

Religion and Fertility in the United States: A Geographic Analysis

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Abstract:

This paper examines the association between religious adherence and fertility rates across counties in the United States (1998-2002), controlling for other demographic and socioeconomic variables. Employing geographically weighted regression (GWR) analysis, this study finds that the relationship between religion and fertility differs remarkably over space, illustrating different spatial patterns according to religious group (e.g. Protestant-Mainline, Protestant-Evangelical, and Catholic). For Catholic adherence, there are positive, negative, and insignificant associations with fertility rates depending on the location. Such spatial patterning challenges fertility transition theory and supports cultural explanations of fertility differentials.

Keywords: fertility, religion, culture, spatial analysis

Only a few demographic studies have looked at the spatial patterns and correlates of fertility in the United States (Boyle 2004; Weeks 2004); and, despite its importance, the research on spatial variability excludes analyses of religion and fertility (Morrill 1993). Although many fertility studies focus on the national scale, variation at smaller scales of analysis proves equally remarkable. For example, in the United States in 1999, the general fertility rate, which measures the number of children per thousand women aged 15-44, varied from 49.4 in Maine to 93.1 in Utah (NCHS 1999). In terms of children per woman, this translates roughly to 1.7 children per woman in Maine, compared to 3.2 children per woman in Utah. Such variation begs further investigation of fertility rates and cultural variables, such as religion, at a more disaggregate or local level.

In pursuit of a geographic analysis of religion and fertility, this paper examines the association between county-level fertility rates and religious adherence, controlling for mediating demographic and economic variables. First, the literature review considers previous theoretical and empirical research on fertility; then, maps of the general fertility rate across counties illuminate geographic differences across the country. The data, sources and methods for analysis are described. Last, multivariate regression analysis is conducted, and the interaction of religion and other variables is considered with path analysis. Also, geographically weighted regression (GWR) is used to predict local parameters that illustrate how the association between religion and fertility varies geographically.

Theoretical and Empirical Research on Fertility

There is much that geographers can contribute to demographic research. First, this paper reviews how geographic research complicates theories of demographic transition. Specifically, demographic transition theory argues that fertility declines from very high rates to replacement levels over time; but, geographic evidence presented here shows that even in the U.S., fertility decline has not been spatially uniform, partly because of cultural and religious differences. Second, this paper shows how research on religion and fertility contributes to the literature on cultural explanations of demographic change. Third, research on the geography of fertility is reviewed to demonstrate the depth of previous efforts, upon which this study builds. Fourth, recent demographic research that includes spatial statistical techniques to study fertility is summarized, the present research is placed within this unique and developing literature.

Geographic Research and the Demographic Transition Theory. To begin, a substantial portion of research on fertility focuses on the demographic transition theory: where societies move from a state of high fertility (and mortality) to low fertility (and mortality) over time. In fact, the large body of literature on the fertility transition testifies to the richness of theoretical knowledge of fertility studies. Articulating the depth of debate within demography; Charles Hirshman contends, “there will be a widely accepted theory of fertility transition before the world reaches zero population growth, but that it will be a close race” (1994, 123). Others suggest that fertility studies require a synthesis of ideas and research, rather than completely new theories (Mason 1997). One goal of this research is to quantify the role of religion in promoting regional fertility differentials. The importance of examining the association between fertility and religion is also

spatially demonstrated. If fertility rates in the same country are higher, or above replacement rate, in some areas, and lower in other areas because of religion, then a basic premise of fertility transition theory is challenged: economic modernization does not wholly explain and determine fertility decline. Further, the nature of fertility decline is not uniform over space.

Spatially homogenous fertility decline is unlikely, given that religious institutions help shape attitudes about fertility (McQuillan 2004). When examined at a neighborhood or county scale, broad cultural norms, often fostered through religion, take on an interesting spatial heterogeneity, which may also become manifest in actual population behavior, such as fertility. As Weeks et al. (2004) notes,

Culture is bound to be highly spatial in nature because it is easier to copy than to invent (the essence of diffusion) and people are likely to copy solutions to their problems from neighbors: the fewer and less diverse your neighbors, the fewer options you have from which to choose.

Indeed, religious participation in the U.S. and measures of religious diversity have demonstrated spatially persistent patterns over time (Newman and Halvorson 1980; Zelinsky 1961).

Religion as a Cultural Component of Demographic Change. Generally, research on the fertility transition theory in demography includes a number of possible explanations for fertility change: economic explanations, ideational or diffusion explanations (of both ideas and contraception), evolutionary theories, cultural differences, changes in marriage and family, and that fertility exists in a dynamic equilibrium with mortality (Bulatao 2001; Hirschman 2004; Mason 1997). A number of demographers

suggest that economic theories cannot explain all demographic variation and need the support of other theories regarding the complexity of social relationships (Bongaarts and Watkins 1996; Carley 2001; Pampel and Peters 1995; Pollak and Watkins 1993). In response, many ethnic and racial studies of fertility challenge traditional explanations of fertility transition (Bledsoe et al. 1998; Forste and Tienda 1996; Landale and Hauan 1996; Tolnay 1989; Tolnay and Glynn 1994). Likewise, research on religion and demography challenges traditional explanations by interpreting fertility differentials as a product of cultural differences.

Bridging the split in literature between developing and developed countries, Caldwell (2001) suggests that the fertility transition in *all* countries is initiated by changes in attitudes and behaviors. Watkins' (1990) application of "imagined communities" to fertility behavior also raises important questions regarding the construction of identity in everyday life, implicating both identity politics and fertility in a complex and dynamic interaction. Overall, more and more evidence has been gathered in support of geographic-ideational and cultural, or religious, influences on fertility change.

However, cultural elements of demography often prove difficult to measure and analyze. As a consequence, few empirical studies incorporate notions of culture and ideas into a study of fertility (Smith and Easterlow 2005). Bongaarts and Watkins (1996) contend that

perhaps because ideas seem 'softer' than income and prices, or perhaps because they are difficult to measure in surveys, demographers have been reluctant to consider their influence. But it is evident that ideas can be potent stimuli for behavior: Christianity, Communism, and democracy have been exceptionally influential worldwide, and feminism may ultimately belong in this category.

Or, as Boyle (2004) argues: “any explanation of fertility change requires an understanding of local cultures and social leanings.”

Bongaarts and Watkins (1996, 660-661) also contend that social interactions exhibit a definitive geographic component, which can be analyzed to better understand demographic behavior. They find that in addition to spatial closeness there are also social networks through which information and ideas flow, creating socially close communities, if not spatially close communities. Through these social and spatial networks, ideas are exchanged and behavioral norms shift or change: “without channels, ... communities would be isolated; ... channels connect them, determining the range and intensity of the flow of social interaction” (Bongaarts and Watkins 1996, 661). Routes of commerce, actions of government to enhance communication and transportation infrastructure, and cultural homogeneity (linguistic, ethnic, and as argued here, religious) determine the connectivity of individuals, groups, and communities. This paper tests the theories of information flow as they operate through religious networks and are applied to ideas about fertility, at the county-level. Bongaarts and Watkins (1996, 664) say that this process is key to “any comprehensive and realistic theory of fertility.” Otherwise, empirical models of fertility rates become misspecified. Cleland (2001) explains that fertility decline is not uniform, but complex and related to political, religious, and cultural contours, and Graham (2000) puts the onus on population geographers in particular to consider the role of social and cultural elements of fertility theory.

In fact, emerging theories in demography on culture advocate the use of quantitative studies, as conducted here. For example, Hirshman (2004) describes the strong cultural hypothesis as the cultural influence on fertility that remains even after

controlling for socioeconomic characteristics. He goes on to say that little has been done to empirically assess the role of culture in the diffusion of fertility behavior (Hirshman 2004: 217). This paper pursues such research. One other example of empirical research on culture and fertility, from Lesthaeghe and Wilson (1979), shows that the secularization in Europe relates to the decline in traditional views about marriage and the family, which prized higher fertility. I expand on theories suggested by Lesthaeghe and Wilson (1979) below by examining the intervening influence of marriage rates on religion in predicting fertility differentials in the U.S.

Geography of Fertility. To complicate current research on culture and demography, though it is true that ideas transfer more rapidly through homogenous groups, ideas also spread via a multiplex of networks (Carley 2001). In other words, an individual arrives at a particular idea, on marriage or contraception, for example, via a multitude of avenues, some personal, some institutional. But, space matters especially to the organization of groups and how ideas are spread among them. And, this spatial organization can be revealed as larger patterns of social behavior. Outlined below are important geographic studies of fertility on which this paper builds.

