996) find that there are substantial cross-section differences in crime rates that are not due to differences in economic and social conditions. They show that these differences depend largely on positive covariance across agents' decisions about criminal activity. Agents in some cities will be influenced to participate in crime by their neighbors while others will not.

The impetus for Akerlof et al (1996) is that the standard set of economic costs and benefits (as posited by welfare theory and job-shortage theory) does not explain the size and timing of the increase in out-of-wedlock births. They instead show that technological advances in women's contraception may have altered attitudes about premarital sex and "shotgun" weddings. In particular, when the cost of abortion is low and contraceptives are easily available, women are less able to extract promises of marriages from men in the event of premarital pregnancy.

The teen birth results in the paper here are consistent with this previous work and the conformity model. They show that (1) initial endowments depend on attitudes and values as well as on standard socioeconomic characteristics, (2) the distribution of initial endowments as measured by the behavior of peers affects the choices of individuals with a given set of endowments and (3) the level of social interaction between groups alters the degree of conformity between different types of individuals.

Specifically, in the case of pregnancy prevention as the x variable in the conformity model, the initial endowment for teens may depend on religious denomination. Catholic doctrine and teaching includes rigid restrictions and/or prohibitions on premarital sex, abortion, and contraception[8]. Because of these prohibitions, Catholic girls may be less likely to have premarital sex but may be more likely to give birth if they do[9]. A higher effect of the former has been used to explain the finding of lower teen pregnancy rates among Catholic girls in some previous work (Plotnick, 1992; Lundberg and Plotnick, 1995) [10]. In this case, Catholic teens would be less likely to have type 1 inherited positions based on family background characteristics and parents' values and attitudes. Given variations in the costs of moving to the social optimum, differences in inherited position would, therefore, explain some of the observed differences in teen childbearing based on an individual's denomination[11].

The conformity model also implies that Catholic doctrine may have spillover effects. Assume that, as implied above, fewer teens are in the type 1 position and more teens are in the type 2 and type 3 positions in communities with higher fractions of Catholics. The conformity effects for type 1 individuals from her own group would be lower (smaller m_{11}) and those associated with individuals with higher initial endowments would increase (larger m_{21} and m_{31}). The acquired level of x_{s1} will, therefore, be higher. This model implies that Catholicism may reduce teen childbearing through two channels. First is through the higher endowment levels for individual Catholics. Second is through spillover effects of Catholics on the choice of x for all individuals (Catholic and non-Catholic) with a given initial endowment.

As in the crime analysis of Glaeser et al, the spillover effects are not likely to be uniform. Less social interaction between type i individuals and Catholics in group 3 (and group 2) as measured by m_{3i} (and m_{2i}) would lower them. Patterns of residential segregation and the relatively small numbers of black Catholics[12] make African-Americans less suspectible to Catholic influences . Similarly, lower differences

in the distribution of initial endowments between Catholics and non-Catholics would also reduce spillovers. Given the historically larger family sizes among Catholics[13], Catholic women in their twenties are not likely to have higher pregnancy prevention endowments than those from other denominations. The model would, therefore, not predict lower fertility due to spillovers for these women[14].

IV. Empirical Analysis

This analysis used data from the National Longitudinal Study of Youth (NLSY) to examine the effects of neighborhood religiosity as measured by the percentage Catholic on teenage births. The NLSY is a nationally representative panel of individuals ages 14-22 begun in 1979. Sample members were interviewed annually to determine information about schooling, work, and other experiences[15]. The individual data from the NLSY was merged with data on the fraction of the individual's county that was Catholic from the 1980 Survey of Churches and Church Membership collected by the Glenmary Research Center[16]. The individual data was also merged with information on state blue laws[17]and on the presence of state restrictions on availability of public funding for abortions and restrictions of the sale of contraceptives[18]. Lastly the individual data was merged with county-level data on the fraction of all 1980 births that were to women under age 20[19].

The specific model used for the analysis is

(5) $Y^* = X\alpha + \delta_1 V_1 + \delta_2 V_2 + \varepsilon_0$

(6) $V_1 = Z\beta_1 + \varepsilon_1$

(7) $V_2 = Z\beta_2 + \varepsilon_2$

where Y^* is the individual's choice of the level of pregnancy prevention, V_1 is an observed proxy for the endowment of others (e.g. the fraction of all 1980 births in the individual's county that were to mothers under 20 years old), V_2 is the unobserved index of the endowment of others, X includes family background and other observed exogenous determinants of the individual's initial endowment, and Z equals determinants of the endowments of others (such as the percentage of

the individual's county that was Catholic in 1980). Substituting (6) and (7) into (5) gives the reduced form equation:

(8) $Y^* = X\alpha + (\delta_1\beta_1 + \delta_2\beta_2)Z + (\varepsilon_0 + \delta_1\varepsilon_1 + \delta_2\varepsilon_2)$.

