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FROM EMPTY PEWS TO EMPTY CRADLES: Fertility Decline Among European Catholics[1]

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Abstract

The Catholic countries of Europe pose a puzzle for economic demography – their fertility is the lowest in history despite low female labor force participation rates. Total fertility rates now average 1.4 lifetime children per woman in Southern Europe. We apply a panel on church attendance and clergy employment from 1960-2000 to the study of fertility decline among European Catholics since the Second Vatican Council (1962-65). Though Catholic theology is fairly uniform across countries, the level of services provided, (as measured by nuns per Catholic) varies considerably both across countries and over time, indicating large differences in Church provision of education, health, welfare and other social services. We find that the interaction of service provision (nuns/catholic) decline and religiosity (church attendance) decline strongly predicts declining fertility.

The nuns/catholic effect provides evidence that religion affects fertility not only through preferences but also functionally, through social service provision. Moreover, church attendance is apparently necessary for Church social service provision to affect fertility. Nuns outperform priests in predicting fertility, suggesting that social service provision may matter more for fertility than do the theological services provided by priests which might affect preferences. In the context of a simple model in which religious services can raise fertility either by lowering the shadow cost of a mother's time or by lowering the effective cost of raising children, the data imply that the latter effect dominates.

1. Introduction

Birth rates fell so rapidly in the 1970s and 1980s in Southern Europe that in a generation it fell fell from Europe's highest fertility region to its lowest. Unless these rates (now below 1.4) rise substantially and soon, the native-born population is destined to further age and shrink. This phenomenon has been noted by many researchers. (Munoz-Perez (1989), for example, has studied Italy, Greece, Portugal and Spain in detail.) An aging and shrinking population has major economic implications. An aging workforce creates difficulties in retraining and generates demand for young immigrant workers. The growing share of retirees threatens the solvency of "pay as you go" social insurance funds. Italy and Spain, for instance, are projected to have one retiree for each working age person by the year 2050. The increased morbidity implied by an aging population will also strain the funding and provision of public sector health care.

Insofar as Europe's experience reflects general consequences of economic development and social change, understanding the determinants of fertility decline in Southern Europe is important for world population projections. The consequences of policies concerning immigration, education, health and retirement all depend upon population trends. Yet credible demographic projections require credible models, and demographers remain confused about the causes of European fertility decline. The central puzzle is that Southern European fertility has declined since 1960 *without* a rapid increase in female labor force participation (Bettio and Villa, 1998; Ahn and Mira, 2002), so that Southern Europe now has historically low rates of *both* fertility *and* female participation. In Spain and Italy, total fertility has fallen below 1.3 and female labor force participation remains under 40% – both well below European averages. This pattern contradicts the standard economic fertility model of Becker and Lewis (Becker and Lewis, 1973; Becker, 1991), is unprecedented in the history of fertility transition and is not resolved by considering plausible economic factors such as housing prices or female education (Del Boca, 2002).

Our approach to this puzzle links fertility to religion, and in particular to special aspects of Catholicism. For an indication of Catholicism's possible relevance, Figure 1 plots the development of total fertility rates (TFR) for three categories of Western European nations: the very Catholic countries (with more than 70% of the population Catholic – Belgium, Ireland, Italy, Luxembourg, Portugal, Spain,); the very Protestant (with 70% or more Protestants – Denmark, Norway, Sweden and the UK); and other countries (with neither religion dominant or a history of strong separation between religious and national institutions – France[2], Germany, Greece, Netherlands and Switzerland). The strongly Catholic countries had fertility *almost a half child per woman higher* than the other countries in the 1970s. Yet fertility in these Catholic countries declined so rapidly in the 1970s and 1980s that by the 1990s they averaged the lowest fertility in Europe, about *half a child less* than that of the strongly Protestant countries.

What is it about those strongly Catholic countries that caused fertility to decline so rapidly? And what are the implications for future fertility trends in developed countries? Since the 1960s these same Catholic countries have experienced unprecedented decline in church attendance and other forms of religiosity. Figure 2 reports declines in Church attendance for eight European countries between 1960 and 1990. While attendance declined by six percentage points in the majority Protestant countries (Denmark, Norway, Sweden, UK), the decline was fully fifteen percentage points in the Catholic countries (Ireland, Italy, Portugal and Spain) over that 30 year period.

[2] Since the Revolution, French governments have repeatedly limited the activities of the Catholic Church, particularly those most relevant to this study. Hence, "by the end of the nineteenth century, the Church had lost all connection to the French state, religious instruction was forbidden, and religious orders were forbidden to teach in private schools" (Warner 2000: 62, c.f. Lee and Piveteau 1967).

Religiosity and fertility have previously been linked in many studies (Stolzenberg, Bair-Loy, et al. 1995). Several mechanisms are plausible: First, religion could affect individual preferences for children or for use of birth control. Second, religion could influence social norms regarding childbearing and women's work. Third, religion could affect education and thus change the shadow price of raising children. Fourth, religious communities could lower the effective price of raising children by providing child-friendly social services, such as day care, schools, and medical care. Finally, religion could affect national politics and thus the provision of child-friendly social services by government. We return to these mechanisms below, but for now the key point is that they all predict a positive association between fertility and religiosity at an individual or group level. We expect that positive association to be stronger among Catholics. Compared to mainstream Protestant churches, the Catholic Church has traditionally been much more supportive of fertility in both its teachings and its family friendly social service provision networks, especially prior to the Second Vatican Council of 1962-1965.