Several studies examine spatial and regional variations in fertility in Europe, finding significant patterns in the data. Hank (2001) studies regional fertility in Western Germany, finding evidence of persistent, substantial differences in fertility, which may in part be explained by religious differences, in addition to opportunities in higher education for women. Hank (2001) cites Kemper (1991) for finding culture, particularly secularization, as important to fertility decline. Elsewhere, Franklin and Plane (2004)

identify strong North-South fertility differences in Italy. Wilson (2000) further confirms that even in post-transition societies, significant spatial differences persist. In Eastern Europe, spatial differences in fertility have had a permanent character due to migration trends and post war demography (Iwanicka-Lyra and Witkowski 1991). The context of fertility rates in different countries truly illustrates how demographic variables are also inherently geographic variables.

Research in population geography focuses more on fertility in Europe, perhaps because low birth rates are now seen as a social and political challenge (Karjalainen 1991). Although, in developing countries, both large and small, spatial variation exists even more clearly (Baehr and Gans 1991). In small regions, such as Barbados (Jones 1977) and Trinidad and Tobago (Coward 1986), geographic fertility differences remain evident, even after major in-roads to fertility decline have been made. Weeks (2004) examines fertility in Cairo, finding evidence of spatial dependence. A number of studies also examine fertility indicators over time and space. For example, some studies use kriging, a spatial estimation technique that employs Geographic Information Systems (GIS), to assess boundaries of fertility differentials and how they vary over time, specifically looking at evidence from India (Balabdaoui et al. 2001; Bhat 1996). Further, the decline of fertility in some regions has caused an intensification of spatial patterns (Guilmoto and Rajan 2001). New spatial statistical methods used here expand techniques employed by Bhat (1996) and Balabdaoui et al. (2001) by assessing the association between fertility to covariates, instead of univariate analysis.

Internationally, there are significant, empirical variations in how religion affects fertility, geographically. For example, in Catholic countries, France compared with

Ireland, or in Islamic countries, Saudi Arabia, Pakistan and Syria compared with Indonesia, Egypt, and Iran, there are remarkable differences in fertility (McQuillan 2004). Regional examples also hold, in England and Wales, as marriages ordained by churches decreased, so too did fertility, indicating a shift away from traditional families to “consumer-oriented behavior” (Woods 1987). Religion has also been found to be a deterrent to fertility decline in rural, Muslim regions in Eastern Malaysia (Noin 1991). In Europe, dechristianized areas experienced the first decreases in fertility, particularly when areas were also more urban and educated (Noin 1991). Bhat (1996) also finds religion to have an important effect on fertility differentials in India. And, in studying the South Island in New Zealand, fertility patterns have been associated with Catholic church attendance (Heenan 1967); there are also strong associations in fertility differences and religion in Northern Ireland (Compton 1991). However, no geographic studies examine fertility differentials in the U.S., as they relate to religion.

Spatial Statistics in Fertility Research. Last, recent research in geography that uses spatial statistical techniques has made important contributions to the field of demography. This paper builds on the new, emerging statistical research, and incorporates cultural theories discussed above. Because of the nature of the data, demographic research is often inadequate at studying small-scale geographic differences. For example, demographers, such as Mosher, Williams, and Johnson (1992), have examined fertility and contraception in the U.S., as related to religious identity and participation, but without much discussion of how those variables differ across space. They mention the large-scale variation, across four U.S. census regions, noting the data limitations, which

prevent them from further understanding the relationship between religion and fertility over space.

Ecological research examining fertility in the U.S. has been conducted by Tolnay (1994), who studied fertility rates in the South in the 1940s using county-level data. He suggests that fertility in the South was distinct because of structural (urbanization, industrialization, and education), diffusion-innovation (similar cultural contours), and health (venereal disease causing reduced fertility) reasons. Though Tolnay (1994) does not examine religion, it is also the case that the consequences of religion on fertility are not uniform (McQuillan 2004), suggesting that further geographical analysis is worthwhile.

O'Connell (1981) and Morrill (1993) study variability in fertility across states in the U.S. Variability in fertility exists because of different patterns in development, ethnicity, prior growth, culture, environment, and accessibility (Morrill 1993). Forces of convergence and divergence, with long term developmental trends and short term cyclic effects, also impact fertility rates (O'Connell 1981). Morrill (1993) predicts U.S. fertility rates using age structure variables, such as proportion of the population less than 18, proportion greater than 65, and other variables, such as divorce rates, proportion of the population not married, percent black, percent Hispanic, the median income in each county, percent having attended some college, the female labor force participation rate, the log of population, growth rate in previous decades, and mobility (persons living in a different state five years ago). Further, he suggests that religion, abortion rates, and married couples with children, as a share of all households, ought to be included. He argues that the plurality of the U.S. makes it an interesting case for study, and he

concludes that age, ethnicity, and cultural segregation generate divergence of demographic indicators (fertility and mortality) (Morrill 1993). The research presented in this paper specifically expands on Morrill's research to include more of the cultural component that he suggests for future research.

Other recent examples of spatial approaches in demography that this paper draws from include research by Potter, Schmertmann, and Cavenaghi (2002), and Weeks, et al. (2004). Potter, Schmertmann, and Caenaghi (2002) examine microregional data from Brazil to study the association between demographic variables and development characteristics. They find that education and electrification prove influential in predicting lower fertility rates. While they use GIS for visualization of descriptive statistics, the statistical technique employed by these authors, the fixed effects model, does not utilize the spatial aspects of the data available to them. Weeks, et al. (2004) examines the variation in inter-urban fertility in Cairo, Egypt. Using data on marriage rates and satellite images of land cover as a proxy for level of urbanization, the authors argue that decline of fertility in Cairo has not been uniform, as expected by theories of diffusion. Instead, they argue that neighborhoods are the most important source of attitudes and ideas about fertility. Weeks, et al. (2004) takes a particularly spatial approach to their data analysis, carefully examining spatial associations and using spatial regression techniques. Though the data in this paper is analyzed at a larger resolution (the county-level), it is possible to examine the spatial associations between fertility and other covariates of interest, using spatial statistical techniques. This paper aims to fill a gap in U.S. demographic research by studying the geographic relationship between religion and

fertility. The following section looks at measures of fertility, religion, and other mediating variables affecting religion.

Data and Sources

Several variables and the data sources are used for analysis. First, measures of fertility are described and examined across U.S. counties. Then, the correlates of fertility, particularly religion, are discussed.

Measures of Fertility in the U.S. The general fertility rate is measured by the number of births per 1000 of women of childbearing age (in this case, it is calculated for women 15-44). The data are compiled by the CDC Reproductive Health Information Source (<http://apps.nccd.cdc.gov/gisdrh/>), which uses Vital Statistics and Census estimates from 1998-2002 to calculate fertility for each county (Centers for Disease Control (CDC) 2004).¹ Figure 1 shows a contour map of fertility rates across the U.S. The spread, or variance, in fertility across counties in the U.S. is large and interesting. Fertility rates range from 15.47 (Storey County, Nevada) to 224.58 (Grand Isle County, Vermont). The national average fertility rate is 69.71 (CDC 2005). The range of fertility levels in the U.S. is comparable to the range in fertility levels across the globe! Keeping in mind that countries also experience significant internal geographic variation, the differences in fertility levels across the U.S. appear to be worthy of investigation. As with any continuous scientific measurement, such as temperature or humidity, local measures are often more informative than regional or national ones. However, fertility figures are shrouded in a complex of demographic, health, economic, political, social, and cultural

¹ There are 3141 counties in the U.S., including the District of Columbia.

relationships. This paper aims to control for these mediating variables, while focusing on the associations between religion and fertility.

< Insert figure 1 about here >

Analysis of fertility rates over space has raised criticism from some population geographers. As Compton (1991) contends, fertility is largely becoming spatially homogenous, and should not be considered by population geographers. Compton (1991) argues that

unlike mortality and migration, however, location per se does not exercise a decisive independent influence on fertility in Western industrial countries; neither family size, norms nor the time of birth are a function of the intrinsic characteristics of space. According to this reasoning, spatial variations in fertility are incidental outcomes of ... aspatial processes ... (75).