Y^* is not observed. However, it is assumed that the teen gives birth ($Y=1$) if $Y^*<0$ and does not give birth ($Y=0$) if $Y^*\geq 0$ and that the error term has a standard logistic distribution. The equation estimated in this analysis is then given by:

(9) $$\text{Prob}(Y=1) = \exp[X\alpha + (\delta_1\beta_1 + \delta_2\beta_2)Z + (\varepsilon_0 + \delta_1\varepsilon_1 + \delta_2\varepsilon_2)] / [1 + \exp[X\alpha + (\delta_1\beta_1 + \delta_2\beta_2)Z + (\varepsilon_0 + \delta_1\varepsilon_1 + \delta_2\varepsilon_2)]]$$

Summary statistics for selected variables used in the analysis are listed in Table 1. About 32 percent of the sample was Catholic[20] and Catholics made up 41 percent of religious adherents in all counties where sample members resided[21]. About 25 percent of the sample gave birth as teens. This fraction varies from 22.0 percent for teens in counties where Catholics made up more than 60 percent of religious adherents to 31.9 percent in counties where Catholics amounted to less than 25 percent of adherents[22]. Catholic girls are less likely to give birth (at 20.5%) compared to non-Catholic girls (27.7%).

The first column of Table 2 lists the reduced form logit results (equation 9) showing the effects of selected variables on teen births for the entire sample[23]. The results are largely consistent with those from other studies. The likelihood of a teen birth is higher for African-Americans, for girls with more siblings, and for girls who live in urban areas or who grow up in female-headed families. Higher years of parent's schooling, having a white-collar father, living in a household at age 14 that received magazines or where someone had a library card, and participating in sex education classes reduce the likelihood of teen births.

In addition to these relatively common findings, Tables 2-4 provide substantial evidence supporting the conformity model. The first result consistent with the model is that teen pregnancy prevention endowments are higher for individual Catholic teens and thus, overall levels of teen pregnancy prevention endowments are higher in communities with more Catholics. The first column in Table 2 shows that, in fact, Catholic teens are substantially less likely to give birth. When all variables at are their means, the –0.215 coefficient implies the expected teen birth fraction for Catholics is 23 percent and the

rate for all others is 27 percent. This suggests that the effect of Catholicism on reducing teen pregnancy dominates any effect on reducing abortions and, therefore, indicates that individual Catholic teens have higher pregnancy prevention endowments. The lower teen birth probability for Catholics would imply that, in the absence of any spillover effects, teen birth fraction difference between those in counties at the bottom third of the percentage Catholic (less than 25 percent of adherents) and the top third (more than 60 percent of adherents) would equal 2.5 percentage points[24].

The second result consistent with the conformity model is that a proxy for higher community-level endowments (i.e. the percentage Catholic) reduces the likelihood of individuals in the community giving birth as teens. The coefficient of the Catholic fraction of the religious adherents in the individual's county is large, significant, and negative (-0.575)[25]. When all variables are at their means, a 10 percentage point increase in the percentage Catholic reduces the likelihood of teen births by 1.1 percentage points. In Table 1, the teen birth fraction difference between those at the bottom third of the percentage Catholic (less than 25 percent of adherents) and the top third (more than 60 percent of adherents) was 9.9 percentage points. When all other variables are at the overall means, the difference between these two groups implied by the –0.575 coefficient in the first column of Table 1 is only slightly smaller at 7.6 percentage points[26].

The third result consistent with the conformity model is that the size and direction of the effects of the percentage Catholic varies in the predictable ways with endowment and social interaction differences across groups. The second column of Table 2 is comparable to column 1 except that it lists results for the same women in the 20s rather than in their teens. Some of the estimated coefficients are similar to those of column 1. For example, higher parents' schooling reduces the likelihood of giving birth and being African-American increases it[27]. However, column 2 also shows that Catholic women in their 20's were significantly more rather than less likely to give birth. Consistent with this observation, the coefficient of the percentage Catholic is positive (though not significant) rather than negative as it is for these same women when they were teens. The conformity model also implies that the percentage Catholic would not affect African-American teens as much as white teens. According to rows 2-3 of Table 3, the coefficient of the percentage Catholic for African-Americans is significantly smaller than for

whites (in absolute value) and is not statistically significant from zero[28]. Only African-Americans in the counties with 75% or more Catholics[29] have significantly (at the 10 percent level) lower birth rates than do other African-Americans (Table 4, row 1).