Figure 3 illustrates the declines in church attendance and fertility for Italy, Ireland and Spain, three European countries with high proportions of Catholics. Church attendance data are derived from the ISSP (International Social Survey Program) using procedures developed by Iannaccone (2003). The ISSP provides comparable church attendance data on 12 Western European countries, including the "strongly Catholic" countries Ireland, Italy, Portugal and Spain. The figure graphs current fertility rates against church attendance of children 15 years previously -- a lag that allows time for changing tastes, norms, or institutions to take effect and precludes endogeneity due to families returning to church for the benefit of the children. The figure is read as follows: In the top right corner are dots representing the fertility of Irish women in 1960, 1965 and 1970 at (3.8, 4.0 and 3.9 children). Lagged church attendance rates for Ireland in those three years (15 years earlier in 1945, 1950 and 1955) are 98%, 98% and 97%. As we trace the Irish data each five years through 2000 fertility falls sharply and lagged church attendance falls mildly, to a TFR of 1.87 and a lagged attendance rate of 92% (recorded in 1985). The Spanish, Italian and Portuguese data follow the same pattern, passing from the upper right to the lower left over time, though with less steep slopes.

The positive correlation of attendance and fertility in these countries is not merely the result of a slow common trend. Indeed, clergy per capita and fertility among Catholics show a sharp break in the mid 1960s. The Irish case illustrated in the graph to the right is quite striking but not atypical. Fertility was steady or even rising in most of the predominantly Catholic countries of Europe through the mid 1960s. Surprisingly enough to us, so was the strength of the Catholic Church as an institution, as measured by the number of nuns and priests, or as measured by Church attendance.

The data indicate that the connection of fertility and religiosity is primarily a *Catholic* phenomenon. Fertility decline was less dramatic in other European countries, and, as we will see in the statistical analysis below, was uncorrelated with declines in Church attendance among Protestants, or even among Catholics absent a decline in the number of nuns per Catholic. Our results show a strong regularity: the combination of *declining religiosity* (as measured by church attendance) and *declining social service provision* (as measured by nuns per Catholic) *clearly predicts declining fertility among European Catholics.*

Below we briefly survey the literature on religion, economics, and fertility, and set out our conjectures in detail. Section 3 introduces some important characteristics of "communal" religions, and the data on Catholic decline since the 1960s. Section 4 provides a framework for estimation which allows religious institutions to affect fertility through both theological and service provision channels. The results show fairly clearly that the fertility decline among

European Catholics is primarily due to a decline in social service provision rather than a change in theology. Section 5 concludes

2. Literature

Our approach assimilates insights from three literatures: economic demography, fertility and religion, and the economics of religion.

The classic contributions to economic demography explain the importance of childhood mortality and female labor force participation (Becker and Lewis, 1973; Becker, 1991). Becker's quality-quantity theory emphasizes the role of rising female earnings in raising the cost of child quantity relative to that of quality (education, health) of children, inducing mothers to raise fewer children with more resources invested in each child. Yet female labor force participation is now associated with relatively *high* fertility across countries in Europe, contradicting the prediction of the Becker model. Childhood mortality rates are low and stable in Europe so they cannot explain falling fertility. Bongaarts (1999) suggested that uniquely low European total fertility rates in the 1990s may underpredict eventual fertility, and that women will compensate later in life for the low fertility of their 20s. But we have yet to observe any recovery in total fertility rates as those women have reached their 40s, making a subsequent fertility increase unlikely.

Daniela Del Boca (2002, 2003) has argued that Southern European labor market institutions are very unfavorable to working mothers, with poor provision of child care and few part time jobs with benefits. She argues that rather than work *or* raise children, young women wait (typically living with parents) until they obtain a job supportive of motherhood. de Laat and Sevilla-Sanz (2004) offer an analogous explanation based on norms, arguing that Southern European fathers are less willing to care for children, increasing the shadow cost of child rearing for potential working mothers and augmenting the substitution effect of rising women's wages on fertility. Giuliano (forthcoming) links the gender role attitudes of Southern Europeans to low labor force participation in both Europe and the U.S. Given the Catholic Church's historic role in providing institutional and normative support for fertility and childrearing, our theory offers an alterative but complementary set of explanations.

The literature on fertility and religion is potentially more helpful in understanding Southern Europe (Lehrer 1995; Lehrer 1996). Differential fertility changes among Catholics and Protestants have been studied extensively in the U.S. Westoff and Jones (1979) showed that Catholics experienced an amplified baby boom – higher completed fertility in the 1950s (by about a child per family), followed by rapid fertility decline in the 1960s and 1970s which eliminated the Catholic / NonCatholic gap by the mid 1970s. They also report that among Catholics, religiosity, (as measured by communion) was associated with higher fertility in the 1950s and 1960s but not in the 1970s. Rosenzweig and Schultz (1985) found that Catholics have more children even after adjusting for other socioeconomic factors, such as maternal education. Sander (1992) takes issue with a causal interpretation of the effect of Catholicism on fertility, reporting evidence that couples who prefer large families are more likely to remain Catholic or convert to Catholicism. An important recent paper by Adsera (2004) examines the role of religion and religiosity in Spain. Using data from the 1985 and 1999 Spanish Fertility Surveys, she finds that practicing (i.e., observant) Catholics had no higher fertility than non-practicing Catholics in the mid-1980s. Yet by the late-1990s, after 15 years of decline in practice, the remaining practicing Catholics *do* have higher fertility. Although Adsera's interpretation of this shift differs from ours, we will see that her results are consistent with ours if we view the effect of religiosity on fertility

as depending on a third factor, social service provision, if it is allocated only to the practicing by the late 1990s, as a club model would imply.

Club-theoretic models from the economics of religion predict that communally-oriented "sectarian" religions tend to have high fertility even in the absence of explicit pronatalist theology. The argument starts with Iannaccone's (1992) model of religious sects as clubs providing quasi-public services to members. To limit free-rider problems, such groups impose prohibitions, so-called "stigmas," that indirectly tax (non-group) market activities. At the margin, members respond by shifting hours away from the labor force and into non-markets activities that benefit the club. Because of the positive externalities associated with club activities, the prohibitions end up raising the utility of club members. That club model provides a coherent rational-choice theory that not only fits a wide range of data on (apparently irrational) sectarian groups but also explains the more mild prohibitions characteristic of merely "conservative" churches like contemporary evangelical Protestants, traditional Catholics and Orthodox Jews. Berman (2000) marries the club approach to Becker's (1991) theory of fertility, showing that prohibitions increase the effective tax on market labor, thereby reducing real wages. The effect of these prohibitions for women is to make investments of market resources in child "quality" more difficult to achieve while making quantity more attainable, with a resulting increase in fertility.[3] The point is not that European Catholics are a sect. Nevertheless, if religiosity can have large effects on fertility among sects through social service provision, it should not be surprising to see fertility effects of religiosity even in a mainstream religion which is less dogmatic about theology.