But, at least in the case of the U.S., it has been shown that significant variation still persists (Morrill 1993). And, further, it ought to be the point of view, or premise behind the research in population geography that space plays an important and unique role in health and behavioral variables (Bocquet-Appel et al. 1996; Weeks 2004). Even supposing that spatial variations are only a product of misspecification, which this paper argues is not the case, the potential for spatial statistics to visualize and examine spatial non-stationarity can lend insights into underlying processes that models cannot completely define – making such analysis a worthwhile endeavor (Charlton et al. 1996). However, as argued in the introduction, all variables are intrinsically geographic and spatial, in the same way that they are intrinsically historical, and connected with time.

With this in mind, the following sections discuss religion and other correlates of fertility: demographic, health, economic, policy, and social-related variables.

Measures of Religion. A focal point of this research is to examine the ecological role of religion with respect to fertility differentials. Religion significantly affects birth rates, particularly when pro-life and pro-family religions are geographically concentrated. For example, Mormon religious participation, which is clustered in Utah, but also Nevada, Idaho, Arizona, and Colorado, certainly influences regional fertility rates. There is a distinctive religious pattern of Evangelical Protestant groups in the South; also, there is an interesting bifurcation in Catholic Church adherence – in New England, but also in the Southwest. A measure of religious diversity, or heterogeneity, will also be examined in relation to fertility rates.

This paper uses a measure of diversity suggested by Lieberman (1969). Lieberman (1969, 851) defines diversity as “the position of a population along a continuum ranging from homogeneity to heterogeneity with respect to one or more qualitative variables.” In his example, Lieberman (1969, 851) considers a measure that answers the question: “... if all residents of the city are pared together two at a time, what proportion of the pairs combine persons with different religious affiliations?”

The other religious variables are constructed from data compiled by American Religious Data Archives (ARDA), for 2000. The measures are defined as the proportion of certain religious groups (Protestant-Mainline, Protestant-Evangelical, Catholic, Jewish, Muslim, Eastern, Orthodox, and Utopian) with respect to the county population. Table 1

sets out the independent variables used in multivariate analysis, their expected relationship to fertility, and the sources for the data.

<Table 1 about here>

Though a positive relationship between religion and fertility is expected, recent empirical studies have found that Catholic fertility tends to be lower than Protestant fertility in the U.S. (Mosher et al. 1992). High fertility among Mormon populations has been evident for some time, and young Mormons have higher fertility expectations than young non-Mormons (Toney et al. 1985). It is also explained that,

two points about the fertility patterns of Mormons are noteworthy. First, those patterns are largely independent of socioeconomic factors, and thus affirm the importance of religious and group norms in influencing fertility. Second, even though Mormon fertility remains higher than that of other groups, it is now much lower now than in previous generations ... (Mosher et al. 1992).

Families with no religious association tend to exhibit very low fertility (Mosher et al. 1992). Toney, Golesorkhi, and Stinner (1985) argue that living in a high fertility area does not affect the fertility of individuals living there; for example, living in a predominantly Mormon area does not affect the fertility of non-Mormons. Though this study engages in only ecological assessments, Toney, Golesorkhi, and Stinner (1985) do not discuss the possibility of self-selection of individuals to live in high fertility areas. In fact, a premise of Weeks (2004, 390) is that: “the reproductive variables of some people within a neighborhood will influence the behavior of others, even net of the human capital opportunities that objectively exist in the neighborhood.” Further, “changes in

reproductive behavior at the local level may be influenced by changes in spatial patterns of fertility transition” (Weeks 2004, 390).

There are also important interrelations between religion and other cultural aspects. McQuillan (2004, 43) asks, “can religion shape demographic behavior in a setting where there is religious pluralism and where a particular religious denomination may lack support from civil institutions or perhaps even face opposition?” He responds, yes, as was the case with immigrant enclaves in U.S. history. Religion most affects fertility when, (1) religions influence norms related to fertility, (2) communicate teachings and have the ability to enforce compliance, and (3) when members have a strong sense of attachment to religious community (McQuillan 2004).

It is also evident that religion operates under a broader umbrella of social capital that is strongly related to community and geography. Parents may decide to have children due to the social capital they create: children generate strong ties within families and within the larger community (Schoen et al. 1997). Marriage, children, and generational transfers all constitute investment in social capital (Astone et al. 1999). Consequently, social capital can be a major motivation for behavior. One of the presuppositions expounded by Weeks (2004, 390) in his analysis is that “the social environment influences the social and human capital variables that more directly influence the demand for children.”

Demographic Variables. A number of demographic variables, which describe the county populations, have important associations with the fertility rate, particularly: age structure, mobility, urbanization, infant mortality rate, access to family planning, ethnicity, nativity,

and marriage rates. These variables are controlled for to more clearly illustrate the association between religion and fertility. Most of the measures for these variables are obtained from the Census 2000. The measure for the concentration of family planning clinics is derived from the Alan Guttmacher Institute, and data on infant mortality come from the CDC. The demographic and economic variables described here are used as controls to study the impact of religion on fertility, and it is necessary to focus some attention on why these controls are important to the specification of models of the fertility rate. Although they are not discussed with detail in the findings below, discovering the spatial associations between fertility rates and other demographic and economic variables is an important contribution to fertility studies that will be included in future research.

First, age structure determines the youthfulness of a population and, by extension, the extent of fertility or new births. Following Morrill (1993), the models below examine the proportion of the population under 18, as an indicator of younger age structures. Counties with larger populations under 18 are likely to be associated with higher levels of fertility. The county-level mean of populations 18 and under is 27 percent, and the range extends from a minimum of zero percent to a maximum of 48 percent.

Mobility, or the proportion of the population that lived in a different county five years ago, is considered a measure of the vitality or dynamism of the county (for example, see Morrill (1991, 1993)). Fertility is linked to migration in that migration is higher for younger populations who are having children (Alonso 1980). This is confirmed by the extensive body of literature by Andrei Rogers and his colleagues that examine the age profile of migration (Rogers 1995; Rogers and Willekens 1986; Rogers et al. 2001). If for no other reason, the relationship between fertility and migration makes

this a profoundly regional and geographic study. Migration is also seen more as a mechanism of ideational diffusion and consequently fertility change (Higueras-Arnal 1991). Last, there is a growing popular discussion of exurbia, where young families are moving to outer-suburbs where the lower cost of living and change in culture provide a more suitable climate for raising children (Brooks 2004).

Next, urbanization is associated with fertility rates. One major premise of demographic transition theory is that modernization and urbanization, in particular, explains the decline in fertility, in that diffusion of the fertility transition moves from urban to rural areas (Noin 1991). In cities, women may have more opportunities for education and employment, and greater access to family planning clinics, contraception, and abortion. Cities also stand in contrast to rural areas in terms of cost of living and availability of housing. Urbanization may also be linked to secularization and a declining influence of community. Weeks et al. (2004) examine urban influences on fertility in Cairo, commenting:

Cities epitomize the environment in which elements of rational choice (the trade-off between the supply and demand of children) intersect and interact with the diffusion of innovations (methods of fertility control) to keep fertility low (75).

However, by using micro-level spatial data, Weeks et al. (2004) reveal the heterogeneity in fertility even within urban areas. It is not within the scope of this analysis to examine interurban fertility in U.S. cities, but one certainly worthy of future research.

Despite controlling for many socio-economic variables that associate urbanized areas with lower fertility, the relationship between fertility and urbanization is expected to be negative (inverse) because of ideational notions of diffusion in an urban setting. More mass media and communication of expected social norms seem endemic to cities;

or conversely, rural areas may be subject to a smaller range of ideas and choices, creating a resistance to change, even in reproductive behaviors (Weeks et al. 2004). Other studies suggest a selection process for those who live in rural areas, tending to exhibit more traditional, pro-family, pro-natalist attitude (Hank 2001 citing Strohmeier 1998, in the case of Western Germany, or as Brooks 2004a conjectures). Further, in the case of Western Germany, rural-urban differences exceed even East-West German differences (Hank 2001). In Sri Lanka and Korea, it is apparent that transportation infrastructure has been linked with fertility decline (Noin 1991). But, unexpected relationships between fertility and urbanization have been found where regional differences are overwhelming, as in Italy (Brunetta and Rotondi 1991). Here, urbanization is measured by percent of the county population living in an urban area, according the U.S. Census (2000).