The fourth result consistent with the conformity model is that the percentage Catholic alters individual teen births, in part, through a measure of community/peer attitudes towards teen births. The third column of Table 2 adds a proxy for community attitudes toward teen births, the fraction of all 1980 county of residence births that were to mothers under 20 years old (i.e. teen births/total births) to the variables in the first column. This is equivalent to only substituting for V_2 in equation (5) instead of for both V_1 and V_2 as in equation (8). That is,

(10) $Y^* = X\alpha + \delta_1 V_1 + \delta_2 \beta_2 Z + (\varepsilon_0 + \delta_2 \varepsilon_2)$.

According to the model, column 1 would then represent the reduced form total effect of the percent Catholic on teen births (equation 8) [30] and column 3 would represent the estimate net of the effect of county teen birth fraction (equation 10)[31].

Column 3 shows that the county's teen birth fraction has a large and significant positive effect on the likelihood that an individual teen will give birth. It also shows that adding the county's teen birth fraction reduced the coefficient of percentage Catholic from –0.575 to –0.430. This implies the effect of the percent Catholic net of the effect of the county teen birth fraction is about 25 percent lower than the reduced form total effect of the percent Catholic on teen births[32]. This suggests that changes in the percentage Catholic operate, at least in part, through changing peer endowments and choices (as measured by the teen birth fraction). These peer attitudes and behaviors, in turn, alter the individual's pregnancy prevention choice.

The interpretation that the percentage Catholic operates through the teen birth rate assumes that causality runs from the percentage Catholic to the teen birth fraction and not vice-versa. The teen birth rate could change in the percentage Catholic in two hypothetical ways. First, it may affect residential choices of Catholics relative to others. Second, it would alter the number of individuals converting to and from Catholicism. It is unlikely that either of these is true. While there is no evidence that changes in

teen birth rates directly alter residential choice patterns (Long, 1988), the teen birth fraction may be correlated with other variables that alter residential choice patterns that are not included in this analysis. However, in results reported later, none of these other variables (e.g. unemployment rate, monthly AFDC payments, county fraction of female-headed families) had any significant effect on teen childbearing.

In addition, there are several reasons why changes in teen birth rates are not likely to change the percentage Catholic by encouraging denominational switching. First, teen birth rates are especially unlikely to be salient for men (roughly half of all Catholics). Second, teen birth rates are unlikely to alter denominational choices of older adults. Third, most teen births are to non-Catholics rather than to Catholics[33]. Fourth, Catholic women who give birth as teens are much more likely to be married than non-Catholic women (Lundberg and Plotnick, 1995)[34]. Therefore, for those women, conflicts between religious beliefs and childbearing practice are less important. Fifth, teen nonmarital childbearing may not be a sufficient problem for many of those remaining women to change their religious denomination.

Note that not all environmental or policy changes that reduce teen pregnancy would be expected to move norms away from teen births. According to the results in columns 1 and 3 of Table 2, removing restrictions on public funding for abortions and the sale of contraception also lower teen births. In contrast to the percentage Catholic, however, the estimated effects of these restrictions do not fall with including the teen birth rate in the analysis and, thus, are the same in columns 1 and 3.

The fifth result consistent with the conformity model is that the effects of the percentage Catholic do not appear to result from unobserved individual, family, or other community effects. Unobserved individual effects may include the individual's own or her parents' religious choices. Similarly, families that chose to live in largely Catholic communities may differ from others in unobserved attitudes or abilities in ways that also affect the likelihood of teen births. Lastly, the percentage Catholic may be correlated with other indicators of religiosity or other socioeconomic characteristics of communities outside of the conformity model that actually cause changes in teen births. In general, the percentage Catholic (Z in equation 9) may be correlated with the error term so that part or all of the estimated effect results from the unobservables.