3. The Impact of Catholicism: Theory and Data

a) The Social Consequences of Communal Religion

Scholars have long recognized that collective activities (and supernatural beliefs) underpin a religion's capacity to constrain behavior and maintain institutions. They have also recognized that some religions are more strongly collective than others. Adam Smith (1965: 748-750) wrote that "strict or austere" systems of morality are far more common in "little religious sects" than in government-regulated "established churches." Subsequent generations of scholars developed insights like these into a full-blown theory of religious organization. The famous sociologist Emile Durkheim (1965: 62) argued that collectivity explained how "religion,"but never "magic," could sustain "moral communities" governed by "unified systems of beliefs and practices."

For European sociologists of the 19th and early-20th centuries, a stronger communal orientation likewise distinguished Catholicism from mainstream (state-church) Protestantism. The social consequences of this difference ranged from lower rates of suicide among Catholics (according to Durkheim) to more rapid economic development among Protestants (according to Weber). Despite lingering debate over the these particular inferences, most religious researchers broadly agree that the Catholic Church traditionally promoted stronger group identity and sustained a broader array of institutions than any Protestant State Church.

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[3] For a formal derivation, see Berman (2000) or Berman and Stepanyan (2003). High fertility is in fact associated with sectarianism among Christians, Ultra-Orthodox Jews (Berman, 2000), and Radical Islamists (Berman and Stepanyan, 2003). This could be due to mechanisms at either the individual or the group level. Berman (2000) shows evidence that increased subsidies to the *group* induced dramatic fertility *increases* of one or two children per woman over a decade among Israeli Ultra-Orthodox Jews. This suggests a group-level mechanism as predicted by the club theory, particularly since this rapid fertility increase occurred *without* any change in Orthodox Jewish theology concerning births or birth control.

The scholarly consensus about Catholicism, communalism, and behavioral constraints leads us to ask whether fertility is yet another behavior sustained more effectively by Catholicism than Protestantism. Official Catholic doctrine favors fertility (and opposes all forms of birth control and abortion) and Catholicism traditionally was associated with large family size.

b) The Second Vatican Council and Recent Declines in Catholic Religious Activity:
The Second Vatican Council (Vatican II) trigged broad-based decline within Catholicism. The losses included reductions in the number of people becoming (or remaining) priests, even larger reductions in the number of nuns, reduced mass attendance among the Catholic laity, and increased willingness among Catholics to question official doctrine, including prohibitions on divorce and birth control (Hout and Greeley 1987; Greeley 1989; Schoenherr and Young 1993: 10-12; Stark and Finke 2000: 169-190). Although researchers have debated why Vatican II had these effects, the decline itself is universally acknowledged.

Vatican II is universally seen as the massive *exogenous* shock, more consequential (and unanticipated) than any other change of the past several centuries. Both contemporaneous and historical accounts of Vatican II stress its radical and surprising character – particularly for parish priests, nuns, and ordinary Catholics (Dolan 1985: 421-454; Hoge and Wenger 2003: 7-12). The Pope who initiated Vatican II was 77 years old when elected in 1958 and widely regarded as an interim "caretaker" (and indeed he died in less than five years). Only one other general council had ever been called – in 1870 – and its effect had been to resist change and reaffirm Church tradition. Thus, even those who applauded Pope John XXIII's decision to convene the Council in 1962 could not have known that his call for "updating" would eventually include scores of doctrines and practices that for hundreds of years had distinguished Catholicism from Protestantism.

The architects of Vatican II did not anticipate the *consequences* of their reforms. Catholicism had been growing for a hundred years or more, and the 1946-1965 post-war period had witnessed especially rapid growth: in total number of Catholics, in church attendance rates, in the numbers of priests and nuns, and in Catholic schools and hospitals. To the great surprise and dismay of Catholics everywhere (and especially the Catholic hierarchy), *all* these growth trends reversed *immediately* after Vatican II. Among the hundreds of historians, sociologists, and religious scholars who have analyzed the Vatican II era with methods ranging from textual analysis to survey research, we have encountered nearly unanimous agreement that the decline was unanticipated and precipitated primarily by changes initiated by the Church hierarchy, rather than by external events or changes (such as trends in income, education, female employment, etc.).

There is strong and widespread disagreement between liberals and conservatives within the Catholic Church over the mechanism by which Vatican II caused attrition of clergy from the Church. Liberals argue that by convening the Council the Church created an expectation of even broader reforms, including allowing clergy to have families and to be paid for their services as do Protestant clergy. When those expectations were dashed, goes the argument, nuns, priests brothers and prospective clergy decided that the reform they awaited would not happen soon enough to be relevant for their own lives. As a result they left the fold or did not join in the first place.

Conservatives have a very different explanation for the attrition of clergy. They say that before the Second Vatican Council clergy were put on a theological pedestal, and told that they were doing holy work. The Council, in an expression of tolerance and inclusion, effectively stated that everyone performing social services such as education, care for the sick and care of the poor should be on a pedestal, as those are all valuable services. The pedestal for secular providers was

not as high as that of nuns and priests, but the effect was to reduce the theological premium that clergy had over secular providers of many of the same services. So it is not surprising that nuns, brothers and priests effectively jumped pedestals, trading off a theological premium against the value of having families and, for the nuns and brothers, earning wages. Whichever explanation one accepts, the conservative or the liberal, the key to what follows is that both explanations are exogenous to fertility.