Infant mortality and access to family planning are also included as covariates of fertility. Data on infant mortality comes from the CDC Reproductive Health Information Source (2004) and information on family planning comes from the Alan Guttmacher Institute (2005). There is a well-documented relationship between infant mortality rate and fertility rate (Cleland 2001). Many intervening factors are at work, but as infant mortality lowers, individuals choose to have fewer children because most of them are expected to live. Although empirically there is a positive correlation between infant mortality and fertility, two potential effects of infant mortality are possible in theory (Whittington, Alm, Peters 1990). The replacement effect explains that higher infant mortality could increase the birth rate, but the cost effect states that infant mortality increases the cost of producing a surviving child, thus reducing fertility. Two extensions of the replacement theory are hoarding and biological replacement (Olsen 1983;

Rosenzweig and Schultz 1983). Hoarding suggests that individuals respond to societal levels of mortality by increasing their fertility. Biological replacement means that when a child dies the interval to the next birth is shortened (since the length of the breast feeding period, a time of lowered fertility, is shortened).

Another health-related, demographic variable considered is access to family planning. The Alan Guttmacher Institute has recorded, by county, the number of publicly funded family planning clinics in 2001 (The Alan Guttmacher Institute 2005).

Internationally, the effect of family planning on fertility has been mixed. It has found to be critical (Kayastha 1991), or to have had no current, visible effect (Tyagi 1991). In the U.S., it is expected that access to family planning clinics, and by extension, contraception would be inversely related to fertility.

The social and cultural, demographic variables considered in this study involve: marital status, race, ethnicity, and nativity. Marriage rates are calculated by dividing the number of married people per county by the population over 16. More married couples per county could be associated with higher fertility and birth rates. Data on marriages come from the Census 2000 Long Form.

Next, racial differences in fertility persist due to historical and cultural developments, which help explain distinct patterns in African American behavior, e.g. poverty, single parenthood, and non-marital births. McDaniel (1996) explains, “racial differences in reproductive behavior are produced by differences in social class, social status, behavior, and culture, which are, in turn, a result of different historical experiences” (134). Similarly, there are ethnic differences in fertility behavior that are worth observation. Percent Hispanic and Native American are also incorporated as

independent variables affecting fertility at the county-level. Black, Hispanic, and Native American populations are expected to have a positive association with fertility rates. For the same reasons that race and ethnicity are examined, nativity status is also considered. A common argument made for the rising fertility in the United States is that the increasing immigrant populations, who have higher fertility rates than native populations, raise the national and local fertility rates.

Economic Variables. Two measures of economic vitality, by county, are considered: per capita income and the unemployment rate. The influence of income on fertility is contested. Economists have described income as having two potential effects. First, higher income means that having children is more affordable. Conversely, higher income may also mean a quantity-quality trade-off occurs, where more money is spent on fewer children. Typically, higher incomes are associated with lower fertility. In this study, per capita income values are used for each county (Census 2000). The median per capita income for U.S. counties is approximately \$17,000, ranging from \$5213 in Buffalo County, South Dakota, to \$44,962 in Marin County, California.

Unemployment can have two potential effects, as described by Whittington, Alm, and Peters (1990). The income effect predicts that higher unemployment would decrease birth rates (if children are normal goods), and the cost effect suggests that unemployment will lower the opportunity cost of spending time with children, increasing fertility.

Because unemployment is transitory, though, it may be expected that unemployment will affect the timing of births rather than the number of children. Unemployment rates are also obtained from the Census 2000.

In the popular press, *New York Times* columnist David Brooks (2004) argues that a movement called natalism is taking hold, and that it is characterized by young people moving to 'exurbia' and having larger families. He contends that young families move to these outer suburbs, where cost of living is lower and a more religious, pro-family (and conservative) culture provides a suitable climate for raising children. However, the argument that cost of living and housing availability can affect fertility rates is not new and has been discussed in relation to fertility in many European countries. To study to the association between the cost of housing and fertility, aggregate number of rooms per county is divided by aggregate housing values to generate an estimate of the cost of housing space. These numbers are acquired from the Census 2000.

To examine variation in economic policy across counties, this study also includes the proportion of the population receiving public assistance, using Census 2000 data. Whittington, Alm, and Peters (1990) explain that welfare generosity, like tax exemption, is potentially an extra source of income. In a study of the impact of welfare on adolescent behavior, Lundberg and Plotnick (1995) find that welfare increases the risk of pregnancy and decreases the risk of abortion for young white women (the results for black women were inconclusive). The authors explain that welfare is viewed as a long run source of income, should a young woman become pregnant. It is expected that welfare generosity would also be associated with higher fertility in this study.

Two variables are used to examine variations in the socioeconomic status of women: female education and female labor force participation. In previous research, the status of women was rarely regarded as a critical or primary reason for fertility differential (Presser 2001; Watkins 1993). Presser notes that in 1970s, it was

controversial to discuss the role of women in the fertility transitions, and many demographers thought the connection inappropriate. She states:

While we have come a long way since the mid-1970s, when a session titled “The status of women: A concern for demographers?” was considered a highly controversial at the Annual Meeting of the Population Association of America – many demographers at the time answering in the negative – we have still just scratched the surface ... (Presser 2001).

Recent research has reconsidered the role of women. As Chesnais and others claim, improvement in the social status of women is important for the initial fertility transition, but it is also important to help raise the fertility rate back to replacement levels in industrialized countries that are undergoing the “second demographic transition,” through programs such as universal childcare (Chesnais 1996; Pampel 2001). Malhotra, Vanneman, and Kishor (1995) argue that demographers increasingly recognize the importance of gender inequality on fertility. Women’s empowerment through education and employment is associated with lower fertility (Sen 2001), and education and literacy are important to spatial differentiations in the fertility rate, as was found to be the case in India (Gosal 1991). Female labor force participation affects fertility indirectly by influencing the age of marriage (generally upward) and directly when women choose career goals above having a baby. Perez and Livi-Bacci (1992) consider countries with the lowest fertility rates in Europe: Italy and Spain. They find that not only do female labor force and female employment matter, but the rate at which they change relative to fertility has explanatory power (Perez and Livi-Bacci 1992). In this study, it is expected that female labor force participation will be negatively related to fertility.

A number of case studies have documented female education as a main factor influencing fertility rates (Arokiasamy 2002; Sen 2001). To analyze female education,

this study presumes the percent of women over 25 having completed college will have an inverse correlation with fertility. Empirically, higher education rates for men and women have typically been associated with lower levels of fertility. Higher education levels for women in particular are strongly associated with lower fertility. There are a number of reasons why this is the case. First, high rates of education are an indicator of social attitudes toward women and equality. Also, education can lead to greater knowledge about sexuality, particularly birth control methods and different ideas about family size. Education influences fertility by changing values and encouraging non-familial goals (Rindfuss et al. 1980), and also, in the case of higher education, raising the age of marriage (Blossfeld and Huinink 1991). In France, education level has been argued to best explain regional fertility differentials (Noin and Chauvire 1991). Education rates in this study are also obtained from the Census 2000 by county.

Multivariate Analysis of Fertility

To study the association between fertility and religion, three statistical methods are used. First, global, multivariate regression analysis is conducted. Second, a simple path analysis demonstrates the importance of indirect effects of religion on fertility. Last, geographically weighted results are mapped and compared with the global regression statistics.

Global Regression Analysis. The results for the global regression, which are found using ordinary least squares (OLS) estimation, are outlined in Table 2 and Table 3. Table 2 lists the results for religion variables on fertility rate, and Table 3 looks at the mediating

variables. The units of analysis differ, so it is helpful to also assess the standardized beta values in parentheses. Five models are considered: the first examines only religion, and the second adds several demographic variables. The third model includes all the demographic variables; and, economic variables are joined into the fourth model. The final model adds the two economic variables relating to the socioeconomic status of women. The adjusted R^2 value improves for each model, and in all five models, there are significant religion variables, although they tend to fluctuate from model to model. The findings demonstrate that religion does have a significant, often positive association with fertility rates.

<Table 2 about here>

<Table 3 about here>

Model 1, with only the religion variables, explains 14 percent of the variation in the fertility rate. Including other demographic variables raises the R^2 to 0.49. Adding variables for the marriage rate, infant mortality rate, and access to family planning clinics increases the R^2 to 0.57. In the most specified model, controlling for other demographic and economic variables, Model 5 explains 61 percent of the variance. Over all five models, adherence for Protestant-Evangelical groups, Latter-Day Saints, and utopian groups contributes the most, among the religion variables, to the estimation of fertility rate. These religious measures exhibit the highest standardized coefficients, and they are positive and significant across all five models. In Model 5, a ten percent increase in Protestant-Evangelical adherence is associated with a 1.3 increase in the general fertility

rate. Or, a one standard deviation change in Protestant-Evangelical adherence is associated with a 0.18 standard deviation change in the fertility rate. A ten percent increase in Latter-Day Saints adherence is associated with a 2.7 percent increase in the general fertility rate. Last, a ten percent increase in utopian adherence is associated with a 0.9 increase in the general fertility rate.