It is unlikely that the percentage Catholic is picking up the effect of unobserved components of individual or family religiosity or other individual characteristics for four reasons. First, the model includes a detailed list of statistically significant family characteristics. These consist of parents' schooling, father's occupation, number of siblings, female headship, and whether any household members received magazines regularly or whether any household member had a library card. Second, the results in column 1 of Table 2 show that whether the individual herself was Catholic and reported annual church attendance[35] both had large and significant effects on teen births. However, the percentage Catholic remained significant holding constant these measures of individual religiosity. In fact, analyses which do not include the percentage Catholic overstate the effects of whether Catholic since Catholics are more likely to live in predominantly Catholic counties than are non-Catholics[36]. Third, including other measures of individual religiosity such as whether Baptist had little effect on the percentage Catholic coefficient (see Table 3 row 4). Fourth, the effects of differences in the percentage Catholic is large and significant for white non-Catholics and whites who did not attend church at all in the previous year[37]. The percentage Catholic is less likely to positively correlated with unobserved components of the error term in these analyses since it is doubtful that the parents of these girls choose where to live based on the percentage Catholics. Thus, any upward bias in the coefficient of the percentage Catholic due to such effects would be small[38]. Unobserved religiosity or other unobserved individual characteristics for nonattendees are especially unlikely to be correlated with the percentage Catholic. The variable whether Catholic for white nonattendees is insignificant and relatively small (-0.030) compared to that for white attendees (-0.195). This suggests that religiosity is not playing an important role in choices made by these girls and their families. Table 4 list results of dummy variables for whether the percentage Catholic was less than 25, 50-74, 75 and over[39]. The estimated effects do not vary significantly by church attendance or denomination (rows 2-6). When all whites are estimated jointly, both those in communities with 75 and over and 50-74 percentage Catholic had significantly lower (at the 5 percent level) birth rates than did those in communities with less than 50 percent. This implies that the percentage Catholic has a similar effect for all whites – Catholic versus non-Catholic and attendees versus nonattendees[40].

It is also unlikely that the coefficient of percentage Catholic is merely capturing other indicators of religiosity or other socioeconomic characteristics of communities based where families choose to live. First, the percentage Catholic is measured at the county rather than at the neighborhood level. Among residential moves within state between 1975 and 1980, over 70 percent occurred within the same county[41]. This suggests that dissatisfaction with neighborhood characteristics is often resolved by choosing a different neighborhood in the same county. Second, the analysis in column 1 of Table 2 estimates the effects of percentage Catholic independent of the other community characteristics. These include the fraction of families in the county who were below the poverty level, the fraction of the county that was African-American, and the fraction that attended college. Only the last was statistically significant. The first two were included for comparability with other studies. Their insignificant coefficients are consistent with more general findings of small peer and neighborhood effects discussed earlier. Third, the coefficient of percentage Catholic remains virtually unchanged with adding other measures of county-level socioeconomic status such as the unemployment rate, the size of Aid to Families with Dependent Children payments, and the percentage of female-headed families (Table 3, row 5). Similar to other analyses of community effects, all of these variables were insignificant. Fourth, the coefficient does not appear to be a proxy for other measures of religiosity or their effect on public policy. All of the other alternatives considered - the percent of the county's population who were church adherents, the number of churches per county square mile, the fraction of the county who were Baptist, and the presence of state blue laws[42] – had small and insignificant coefficients when individually (or collectively) added to the analysis in Table 2. Correspondingly, including these variables did not substantially change the size of the percentage Catholic coefficient (Table 3, row 6). The small and insignificant effect of the fraction of the county who were Baptist is especially noteworthy. Empirical evidence suggests that counties where fundamentalist denominations are strong tend to have more legal restrictions on abortions[43] and thus represent areas where costs of teen pregnancy may be higher. Fifth, the coefficient does not change substantially depending on whether other indicators of the costs of teen births - statewide restrictions on public funding for abortion or the sale of contraceptives - are included (-0.575 in Table 2 column 1) or excluded from the analysis (-0.638 in Table 3 row 7). This is true even though these indicators themselves had a significant

effect of teen births. This suggests that the correlation between the percentage Catholic and these restrictions is relatively small. This conclusion is reinforced by the consistently positive effect of the restrictions on birth rates for both teens (Table 2 column 1) and the same women in their twenties (Table 2 column 2) in contrast with the reversal of the direction of the effects for the percentage Catholic (negative for teens and positive for women in their twenties). Furthermore, it is unlikely that other unmeasured costs on teen births may account for the significant coefficient of percentage Catholic. Lundberg and Plotnick (1995) found that such costs – availabilities of family planning services for teenage women, family planning services for Medicaid-eligible women, and general family planning services – had no effects on childbearing for a similar group of NLSY women holding constant restrictions on abortion funding and contraceptive laws.