Official Church statistics provide detailed evidence of institutional losses following Vatican II. These diminished the Church's labor force, undermined its capacity to provide traditional services (most notably Catholic schools, day care, and hospitals), and reduced its visible presence in community life.[4] The figure (based on data from the *Official Catholic Directory, in* Stark and Finke 2000: 176) plots the number of nuns in the U.S. The number of nuns rises steadily from about 140,000 in 1948 to 180,000 in 1966, the concluding year of Vatican II. Steady growth then immediately turns into a steady decline, dropping to about 90,000 by 1995 and continuing thereafter. Similar mid-to-late 1960s turning points have been extensively documented in America, for the number of priests, average rates of mass attendance, contribution rates, and respect for Church doctrine.

Post-Vatican II declines do not follow identical paths in all countries, but in every developed Western country the number priests and nuns did eventually drop dramatically. The Figure describes this decline for the four largest Catholic countries in Europe. Italy and Germany show the U.S. pattern of growth turning to decline. In Spain the turning point occurs a little later, around 1970, while France only shows a mild acceleration in a trend decline. Although we can only speculate as to the reasons for these country-specific variations, *the different turning points provide useful variation for testing hypotheses about the relationship between religion and fertility.*

c) Catholic Social Services

Although we are still collecting of data on social service provision, the evidence so far suggests an important role for the Church and especially nuns in the pre-Vatican II provision of social services in strongly Catholic countries and communities. In Italy, for example, "until 1966 virtually all [pre-schools] were private [and] seventy percent of nursery and kindergarten children were cared for by religious sisters." (Lee, et al, 1967: 165). In pre-Vatican II America, about 50% of Catholic children attended Catholic schools in the 1950s, and Catholic hospitals provided about one-fifth of all hospital beds (while Catholics accounted for about one-fourth of the U.S. population) (Fialka 2003: 3). Social life in Catholic communities routinely revolved around the Catholic parish and Catholic organizations.

The number of nuns provides the best single index of Catholic social services, since nuns have traditionally provided the primary labor supply staffing Catholic schools, hospitals, and other Church-related institutions. Table 1 reports on nuns per 10,000 Catholics in various countries in Europe, showing that the level of those services varied widely across countries in the 1960s. If we look at the ten countries with more than a third Catholics in the population in the 1960s, the number of nuns per 10,000 Catholics ranged from 6.5 in Poland and 7 in Portugal to 60 in Ireland and 77 in the Netherlands. By the year 2000 that range had narrowed considerably as the number of nuns per 10,000 declined to 32 in Ireland and 18 in the Netherlands.

[4] The reforms of Vatican II had the effect of further reducing their visibility. Nuns stopped wearing distinctive habits, popular but mythical saints were dropped from the official catalog, mass was no longer said in Latin, confession became optional [and hence rare], and "meatless" Fridays ceased to be required.

How important could these nuns be as social service providers? For comparison, for each 10,000 people in the U.S. there are 97 teachers (pre-kindergarten through elementary), 86 nurses and 29 social workers. While the number of nuns/Catholic is lower than that in these European countries, it is of the right order of magnitude, especially considering that we have not counted brothers, priests and volunteers and that a parallel secular workforce exists in these occupations.

In the U.S., extensive survey data on religious activity and religion-specific fertility stretch back to the 1940s. From the mid-1800s through the mid-1900s the Catholic population, about one quarter of Americans, remained visibly distinctive – with its own schools, characteristic ethnicities, low intermarriage to non-Catholics, and a full complement of "parallel" institutions, including churches, social clubs, business associations, civic associations, and academic societies.

The strength and size of Catholic parallel institutions peaked in the 1950s (Greeley, McCready, et al. 1976; Greeley 1977). By the late 1960s, most of these institutions had ceased, shrunk, or became non-sectarian. A comprehensive study of religious orders found that between 1962 and 1992, orders of sisters shrank by 42%. The orders shut down 23% of their hospitals, 15% of their universities and colleges, and 42% of their elementary schools. There are now fewer than 81,000 sisters in America (compared to the 1968 peak of 180,000) and their median age is sixty-nine (Fialka 2003:17). Overall, 40% of the Catholic high schools and 27% of elementary schools closed between 1964 and 1984. Even these closures could not begin to make up for the loss of nuns. In the schools that remained, the share lay teachers rose from under 10% in the 1920s through 1950s to 70% in the mid-1960s, 46% in 1970, 26% in 1980, 12% in 1990, and 6% in 2000. Those most familiar with Catholic schooling data claim the decline was almost entirely induced by supply effects, as nuns left, were replaced by (much higher paid) lay teachers, and schools could no longer cover their costs (Dolan 1992:442, Bryck and Holland 1993: 52).

Two other Catholic trends – church attendance and fertility – also rose and fell during the period before and after Vatican II. As illustrated in the figure, Catholic fertility did not merely exceed Protestant fertility during the post war "baby boom" it experienced *both* a magnified rise and fall (Westoff and Jones 1979). Since 1965 Catholic fertility has declined by about a child per woman more than Protestant fertility, mirroring the excess decline for Catholics in Europe (Hout and Greeley 1987; Greeley 1989). We have identified a variety of church and survey data sources that should permit us to analyze these trends in detail. For now, we merely note this type of *magnified* fertility effect is exactly the sort of Catholic pattern that we hope to confirm across other nations – though presumably shifted to later decades for Southern Europe.

Our primary concern is whether this excess decline in fertility among Catholics is due to *institutional decline and changing social norms* related to the decreased influence of the Church since the Second Vatican Council. In the following section we will attempt to distinguish between those mechanisms.

4. Economic Fertility and Religion: A Framework for Estimation

Our argument so far can be summarized as a series of conjectures:

i) The Second Vatican Council caused a sharp decline in clergy per Catholic, though the timing differed across countries;

ii) That decline reduced social services, spiritual and tangible, provided to Catholic communities;

iii) The reduction in services raised the shadow cost of raising children, reducing fertility;

iv) The reduction in services also caused a drop in religiosity, as measured by church attendance.

Alternatively, it's possible that:

v) The Second Vatican Council changed theology in a way that reduced fertility.

vi) The Second Vatican Council changed theology in a way that made Catholicism less attractive, reducing religiosity.

vii) The Second Vatican Council was symptomatic of changing attitudes toward fertility.