In Model 1, Catholic adherence is positively and significantly associated with fertility, and then turns significantly negative in Model 2. This may have to do with the introduction of percent Hispanic into the model, which is significantly correlated with Catholic adherence ($r = 0.36$). The GWR may help shed more light on the geographic complexities of this variable. Jewish adherence has only insignificant associations with fertility. Muslim and Orthodox adherence become insignificant, as more variables are included to specify the model. Interestingly, Eastern adherence is negatively associated with fertility across all models, and the measure for religious diversity is positively associated with fertility.

Among the mediating variables, percent of the county population 18 and under, is the strongest predictor of fertility level, with a standardized beta of 0.38 in Model 5. It may be interpreted that a one percent increase in the population under 18 is associated with a 1.4 increase in the fertility rate (number of children born per 1000 women of childbearing age). This is followed in magnitude, in Model 5, by the percent of the population that is foreign born (standardized beta = 0.28), and percent of females over 25 having completed a college degree (standardized beta = -0.27). Positive values for urbanization and per capita income are unexpected, and family planning clinics per 1000

people is insignificant. These results will be further discussed with the results of the GWR, in the context of interesting state-effects that stand out.

Test for Modifiable Areal Unit Problems. Though not reported here, to briefly test for problems associated with modifiable areal units, the OLS model is aggregated to the state level. In general, the direction and magnitude of all the religion variables is comparable to the county-level analysis. Protestant-Evangelical, Latter-Day Saints, and Utopian populations have the strongest, positive effect on fertility rates. An interesting deviation, explored in the GWR section below, is for percent Catholic, which is negatively associated with fertility at the state level.

Path Analysis. Religion influences fertility rates both directly and indirectly through mediating variables. A path analysis is one way to distinguish between direct and indirect effects. As an example, the effect of religious adherence as mediated by marriage rates and per capita income is considered. Religion may have an additional positive influence on fertility rates by also increasing marriage rates, which increase fertility rates. Conversely, religious adherence may be positively associated with per capita income, which is then negatively related with fertility rates. A schematic showing the direct and indirect effects of religion is outline in Figure 10.

<Figure 2 about here>

Further, Table 6 shows the total, direct, and indirect effects of religious adherence, marriage rates, and per capita income. The path analysis confirms that the variables in

the OLS models for religion have an understated magnitude in their influence on fertility rates, because religion is also acting through mediating variables.

<Table 6 about here>

Local Regression Results. The advantage of assessing geographically weighted regression in contrast to OLS results lies in the additional information acquired by examining local estimates. Demographic data varies across space for a variety of reasons: difference in the historical context of place, variation in attitudes and preferences, or administrative and political differences. Random sampling or model misspecification, caused by omitted variables or incorrect functional forms are also sources of spatial variation (Fotheringham 1997). Most multivariate models fail to consider this spatial variation or non-stationarity, which has prompted the need for methods that provide analysis of local dissimilarities. Several techniques have been used to measure local relationships (i.e. the expansion method and multilevel modeling), but geographically weighted regression (GWR) has been the only one specifically designed for spatial data.

Multilevel models (MLM) are defined by discrete hierarchies where the intercept and slope coefficients may vary randomly (Duncan and Jones 2000). Although MLMs are used in a variety of applications, they can be specified to consider local parameter estimates. However, the hierarchies used in MLM tend to ignore the continuity of space, and no assumptions are made about the nature of spatial dependency. The spatial expansion method takes a more deterministic, two-stage approach, where the parameters are defined by secondary equations, which expand the model (Casetti 1972). To apply a

more local approach, the parameters may be defined as functions of geographic space, yielding spatial trends in the estimates. While illuminating spatial trends, this model may miss important spatial differences, which can be important to study.

GWR is a specific variation of the weighted least squares model that produces local estimates or regression results for each spatial unit in the analysis. The general form for weighted least squares consists of a dependent variable y that is a function of independent variables x_{ik} , and an error term ε_i :

$$y_i = a_{i0} + \sum_k a_{ik} x_{ik} + \varepsilon_i.$$

In the GWR model, the parameter calculation includes a spatial weight $\mathbf{W}$,

$$\mathbf{a} = (\mathbf{X}^t \mathbf{W} \mathbf{X})^{-1} \mathbf{X}^t \mathbf{W} \mathbf{y},$$

so that the data are weighted according to their nearness to point i (Fotheringham et al. 2000). Data that are closer are weighted more than data that are farther away. In a simple linear regression, w_i would be equal to a matrix with ones in the diagonal, so all data are treated equally, regardless of location.

The weights matrix is defined by the bandwidth (b), or radius around each location that is included in the analysis. This paper uses a variable weighting method, which is defined by a bisquare function, using distance (d) where: $w_{ij} = [1 - (d_{ij}/b_i)^2]^2$ if $d_{ij} < b_i$ and $w_{ij} = 0$ otherwise (Fotheringham et al. 2000). With this adaptive technique, the bandwidth is larger when data are farther apart, and smaller when the data are located closer together. So, in the Western United States, where counties are farther apart, the bandwidth will be larger, and in the East, where counties are closer together, the bandwidth will be smaller. To obtain the bandwidth, the Akaike Information Criterion (AIC) is minimized, taking into account different degrees of freedom across local models.

Results presented below use GWR 3.0 software to estimate the GWR model. A particular advantage of GWR is that the results are mappable, and the relative impact of each of the variables can be evaluated across space. Also, a Monte Carlo test is applied to see if the spatial model is an improvement over the global model.

Local results also come at the cost of an explosion of information and a challenge in the overall assessment of such data. To ease interpretation of the local results, only three prominent religion variables are examined in detail. The GWR model follows the specification of Model 5 in the global regression analysis, where fertility is associated with religion, controlling for mediating demographic and economic variables.

First, the ANOVA test finds that the GWR is a significant improvement over OLS. A map of the local R^2 values is illustrated in Figure 3. The local R^2 values range from 0.51 to 0.66, with the highest R^2 values located in Utah, Arizona, and the South more generally. It is interesting to see that even with the local R^2 values there are clearly discernable state-effects. It has been well-documented that differential policy and differential implementation of national policies can affect demographic outcomes, as was found in Mexico (Berry et al. 2000). The local results here suggest that elements of policy and culture at the state level, such as access to abortion and contraception, may affect fertility rates in ways that are not specified by the GWR.

<Figure 3 about here>

The next two figures map the local associations, or beta coefficients, for Protestant-Mainline (Figure 4) and Protestant-Evangelical (Figure 5) adherence on fertility rates.

The relationship between Protestant-Mainline adherence and the fertility rate is strongest in a few states, such as Washington, New Hampshire, Vermont, New Jersey, and Delaware. It is also strong in California and Wyoming, Colorado, New Mexico, and Texas. For most of the remaining states, there is not a significant relationship between Protestant-Mainline adherence and fertility. Locally, a ten percent increase in Protestant-Mainline adherence is associated with up to a 1.8 increase in the general fertility rate. This points to the importance of local factors in determining the role of religion on fertility. In the global regression models, Protestant-Mainline adherence was insignificant for Models 2 through 4, and positive and significant in Model 5. The local results shed light on the ambiguity in Protestant-Mainline adherence, by showing that the variable is important, but at a very local level. Though the coefficient for Protestant-Mainline adherence had a small effect in the global model, the maximum values for the local coefficients are higher than those for Protestant-Evangelical adherence.

<Figure 4 about here>

Figure 5 shows the association between Protestant – Evangelical adherence and fertility rates. Everywhere in the U.S., there appears to be a significant and positive relationship between Evangelicalism and fertility. In some areas, such as West Virginia, Virginia, Nevada, and Oregon, the coefficient is twice as high as other parts of the country. A ten percent increase in Protestant-Evangelical adherence is associated with a 0.6 to 1.4 percent increase in the general fertility rate.