The last result consistent with the conformity model is the estimated effect of the percentage Catholic on directly on attitudes. The sample used includes girls ages 14-15 who did not expect to give birth in the next 12 months[44]. The dependent variable is the 1979 response to whether the individual expects to give birth for the first time during her teen years. Row 6 of Table 4 shows that living in a county where the fraction Catholic equaled at least .6 (30% of the sample) significantly reduced the probability of this expectation[45]. This coefficient probably underestimates the correlation between attitudes about teen pregnancy and the percentage Catholic. Individuals more favorably disposed to teen pregnancy may think (in many cases, accurately) that they will not give birth. In addition, the sample rules out the teens who gave birth at ages 14 and 15. Both of these would result in fewer positive responses than if the correct attitude were measured.

These various results taken together imply that (1) initial pregnancy endowments depend on attitudes and values measured by whether Catholic, (2) the distribution of initial endowments in a community as measured by the percentage Catholic affects the choices of individuals with a given set of endowments and (3) the level of social interaction alters the degree of conformity between Catholics and others.

Clearly decisions about denomination are well outside the purview of public policy for a variety of positive and normative reasons. Nonetheless these results suggest that other policy, environmental, or

technological changes that alter attitudes and behavior of peers may have similarly large effects on teen childbearing. More emphasis placed on such public policy options would have spillover effects on those outside the purview of the policy as well as those directly subject to it. These policies are in contrast to options which would not correspondingly shift attitudes away from teen pregnancy. As shown earlier, policies such as increased access to abortion and eliminating restrictions on purchasing contraceptives may reduce individual teen births for those directly affected but do not have corresponding spillovers on others through peer influences.

Three types of policies that may have spillover effects have been suggested by previous work. Ellwood (1988) discusses changes in administrative rules (e.g. Family Support Act of 1988) that would establish paternity and raise the amount of support that fathers provide to children born out-of-wedlock. If such changes substantially raise costs to men fathering children out-of-wedlock to teenage women, attitudes about premarital sexual practice may be altered. Loury (1999) finds that home visitation by nurses was the only program among those reviewed that consistently resulted in fewer subsequent births to welfare mothers. Part of the success of the program was attributed to unambiguous normative messages that becoming pregnant again was not desirable. The success of the programs contrasts with the negligible impact of the typical case management approach which simply provided information about birth control and of programs which relied on direct or indirect monetary incentives to avoid future pregnancies. According to Akerlof et al (1996), the technology shock of the legalization of abortion and the invention of the birth control pill increased the willingness of unmarried women to engage in premarital sexual relations. The stigma associated with out-of-wedlock births correspondingly declined resulting in fewer "shotgun" marriages over time. It is unlikely that this stigma would reemerge. However, other types of technology shocks that can rapidly reduce teen fertility such as longer-term contraceptives could also result in changing norms about the desirability of teen births. Ventura et al (1998) notes that the recent decline in birth rates[46] is, in part, due to use of injectable and implant contraceptives[47]. Since this decline was accompanied by a decrease in the proportion of adolescent women who have ever had sex[48], it may reflect changes in attitudes about the desirability of teen births.

V. Conclusion

This paper examines the relationship between the likelihood of giving birth as a teen and the Catholic percentage of religious adherents in one's county. The results show that, independent of the individual's own religious background and socioeconomic characteristics of the individual's neighborhood, the percentage Catholic has a large and significant impact on choices that alter teen fertility. The paper also presents evidence that the percentage Catholic affects teen births through changes in the peer's attitudes and attempts to conform to the behavior of one's peers. This research suggests that other policy, environmental, or technological changes that alter attitudes and behavior of peers may have similar effects by changing the distribution of options individuals are willing to consider.

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Table 1. Means and Standard Deviations of Selected Variables

Teen birth, total	0.254 (0.435)
Counties with percent Catholic <25%	0.318 (0.426)
Counties with percent Catholic>60%	0.220 (0.414)
Catholics	0.205 (0.404)
Non-Catholics	0.277 (0.448)
Birth ages 20-29	0.401 (0.490)
Catholic	0.321 (0.467)
County - percent Catholic	0.411 (0.270)
N=5800	

Standard deviations are in parentheses.