We seek to evaluate the importance of these competing hypotheses using data. Starting at the bottom with (vii), the evidence from both Europe and the U.S. (Stark and Finke (2000)) of a sharp reversal in the growth rate of nuns in the mid 1960s indicates that something discrete occurred, much more rapidly than we would expect of a general change in attitudes. Similarly, the discussion of (i) and (ii) in the previous section can be further explored by argument and examination of data in an extension of Section 3 above.

Our main interest is to see if the data distinguish theological from club or other group effects (i.e., (v) from (iii) or (vi) from (iv)). We reason that theological effects should be related to attendance rather than to social service provision, as proxied by the count of nuns per Catholic. We also argue that theological effects should have more to do with priests than with nuns.

Religion in a Fertility Model: Preferences and Service Provision

A framework helps clarify how we see the relationship between religion and fertility. Imagine a family maximizing a joint utility function for two adults and f children.[5]

$$\text{Max } U(C/(2+f), f, -\pi(a)|f-\mu|)$$

Here C is consumption, so that C/(2+f) is consumption per family member, and f is fertility, measured in children. The final term measures preference for childbearing, written as the distance between actual fertility, f, and some theological (or ideological) constant, μ, about desired fertility.[6] In that term π is the weight of theology, which is influenced by religiosity, *a*. We measure *a* as church attendance – present or past. This term could also be understood as reflecting the theological weight individuals place on disutility from the use of birth control, to the extent that it affect fertility, the outcome of interest.

[5] For our purposes this could also be a single-parent family in which choices are made by the mother.

[6] A more general specification might be asymmetric in distance of f from μ and might also include an explicit disutility from the use of birth control. Neither of those generalizations would affect the derived estimating equations or the analysis that follows so we have sacrificed generality in favor of clarity.

The family is subject to a budget constraint where a fixed time allocation, T, can be spent on either work hours (H), leisure (L) or raising children, λf.

$$C = wH = w(T-L-\lambda f),$$

H and f are choice variables. Religion can enter the budget constraint in two ways. Let q measure the quality of social services provided by church (which we will proxy for with nuns per Catholic). Then q and a affect the time cost of having children $\lambda = \lambda(a,q)$. The idea is that schooling, daycare and health services reduce the time required of parents in raising children, but that access to those services may be restricted to individuals who publicly display religiosity through church attendance, a. The second mechanism through which religious services can enter the budget constraint is by influencing the wage. Religious norms and prohibitions tend to reduce the effective wage of women by restricting their consumption sets and their access to labor markets (as in Berman (2000) and Berman and Stepanyan (2003)), so that w=w(a).

Solving for the optimal choice of hours and fertility yields a standard labor supply equation and a derived demand for children

$$f(w(a) , \lambda(a,q) , \pi(a))$$

where a and q both tend to lower both wages, w, and the cost of raising children, λ, raising fertility. This equation has three interesting implications. First, service quality, q, enters only through the budget constraint, not through preferences. Second, we can bound the importance of the wage mechanism by including and excluding female labor force participation in a fertility regression. Third, if access to social services, q, is conditional on displaying religiosity, a, and religiosity is displayed to obtain q, then only the interaction, aq, matters in the cost of childrearing and the wage terms, so that a reduced form would be

$$f(w(a) , \lambda(a,q) , \pi(a)) = f^*(aq , a) .$$

In this specification, a coefficient of zero on church attendance, a, would be evidence consistent with a joint null hypothesis of i) no theological effect of religion on fertility and ii) social services only affect costs and wages for church attenders.

Estimating Equation

For an individual woman, i,

$$(1) \qquad f_{it} = \alpha_s + \beta^r a_{it} + \gamma^r a_{it} q^r_{st} + \theta\, l_{it} + \phi\, n_{st} + \delta_t + \eta_{it}$$

where religiosity, *a,* is measured by church attendance, social service provision, *q*, is proxied by nuns per Catholic (for Catholics of course), and *l* is female labor force participation. The superscript *r* indexes religion while the subscript *s* indexes religious groups within regions. Attendance is an individual characteristic, while quality of service provision is common to coreligionists in the same region. Here β^r captures the religion specific coefficient of church attendance on fertility, which we interpret as a theological effect, as social service provision is held constant. In contrast, γ^r is a religion-specific effect of the interaction of social service provision and attendance. The alternative use of time effect is represented by θ, the coefficient of female labor force participation. The effect of religious social service provision on nonattenders and noncoreligionists is captured by ϕ, the coefficient on the variable nuns/capita.

Equation (1) can be estimated at both the individual and aggregate level. We return below to an example of individual estimates for Italy, but most of our interesting progress has been at the country level. We can aggregate (1) to the country level for Catholics and NonCatholics to get

$$(2) \qquad f_{st} = \alpha_s + \beta^{NC} a_{st} + (\beta^{C} - \beta^{NC})\, a^{C}_{st} + \gamma^{C} a^{C}_{st}\, q^{C}_{st} + \theta\, l_{it} + \phi\, n_{st} + \delta_t + \varepsilon_{st},$$

where C – Catholic, NC – NonCatholic.

For countries without a Catholic majority we have poor measures of attendance by religion, so we use the country's cross-religion average as an approximation $a^{C}_{st} \approx a_{st} P^{C}_{st}$, where P^{C}_{st} is the proportion of Catholics. For the same reason we use $a_{st}\, n_{st} = a_{st}\, P^{C}_{st}\, q^{C}_{st}$ to proxy for $a^{C}_{st}\, q^{C}_{st}$.

To eliminate state effects and treat serial correlation in ε_{st}, we estimate in differences..

$$(3) \qquad \Delta f_{st} = \beta^{NC} \Delta a_{st} + (\beta^{C} - \beta^{NC})\, \Delta(a_{st} P^{C}_{st}) + \gamma^{C} \Delta(a_{st} n_{st}) + \phi\, \Delta n_{st} + \theta\, \Delta l_{st} + \Delta \varepsilon_{st}.$$

This specification allows us to estimate coefficients of attendance for both Catholics and NonCatholics; a coefficient for attendance interacted with social service provision, and a coefficient for social service provision for nonattenders and NonCatholics.