<Figure 5 about here>

The value of geographically weighted regression is clearly exhibited in Figure 6, which illustrates the relationship between Catholic adherence and county-level fertility rates. Here, local coefficient estimates range from positive to negative, and some counties are insignificant. States like Washington, New Hampshire, Vermont, and Delaware show a positive relationship between Catholic adherence and fertility. In states like North Dakota, South Carolina, and Hawaii, this relationship is negative. In other states, such as Maine, Oregon, Nevada, and Arizona, the relationship is insignificant. In other words, depending on the location, a ten percent increase in Catholic adherence is associated with a 0.7 decrease to a 1.6 increase in the general fertility rate.

Why does such variation exist? Despite the hierarchical nature of the Catholic Church, there seem to be pronounced local variations in relation to fertility rates, perhaps because of differences in ideas across dioceses, interactions with ethnic communities, or even state variations. These findings, in particular, are an important contribution to what cannot be analyzed with survey data, in that local, ecological relationships can be visualized.

The maps of the other religious coefficients, though not presented here, are discussed below. While insignificant in the global regression results, the relationship between percent Jewish and fertility is significant and negative in several counties across Midwest and Mid-Atlantic states. Similarly, the local results of Eastern and Orthodox coefficients show a negative relationship with fertility across several states, though not the entirety of the U.S. Local coefficients for Latter-Day Saints are positive and

significant for the whole country, but even more so in Rocky Mountain states. Local coefficients for Utopian groups are also positive and significant across much of the U.S., particularly in the Midwest and the South.

Last, it is interesting to note that in both the global and GWR regressions, diversity has a positive impact on fertility. It is important to also point out that the measure of diversity is not a measure of secularism, but is a measure of the range in the type of religious participation. It could be that the mix of religious participation encourages variety in social capital and participation at the community level. These characteristics may also characterize a more kid-friendly, pronatalist environment. However, this hypothesis cannot be usefully assessed at the county-level in an ecological analysis and would require further investigation.

The three variables with the greatest standardized betas are also worth of discussion. Percent of the population less than 18 is positively associated with fertility rates across the country, so is percent foreign born. Percent of women that have received college degrees is associated with lower fertility rates. Though all three of these variables are globally significant and unidirectional, they also exhibit some interesting local variations.

Conclusion

Both the global, multivariate and local analyses find that religion is significant and important in relation to county-level fertility rates, even after controlling for other mediating variables. The GWR analysis also reveals imperfections in the global analysis by uncovering local variation in the coefficients, particularly in cases where coefficients

may be both positive and negative, or only significant in parts of the country. GWR helps explain why OLS variables may not appear as robust in an ecological analysis, such as the case with Catholic adherence. GWR also helps explain why variables that are expected to have stronger significance in the OLS model do in fact have strong pockets of local significance and/or importance (magnitude), such as the variable for Jewish adherence.

Further research on fertility in the U.S. might also take a multi-level approach (MLM), where individual survey data can be tied to geographic, community-level characteristics (Smith and Easterlow 2005). For example, an interesting and important component of the effect of religion on fertility is interfaith marriage (Lehrer 2004). While this cannot be examined with county-level analysis, it is a point for future research. Religiosity, as opposed to adherence, also has important effects, which should be included in future studies.

Other studies have found that adolescent women affiliated with a religious group are less likely to be sexually active (Brewster et al. 1998). In fact, the interrelationships between religion, age, and fertility would be interesting to study. Religiosity may be associated with lower fertility for teenagers, but associated with a higher fertility for other women. Age-disaggregate information may also be applied geographically for further analysis.

It has been argued that population geographers have yet to truly use the spatial perspective to critique the diffusion approach to demographic transition theory (Graham 2000). National and regional variations are a challenge to demographic transition theory (Boyle 2004). Here, it is shown with both global and local analyses of coefficients

associated with fertility that cultural factors can act as a persistent barrier to uniformly low fertility rates. In other words, this study finds that local variation in fertility in the U.S. continues for a number of reasons, many of which are religiously motivated.

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Figures:

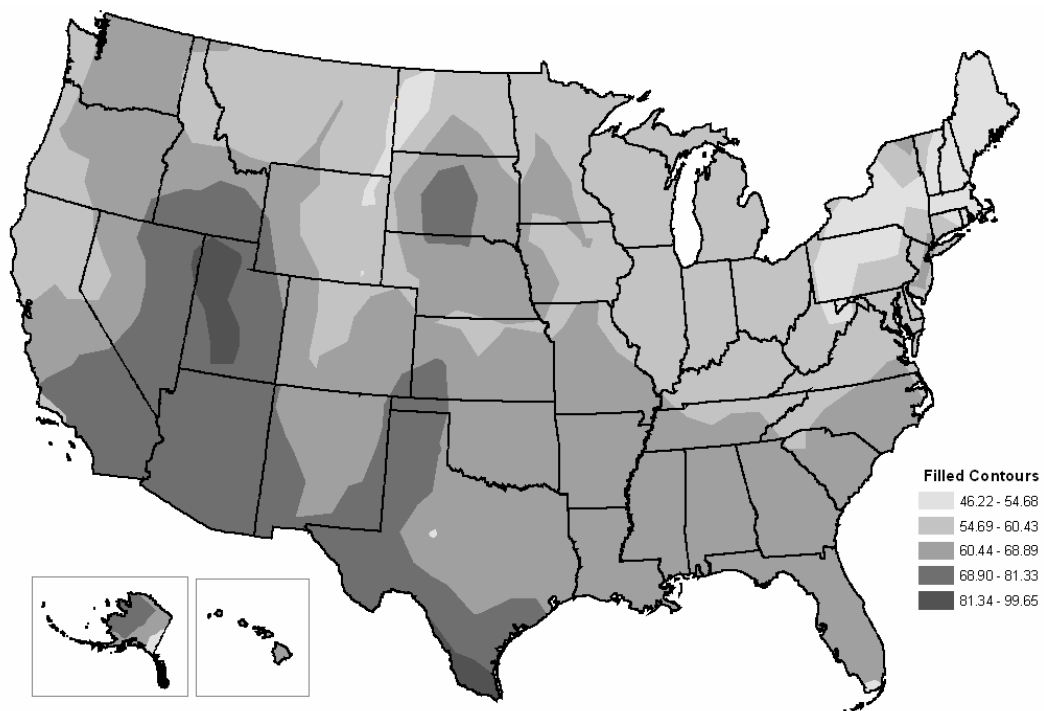


Figure 1. Fertility Rates across U.S. Counties, 1998-2002, Contour Map

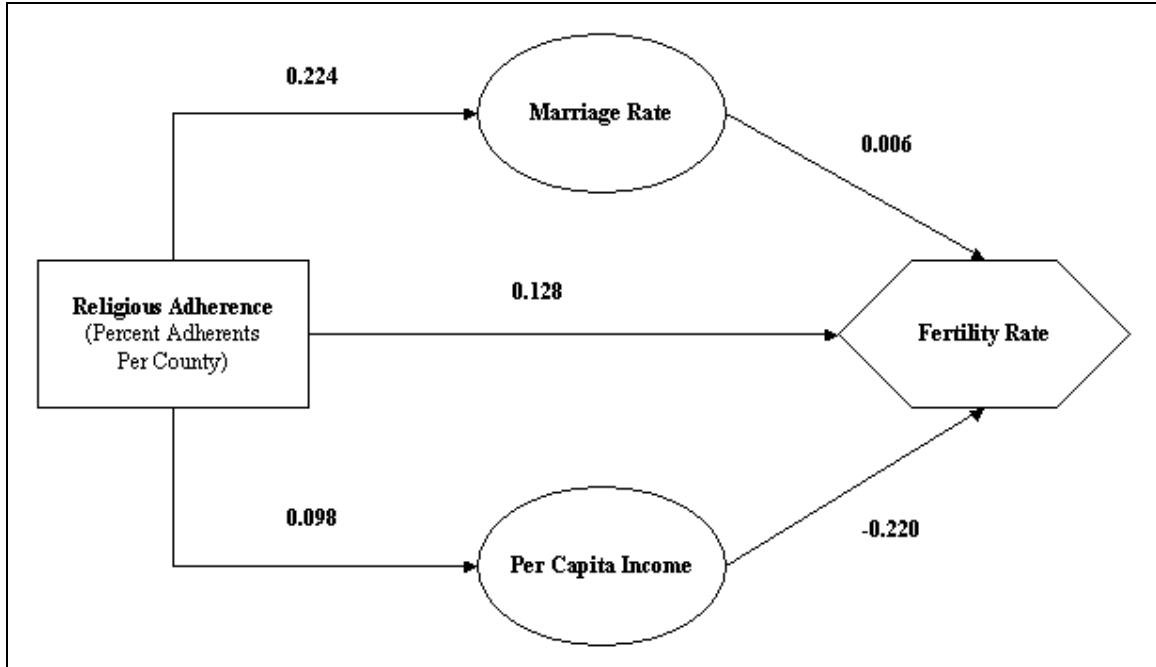


Figure 2. Schematic for Path Analysis of Religious Adherence and Fertility

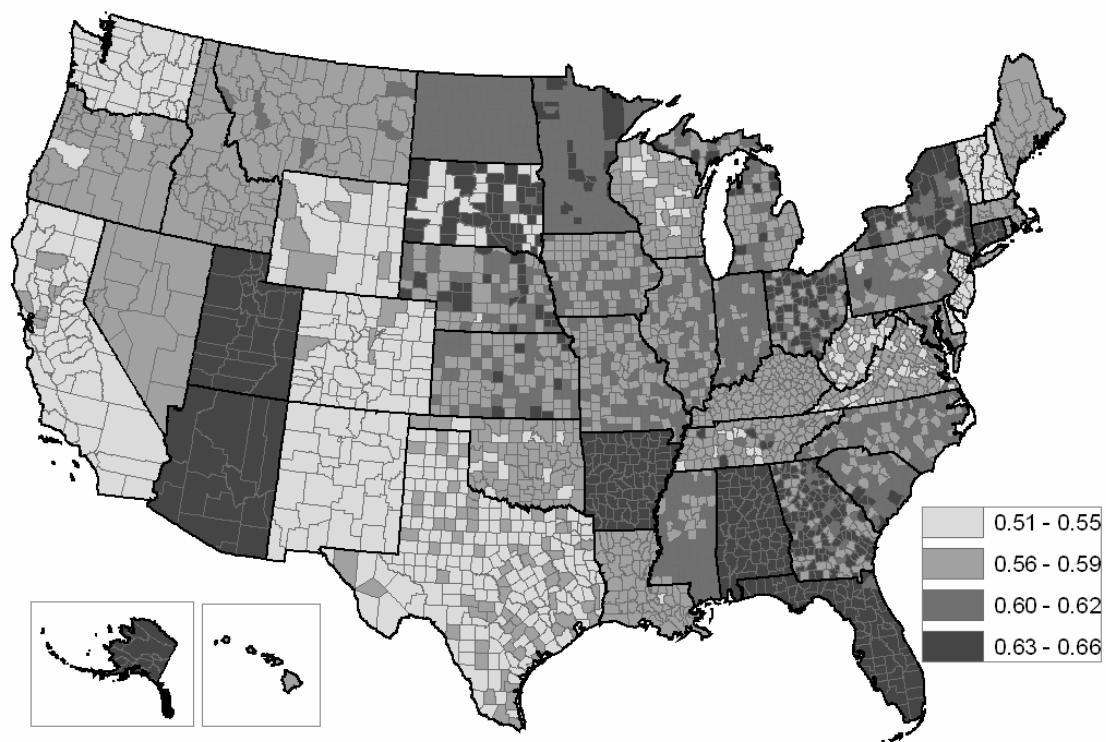


Figure 3. Local R-Squared Values for Geographically Weighted Regression

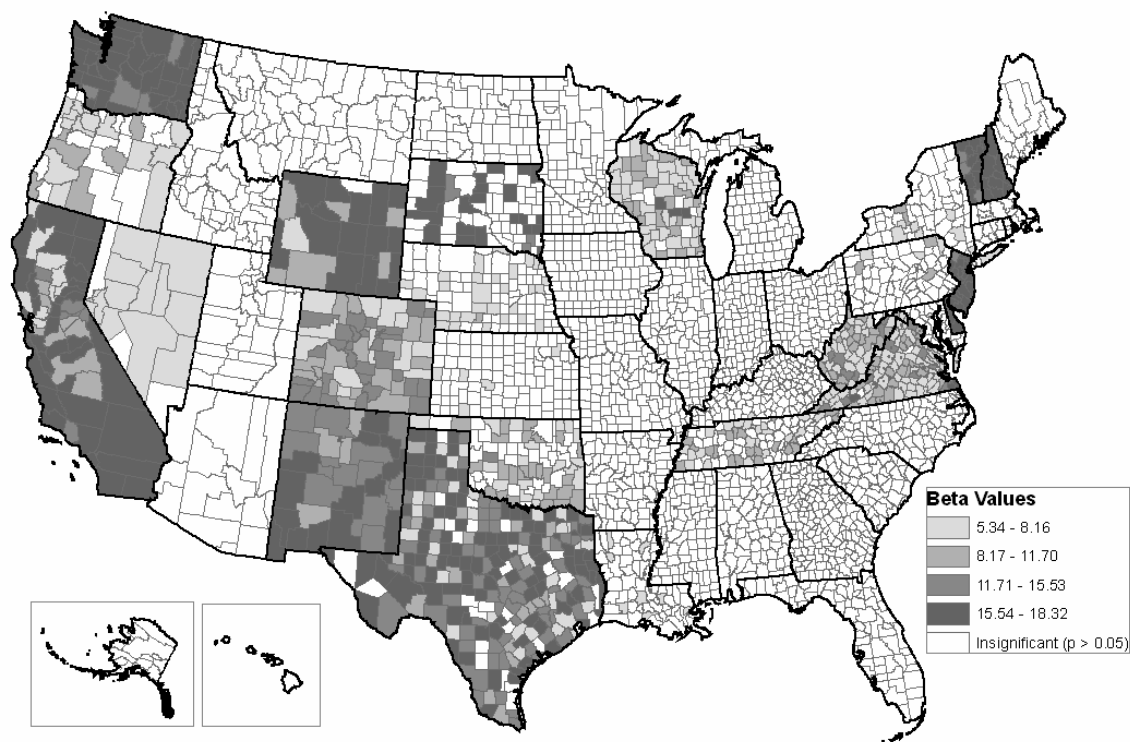


Figure 4. Local Parameter Estimates for Protestant-Mainline Adherence on Fertility Rates

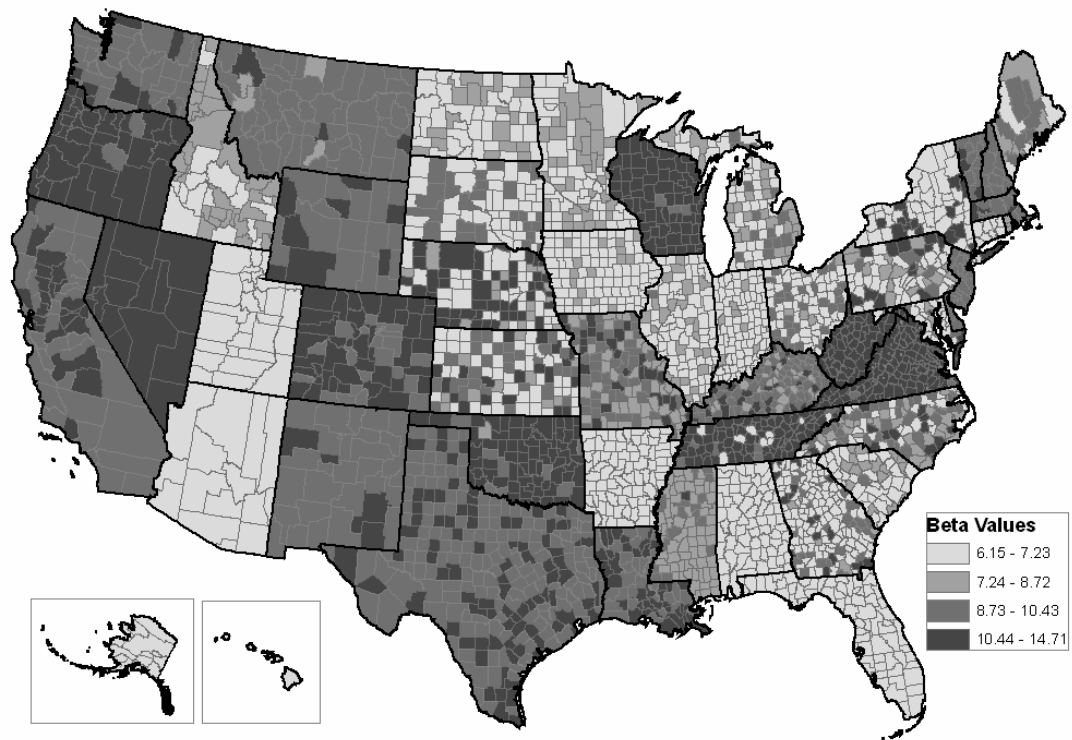


Figure 5. Local Parameter Estimates for Protestant – Evangelical Adherence on Fertility Rate