Table 2. Logit Childbearing Estimates

	Teens	Ages 20-29	Teens
Mother - highest grade completed	-0.075	-0.042	-0.072
	(.0136)	(0.012)	(0.014)
Don't know mother's schooling	-0.533	-0.425	-0.508
	(0.187)	(0.170)	(0.187)
Father - highest grade completed	-0.012	-0.024	-0.012
	(0.012)	(0.010)	(0.012)
Don't know father's schooling	0.176	-0.258	0.180
	(0.143)	(0.127)	(0.143)
Father - professional worker	-0.538	-0.160	-0.541
	(0.119)	(0.085)	(0.120)
Father - clerical worker	-0.484	-0.001	-0.480
	(0.173)	(0.118)	(0.173)
Number of siblings	0.048	0.001	0.049
	(0.013)	(0.011)	(0.013)
Attended sex education class	-0.290	0.200	-0.287
	(0.067)	(0.057)	(0.067)
Female-headed family	0.252	-0.132	0.244
	(0.081)	(0.074)	(0.081)
Household regularly received Magazines (age 14)	-0.452 (0.072)	0.128 (0.062)	-0.443 (0.072)
Family member had library card (age 14)	-0.230 (0.074)	-0.063 (0.066)	-0.226 (0.074)
African-American	0.407	0.324	0.396
	(0.092)	(0.081)	(0.092)
South	-0.008	0.066	-0.008
	(0.097)	(0.083)	(0.096)
Urban	0.183	0.020	0.159
	(0.086)	(0.072)	(0.086)
Times attended church in past year	-0.013	0.001	-0.013
	(0.001)	(0.001)	(0.001)
Catholic	-0.215	0.235	-0.209

	(0.085)	(0.068)	(0.086)
Abortion funding or contraception sales restrictions	0.300 (0.079)	0.223 (0.066	0.288 (0.080)

Table 2. cont.

	Teens	Ages 20-29	Teens
County - percent Catholic	-0.575 (0.164)	0.195 (0.137)	-0.430 (0.171)
County - percent below poverty line	-0.004 (0.005)	-0.001 (0.005)	-0.010 (0.006)
County - percent African-American	0.002 (0.003)	0.008 (0.003)	-0.002 (0.003)
County – percent some college	-0.021 (0.009)	0.008 (0.007)	-0.010 (0.010)
County - teen birth fraction	_	_	0.038 (0.010)
Constant	0.472 (0.240)	-0.440 (0.203)	-0.127 (0.308)
Log likelihood	-2904.42	-3827.88	-2899.46
χ^2	766.46	153.60	776.36
N=5800			

Standard errors are in parentheses.

Table 3. Supplementary Logit Estimates of Percentage Catholic Coefficient

(1) Main results	-0.575 (0.164)
(2) African-Americans	-0.418 (0.355)
(3) Whites	-0.695 (0.199)
(4) Includes whether Baptist	-0.553 (0.165)
(5) Include unemployment rate, AFDC monthly payment, and percentage of female-headed households	-0.644 (0.199)
(6) Includes percent of church adherents, number of churches per county square mile, fraction of the adherents who were Baptists, presence of state blue laws	-0.545 (0.225)
(7) Excludes restrictions on public funding for abortions and sales of contraceptives	-0.638 (0.164)
N=5800	

Standard errors are in parentheses.

Table 4. Supplementary Logit Estimates Using Dummy Variables

Dependent variable: Whether first birth occurs before age 20	Estimated effect of whether percentage Catholic≥.75	Estimated effect of whether percentage Catholic .50-.74	Estimated effect of Whether percentage Catholic<.25	
(1) African-Americans	-0.358 (0.208)			
(2) White Catholics	-0.645 (0.220)	-0.292 (0.169)	0.295	(0.275)
(3) White Non-Catholics	-0.658 (0.270)	-0.187 (0.143)	0.025 (0.145)	
(4) White Attendees	-0.574 (0.185)	-0.263 (0.128)	0.055 (0.144)	
(5) White Non-attendees	-0.746 (0.329)	-0.215 (0.207)	0.077 (0.238)	
(6) All Whites	-0.608 (0.159)	-0.254 (0.108)	0.061 (0.122)	

Dependent variable: whether expects to have first child before age 20	Estimated effect of whether percentage Catholic≥.6
Separate analysis for:	
(6) Ages 14 &15	-0.663 (0.333)

N=5800 (All ages)
N=1193 (Ages 14-15)
Standard errors are in parentheses.