The Data

We make use of data from three sources: administrative data from the Vatican, the International Social Survey Program (ISSP) and the World Development Indicators (WDI).

The Vatican collects data for each diocese in the world, including the number of priests (diocesan and regular), nuns, churches, schools, hospitals, other institutions, Catholics and new baptisms. These data are available dating back to 1959 on an annual basis.[7] The Figure reproduces a page of the 1960 *Annuario Ponteficio* page for Agra in India and Agrigento in Sicily (the birthplace of Ragusa, our collaborator).

The ISSP provides standard household survey data comparable across countries (31 in the 1998 wave).[8] Critically, it includes a retrospective question on the religious participation of the respondents and their parents. Specifically, the question asked is "[W]hen you were around 11 or 12, how often did you/your parents attend religious service?" We also use the ISSP to obtain an approximate measure of completed fertility, using a series of questions about the number of children living in the household. To asses its quality, we compare the ISSP fertility measure with that from obtained by using data from the 1998 wave of the Survey of Italian Households' Income (SIHIW) run by Bank of Italy. The ISSP reported 1.31 children at home whereas the SIHIW reported 1.29 children, both of which are very close to the Italian TFR of 1.19 in 1998. The two surveys also give very similar results in a regression of children on years of education and other personal characteristics, suggesting that the fertility measure and the ISSP sample altogether are remarkably consistent.

The ISSP is also the main source for the *aggregate* attendance rates we use. Church attendance trends are those calculated by Iannaccone (2002) using the same retrospective questions we used to build the religiosity measure. Using the 1991 and 1998 wave of the ISSP-the only two waves to ask the retrospectives questions- Iannaconne builds up a time series of church attendance rates for

[7] Unfortunately, the *Annuario Ponteficio*, dating back to 1959, reports data only at the disaggregated diocesan level, without regional or national aggregation. In 1970 the Vatican began publishing aggregates in the *Annuarium Statisticum Ecclesiae.*

[8] For details see www.issp.org .

the 31 countries sampled by the ISSP. The time series go back to the 1940 and stretch to the 1990. By careful analysis, Iannaccone finds that the patterns of the attendance patterns built from the retrospective questions are reliable and remarkably consistent.

From the WDI obtain Total Fertility Rates, population, education and female labor force participation.

National Estimates of Equation (3)

Table 2 contains summary statistics for the variables used in estimating fertility equation (3). Total fertility declined by an average of 0.14 over each five year interval from 1960 through 2000, a cumulative decline of 1.12 lifetime children. Nuns per capita, church attendance and their interaction all showed declines, but with considerable variation across countries.

Table 3 reports estimates of equation (3) for a panel of 14 European countries between 1960 and 2000. Church attendance alone does not significantly affect fertility, for either Catholics or Protestants, as is evident in the results in columns (1) and (2). This is consistent with the literature described in Section 2, which reports mixed results of church attendance on fertility at the individual level. That finding is consistent with the conjecture that it is not the degree of religiosity that affects fertility but rather the set of services provided by the religious institution.

The interaction of attendance and nuns/capita, our proxy for social service provision, yields a large and statistically significant coefficient of 5.91. This coefficient is most easily interpreted by translating it into (surviving) children per nun. Considering equation (2) for a population of Catholics with 100% church attendance and which is half female, each nun implies approximately 295 children! (Since fertility, f, is measured in children / women, q in nuns per Catholic, and attendance as a percentage, d(children)/d(nuns) = d (children)/d f x df/dq x dq/d(nuns) = women x 100 x 5.91 x (1/Catholics) = 591/2 ≈ 295.) Of course these are only estimates and should be treated with caution. The standard error on that children per nun estimate is about 75 children. Nevertheless, the magnitude is remarkably large if we were to hazard a causal interpretation (more on that below). Ironically enough, the vows that nuns take not to have their *own* children are more than compensated for by their effect on the fertility of others!

An alternative way of looking at these results is to ask how much of unexplained decline in European fertility they account for. Comparing the constants in specifications (2) and (3) indicates that this Catholic social service provision measure explains about 30% (1-.087/-.125) of the fertility reduction left unexplained by changes in female labor force participation in Europe between 1960 and 2000.

Does social service provision predict increased fertility holding church attendance constant? Apparently not. When both the main effect and the interaction are included (specification (4)) the coefficient on social service provision is negative though insignificant. We view this as evidence that religiosity has instrumental value, allowing access to services as in the club model.

These results are virtually unchanged by removing female labor force participation from the right hand side, suggesting that the religious norms and prohibitions mechanism operating through effective wages (in the model outlined above) is relatively unimportant. The results are also robust to adding years of education for women aged 15+ (from the Barro-Lee data) as an alternative measure of the economic opportunities of women. The estimated coefficient is positive but insignificant.

One might worry that our measure of social service provision, nuns per capita, is endogenous in this regression. We have argued in Section 3 above that most of the time series variation in nuns per capita is due to an exogenous shock that occurred in the 1960s because of the Second Vatican Council. Yet it might also be true that nuns are shifted from country to country in order to accommodate increases in fertility. Specification (5) addresses that concern by estimating the equation with the level of nuns/capita held constant over time within countries. The estimated coefficient is even more positive in that case, though less precisely estimated.

Table 4 is designed to address a more serious potential endogeneity bias, that church attendance is affected by fertility, perhaps because parents attend church because they feel it benefits their children. The ISSP data is an excellent resource in this sense because it provides retrospective church attendance data dating back many years. The Table reports the result of using lagged rather than current church attendance to predict fertility, both as a main effect and interacted with our social service provision proxy. The lag allow some time for religious human capital accumulation, religious social capital accumulation, and fertility preference formation by individuals so that fertility in the childbearing years can be influenced by attendance in childhood. In the case of social services that accumulated social capital may qualify individuals for access to services.