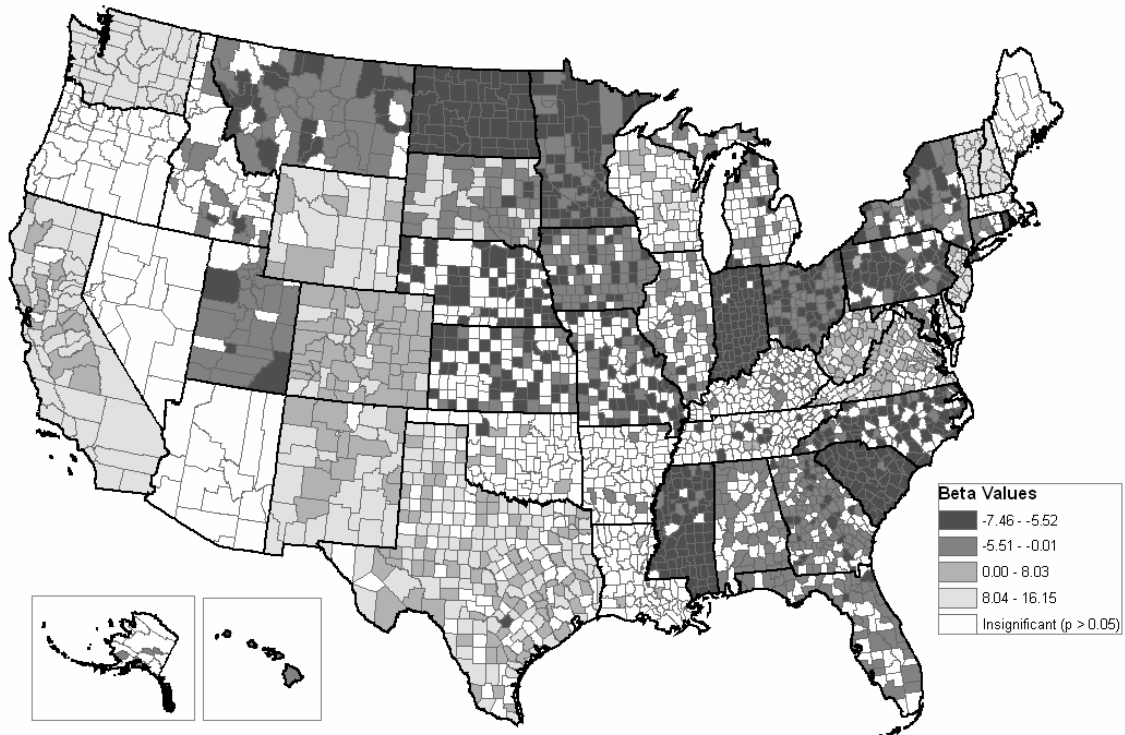


Figure 6. Local Parameter Estimates for Catholic Adherence on Fertility Rates

Tables:

Table 1. Independent Variables, Expected Relationship to Fertility Rate, and Sources

Variable	Expected Relationship	Sources
<i>Religious:</i>		
Percent Protestant – Evangelical	+	ARDA 2000
Percent Protestant – Mainline	+	
Percent Catholic	+	
Percent Jewish	+	
Percent Muslim	+	
Percent Eastern	+	
Percent Orthodox	+	
Percent Mormon	+	
Percent Utopian	+	
Measure of Diversity	-	
<i>Demographic:</i>		
Age Structure -	+	Census 2000
Proportion of the population under 18		
Mobility -	+	Census 2000
Proportion of population that lived in a different county 5 years ago		
Urbanization	-	Census 2000
Percent Black	+	Census 2000
Percent Hispanic	+	Census 2000
Percent Native American	+	Census 2000
Percent Foreign Born	+	Census 2000
Marriage Rates	+	Census 2000
Infant Mortality Rate	+	CDC 1998-2002
Access to Family Planning -	-	Alan Guttmacher
Public Family Planning Clinics per 1000 people		Institute 2002
<i>Economic:</i>		
Per Capita Income	-	Census 2000
Unemployment Rate	-	Census 2000
Percent Households Receiving Public Assistance	+	Census 2000
Female Education – percent of women over 25 having completed college	-	Census 2000
Female Labor Force Participate Rate	-	Census 2000

Table 2. Global Regression, OLS Results with Religion Predicting County-level Fertility Rate, Standardized Betas in Parentheses

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Religion -					
Percent Protestant Mainline	-0.13** (-0.12)	0.02 (0.02)	0.03 (0.01)	0.01 (0.00)	0.07* (0.04)
Percent Protestant Evangelical	0.18** (0.26)	0.12** (0.27)	0.12** (0.17)	0.11** (0.15)	0.13** (0.18)
Percent Catholic	0.16** (0.20)	-0.04* (-0.05)	0.01 (0.01)	0.03 (0.04)	0.05* (0.07)
Percent Jewish	-0.17 (0.02)	-0.12 (-0.01)	-0.23 (-0.03)	-0.09 (-0.01)	-0.21 (-0.03)
Percent Muslim	7.28** (0.13)	-1.20 (-0.02)	-1.07 (-0.02)	-0.55 (-0.01)	-0.39 (-0.01)
Percent Eastern	-0.03 (-0.00)	-1.65** (-0.06)	-0.88 (-0.04)	-0.77 (-0.03)	-1.11* (-0.05)
Percent Orthodox	1.10** (0.06)	-0.73** (-0.04)	1.10* (0.05)	0.42 (0.02)	0.19 (0.01)
Percent LDS	0.37** (0.27)	0.18** (0.13)	0.21** (0.13)	0.22** (0.13)	0.27** (0.16)
Percent Utopian	0.88** (0.13)	0.55** (0.08)	0.94** (0.11)	0.93** (0.11)	0.93** (0.11)
Diversity Measure	0.94 (0.01)	0.79 (0.01)	3.36 (0.04)	5.10* (0.07)	5.47** (0.07)
Adjusted – R ²	0.14	0.49	0.57	0.59	0.61

*p < 0.05, **p < 0.01

Table 3. Global, OLS Results for Mediating Variables

Mediating Variables -	Model 1	Model 2	Model 3	Model 4	Model 5
Demographic -					
Population Less Than 18		1.37** (0.40)	1.35** (0.38)	1.23** (0.33)	1.40** (0.38)
Percent Urban		0.03** (0.08)	0.02 (0.04)	0.03* (0.06)	0.03 (0.07)
Percent Different County (5 yrs.)		-0.14** (-0.08)	-0.11** (-0.07)	-0.06 (-0.04)	0.07* (0.05)
Percent Black		0.10** (0.13)	0.15** (0.20)	0.18** (0.24)	0.18** (0.23)
Percent Hispanic		0.17** (0.18)	0.19** (0.19)	0.15** (0.15)	0.14** (0.14)
Percent Native American		0.32** (0.20)	0.34** (0.18)	0.32** (0.17)	0.32** (0.18)
Percent Foreign Born		0.38** (0.16)	0.45** (0.22)	0.54** (0.27)	0.57** (0.28)
Marriage Rate			0.45** (0.23)	0.51** (0.23)	0.31** (0.16)
Infant Mortality Rate			0.39** (0.10)	0.30** (0.07)	0.25** (0.06)
Family Planning Clinics per 1000			11.03* (0.05)	4.82 (0.02)	5.74 (0.02)
Economic -					
Per Capita Income ('000s)				-0.17 (-0.06)	0.43** (0.16)
Unemployment Rate				-0.75** (-0.16)	-0.74** (-0.16)
Percent Public Assistance				1.02** (0.18)	1.03** (0.18)
Dollars per Room ('000s)				-0.15* (-0.07)	-0.15* (-0.07)
Percent Female College					-0.62** (-0.27)
Female Labor Force Participation					-0.06 (-0.03)
Intercept	56.09**	19.98**	-15.03**	-10.91**	-7.68
Adjusted - R ²	0.14	0.49	0.57	0.59	0.61

*p < 0.05, **p < 0.01

Table 4. Results for Path Analysis

	Total	Direct	Indirect
Religious Adherence	0.151	0.128	0.023
Marriage Rate	0.006	0.006	0
Per Capita Income	-0.220	-0.220	0