Footnotes

[1] This was measured by the percent of students in the individual's school who were classified as economically disadvantaged.

[2] These were measured by the proportion of families receiving public assistance, the proportion of families with low income, the proportion of families with high income, and the proportion of families that were headed by a single female in the individual's Census tract.

[3] This was measured by the percentage black, median family income, proportion of families below the poverty line, percent of females who were never married, and the average number of children ever born per ever married women in the individual's Census tract.

[4] This would include abstinence, contraception, and/or abortion.

[5] The terms f and g are included so that the marginal benefit of closer relations is not infinite.

[6] It is assumed that each individual expects the acquired position of the others will be the same as their endowment position.

[7] The community characteristics included median household income, percent black, and manufacturing share of employment, exposure to educated people, percent of single mothers among older women, and average commuting times to work for blacks. The family background characteristics include female-headed family, years of schooling for household head, and number of workers in the family.

[8] U.S. Catholic Conference (1977).

[9] This may be also true if teen pregnancy is endogenous. For example, Kane and Staiger (1996) found that raising the costs of abortion reduced rather than increased teen births. Specifically, raising the costs of teen pregnancy (by making abortions more difficult) encouraged young women to make choices that reduce the chances of pregnancy and thus the likelihood of teen births.

[10] Lundberg and Plotnick (1995) found that Catholic teens were significantly less likely to become pregnant. They were also less likely to have an abortion although this effect was not significant.

[11] For example, due to conformity effects and social distance, type 3 individuals are unlikely to choose $x_{s3}<x_{e2}$ and type 1 individuals are unlikely to choose $x_{s1}>x_{e2}$. Such changes would reduce utility resulting from associating with their own group and the group closest to them in favor of associating with the group farthest from their initial endowment. Similarly type 2 individuals are likely to choose higher acquired values of x than type 1 individuals.

[12]Data from a similar study of adolescent pregnancy (Hayward et al, 1992) indicated that 9 percent of their nationally representative sample of African-American women ages 15-44 were Catholic compared to 32 percent of white women.

[13] See Mosher and Hendershot (1984).

[14] Substantial differences in initial endowments could possibly also affect group differences in the effects of the percentage Catholic. This would occur, for example, if some groups have endowments well above levels that generate most births.

[15]Out of the original sample of 6283 women, 483 were excluded because they did not have valid data for the percentage Catholics in their county.

[16] See Quinn et al (1982) for details about this survey.

[17] See Laband and Heinbuch, 1987.

[18] See Bush (1983).

[19] U.S. Bureau of the Census, *County and City Data Book*, 1983.

[20] This is slightly higher than figures from national samples of adults of 28 percent in 1985. See Greeley (1989). The greater fraction of Catholics who switch denominations as adults than Protestants may account for part of this gap.

[21] The higher fraction of Catholics among religious adherents compared to the fraction of Catholics in the sample is largely due to (1) the definition of religious adherents (all Catholics were defined as adherents but, for other denominations, not all members were considered adherents) and (2) many non-Catholic African-American religious adherents and those from smaller denominations were not included in the Glenmary accounting.

[22] About 32 percent of the entire sample resided in counties where the fraction of Catholics was less than 25 percent and about 32 percent of the sample lived in counties where the fraction of Catholics was more than 60 percent.

[23] Weighted results are similar to those listed here.

[24] The actual percentage Catholic for those below 25 percent was 0.079 and the fraction for those above 60 percent was 0.722. The expected birth fraction equals 23 for Catholics and 27 for non-Catholics. The 2.6 percent figure is the difference between [(.079*23)+(.921*27)], the expected fraction in counties with less than 25 percent Catholic and [(.722*23)+(.278*27)], the expected fraction in counties with more than 60 percent Catholic.

[25] Changing the dependent variable to teen pregnancy rather than teen birth leaves the coefficient of the percentage Catholic relatively the same at -0.559 (0.147). Changing the variable to out-of-wedlock teen birth reduces the coefficient slightly more to -0.488 (0.221). All of these coefficients are significant at the 5 percent level and none is significantly different from the others. The focus is on teen births in this paper since measurement error problems are likely to be less severe than with teen pregnancy and the model for out-of-wedlock teen births involves more choices and is more complicated.

[26] The actual percentage Catholic for those below 25 percent was 0.079 and the fraction for those above 60 percent was 0.722. These figures result in expected teen birth rates of 29.7 percent for the former and 22.1 percent for the latter. These figures are almost identical to those in Table 1.