If anything, these results using 10 and 15 year lags of attendance are sharper than those using current attendance: attendance alone does not matter, while the interaction has a large, significant coefficient in all specifications. As in the previous table, the main effect of nuns per capita is negative (and embarrassingly significant –see note above on nonlinearities) and the specification using the average of nuns over time yields an even larger coefficient on the interaction (specifications (3) and (5)).

Are these results heavily influenced by particular countries? Figure 7 illustrates scatterplots of changes in fertility against changes in the key variable, nuns/capita interacted with lagged church attendance. The top panel labels observations by the final year of the five year difference, showing that the variation driving the regression is indeed that which occurred in the period immediately after the Second Vatican Council, from 1965-70 and from 1970-75. The middle panel labels observations by country, showing that while Ireland is important, Spain, Portugal and the Netherlands also contribute to the positive coefficient. The lower panel plots observations proportional to the country size, to reflect their weights in the regression results. Here we see that the large outliers are not Ireland but Spain and the Netherlands. As a further check on the importance of particular countries we have rerun the regressions omitting one country each time, and found that the results are essentially the same.

A key assumption in our model is that nuns proxy for social service provision rather than influencing preferences for fertility through theological service provision. That assumption is difficult to test directly and cannot be literally true. One way to gauge the relative importance of theological versus social services is to compare the influence on fertility of priests and nuns. The division of labor in Catholic communities is such that a disproportionate amount of theological services are provided by priests, while most social services are provided by nuns. Attrition of priests and attrition of nuns since the Second Vatican council is highly correlated, but not perfectly so, allowing the possibility of estimating separate interaction of priest/capita and nuns/capita with attendance, as in equation (3).

The results of that exercise are reported in Table 5. Column (1) reports the baseline specification of equation (3) from Table 3. Column (2) shows the same specification with priests per capita replacing nuns per capita.

The coefficient is positive, like that for nuns, but very imprecisely estimated. This isn't surprising as the correlation of these two variables is quite high, so priests could easily proxy for the omitted variable "nuns." The third specification runs a "horserace," estimating the partial regression coefficient of priests/capita (interacted with attendance) with nuns/capita (interacted with attendance) included in the equation. The coefficient on the nuns interaction is positive and significant while that on the priests interaction is negative. These results lead us to suspect that the social service provision mechanism is more important than the theological mechanism in affecting fertility.

5. Conclusion

We propose a novel resolution to the Southern European fertility puzzle - the unprecedented and rapid transition to low fertility despite low female labor force participation. Our review of past research on social service provision in communal religions and our empirical results strongly suggest that the combination of declining religiosity and declining social service provision since Vatican II has induced substantial decline in fertility among European Catholics. Moreover, this fertility effect is due less to changing preferences than it is to social effects and institutional decline which reduced child-friendly social services traditionally provided by Catholic communities. That interpretation is consistent with a recent literature which links low fertility to the lack of family-friendly institutions for the children of working mothers in contemporary Italy and other Southern European countries (Del Boca 2002,2003). It may be that receding Church services left a vacuum in family-friendly social service provision long since filled in northern European countries. To further investigate the fertility effects of religion-induced social change, we propose analyzing merged data (on fertility, economic opportunities, religion, and social service provision) across a wide range of countries, using standard data sources, official Church statistics, ISSP and WVS, and regional panels in the U.S. The project promises to enhance economic theories about fertility while also yielding new policy-relevant insights concerning fertility, population projections, and the alternative institutional sources of important social services.

Understanding how social service provision affects fertility may be critical to understanding fertility trends among European Catholics and to projecting European demographics over the next generation. Moreover, the implications extend beyond the half-billion residents of Europe or even the billion Catholics worldwide. The populations and leaders of less developed countries look to Europe and wonder whether increased prosperity and greatly female labor market participation inevitably imply greying populations and demographic decline. These inferences may not be warranted if, as we conjecture, rapid fertility decline in Catholic Europe is not so much due to economic development as it is due to the loss of Church-provided family-friendly social services. If our conjecture is borne out by further analysis it has important public policy implications. Religious groups may strongly support social service provision in some times and places, but very different institutional arrangements may be required to support their continued provision in changing or different cultures. Our conclusions might therefore be important for any society facing rapid economic and social change, and especially for societies in which women are increasingly torn between labor market opportunities and the high shadow cost they impose on child care. That tension may be much greater the less support is available from religious communities, other social networks, markets, or governments.

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Figure 1: Western European Fertility