[27] Notable differences between these results and column 1 include the sign changes for sex education, female head, and restrictions on public funding for abortion or sale of contraceptives. The now positive effect of these variables may reflect their impact on delaying the timing of childbearing. Consider the simplest case where the individual plans to have only one child. Reducing the likelihood of a teen birth would increase the chances of a later birth.

[28] These estimates come from separate logit analyses for African-Americans and for whites.

[29] This includes 14.8 percent of African-Americans.

[30] Because column 1 represents the total effect, it will be used as the standard of comparison for the other analysis in this paper.

[31] Note that, if V_1 is positively correlated with ε_2, δ_1 will be biased upward reflecting part of the effect of V_2.

[32] According to the model, the coefficient of the percentage Catholic does not fall to zero since the unobserved components of the teen pregnancy endowment (V_2) are not captured by the teen birth fraction (V_1) (see equation 10).

[33] About 74 percent of teen births in this sample were to non-Catholics.

[34] In this sample 55 percent of Catholic who gave birth were married compared to 45 percent of non-Catholics.

[35] The church attendance variable is measured as of 1982 for girls under age 17 and as of 1979 for those 17 and older. It, therefore, equals the number of times attended church between ages 17-19 for most of the sample. Since church attendance may be positively correlated with unobserved parents' and children's characteristics that reduce teen pregnancy, it may overestimate the effects of church attendance alone.

[36] The estimated effect of whether Catholic is almost 50 percent higher (–0.319 with s.e. 0.080) when the percentage Catholic is excluded from the analysis.

[37] Nonattendees include all who reported than they did not attend church at all in the previous year. This category includes both Catholics and non-Catholics.

[38] Grogger (1998) used a similar argument to determine the effects of neighborhood violence on schooling. Note also that selecting nonattendees is likely to bias downward the estimated effect of percentage Catholic assuming that $E(Y^*)<0$ for low-attendees. The coefficient of percentage Catholic would capture both its effect on the likelihood that an individual is a nonattendee and the effects on teen births given that the individual is a nonattendee. If the former is negative, then the overall estimated coefficient of percentage Catholic is lower than the true value.

[39] These dummy variables were used for this comparison because of nonlinearities of the effects of percentage Catholic for Catholics. In particular, the 6 percent of Catholics in counties where the percentage Catholic is less than 25 were substantially more likely to have a teen birth than the linear model for the remaining Catholics would predict. The left-out category is 25-49 percent.

[40] Note that it is unlikely that non-Catholics choose where to live based on the presence of Catholic schools. About 6.8 percent of all elementary and secondary students were enrolled in Catholic schools in Fall 1980 (U.S. Department of Education, 1991) and only about 10 percent of students enrolled in Catholic schools were non-Catholic (National Catholic Education Association, 1993).

[41] U.S. Bureau of the Census. County and City Data Book, p. 2. Evans et al (1992) make a similar argument to justify using metropolitan area variables as instruments for the percentage of students in the respondent's school who were economically disadvantaged.

[42] Blue Laws are restrictions on retail sales, entertainment, provisions of services, and/or types of work on Sundays. They were developed to limit activities thought to be inappropriate on the Sabbath.

[43] Medoff (1989).

[44]Restricting the sample to those who do not expect to give birth soon rules out those already pregnant. Older girls were not analyzed to avoid more serious selection problems. A greater fraction of the older girls would be excluded since they would have already become teen mothers. Only 17 of the 1193 girls ages 14-15 had already given birth.

[45]All of the individual and family variables in Table 2 row 1 were included in this analysis. Adding the community level variables did not substantially change the coefficient of percentage Catholic. However, the standard error was larger.

[46] Overall the rate fell from 62.1 per 1000 women in 1991 to 54.7 in 1996. The decline was especially large among African-American teens from 115.5 per 1000 women in 1991 to 91.1 in 1996, the lowest rate ever recorded.

[47] Injectable and implant contraceptives only became available in the early 1990s. In 1995, 13 percent of all women aged 15-19 who used a contraceptive method used these (Guttmacher Institute, 1999). This includes 24 percent of African-American women (Donovan, 1998).

[48] The percentage of sexually experienced women aged 15-19 fell from 52.6 percent in 1988 to 51.3 percent in 1995. This accounted for one-quarter of the drop in the pregnancy rate from 111.4 per 1000 women to 101.1 per 1000 (Guttmacher Institute, 1999).