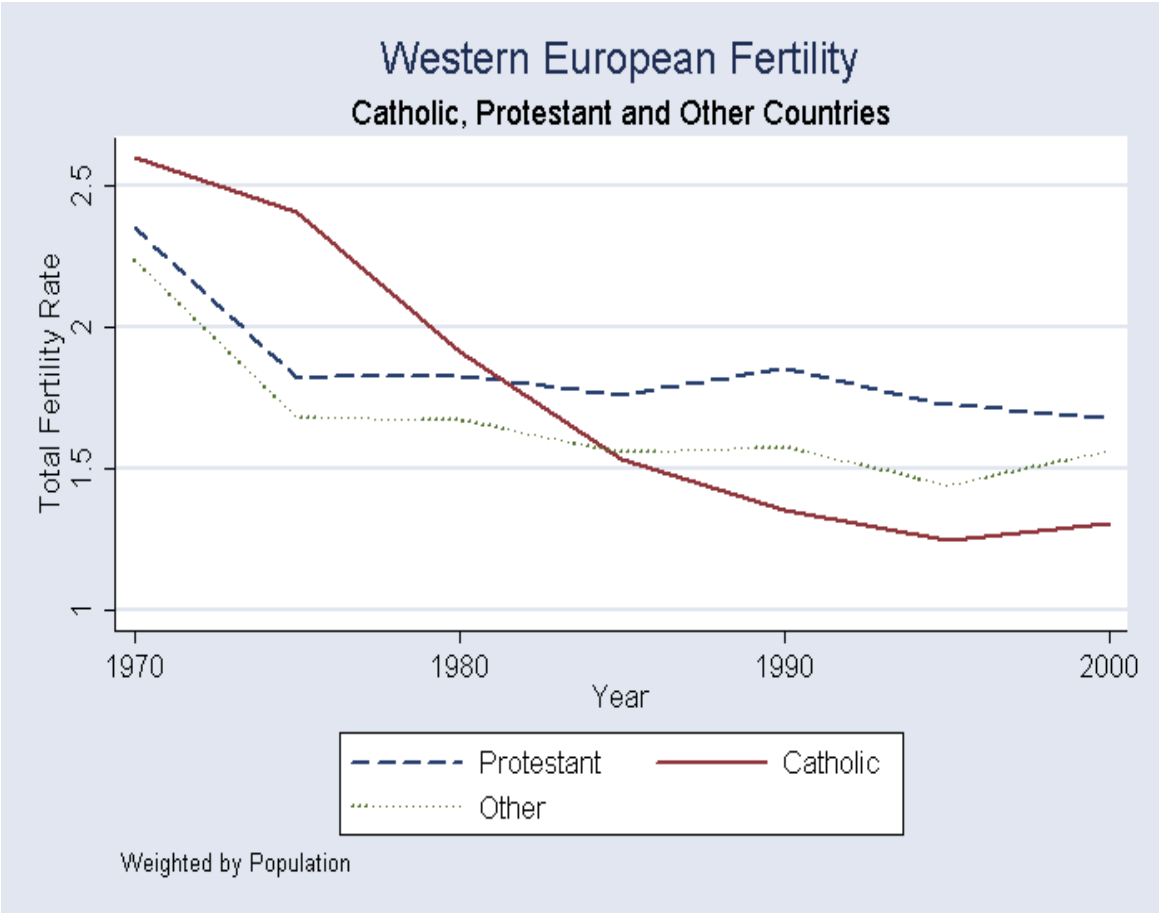
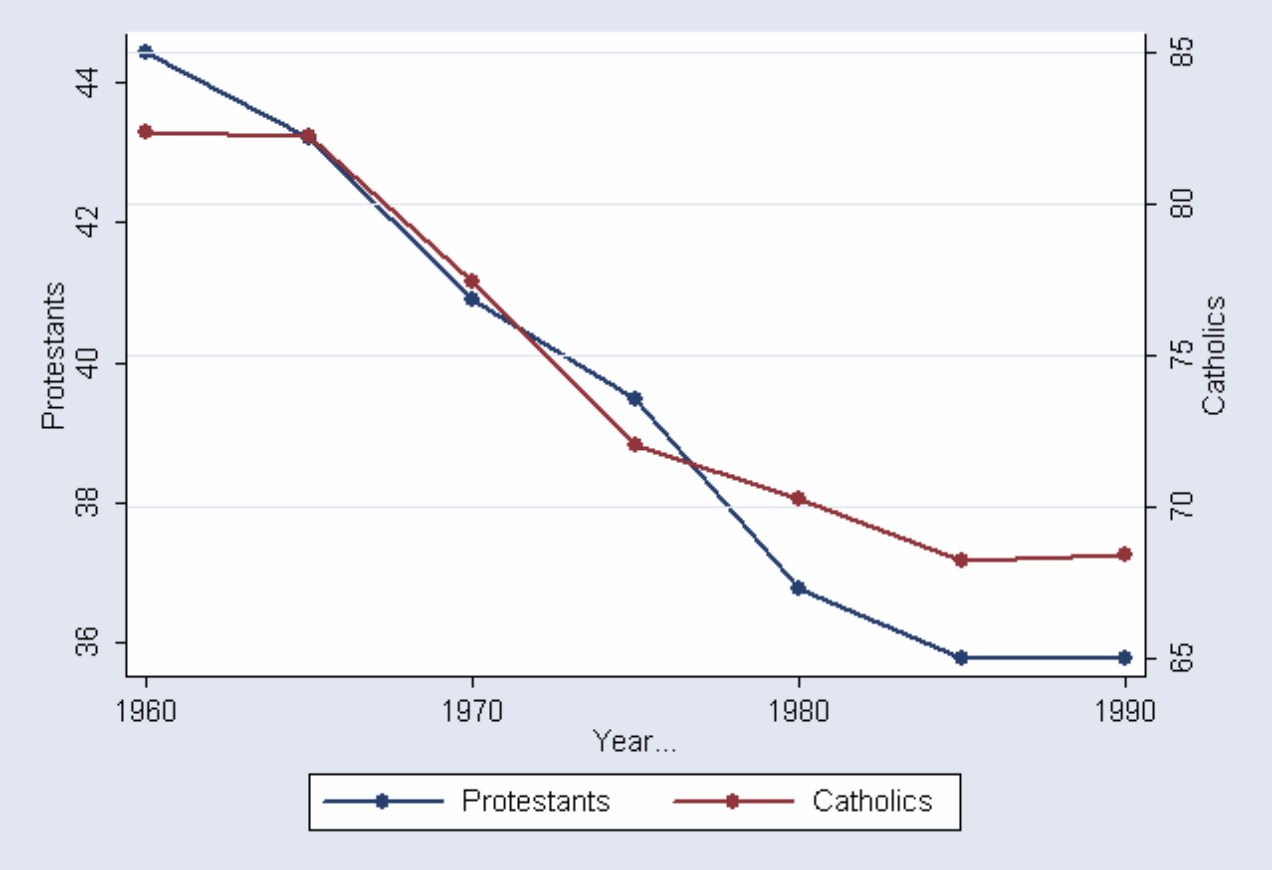


Figure 2: Church Attendance by Main Religion
Catholic and Protestant European Countries



Note: Catholic - Ireland, Italy, Portugal Spain
Protestant – Denmark, Norway, Sweden, UK

Figure 3: Fertility and Lagged Church Attendance
Italy, Ireland and Spain 1960-2000

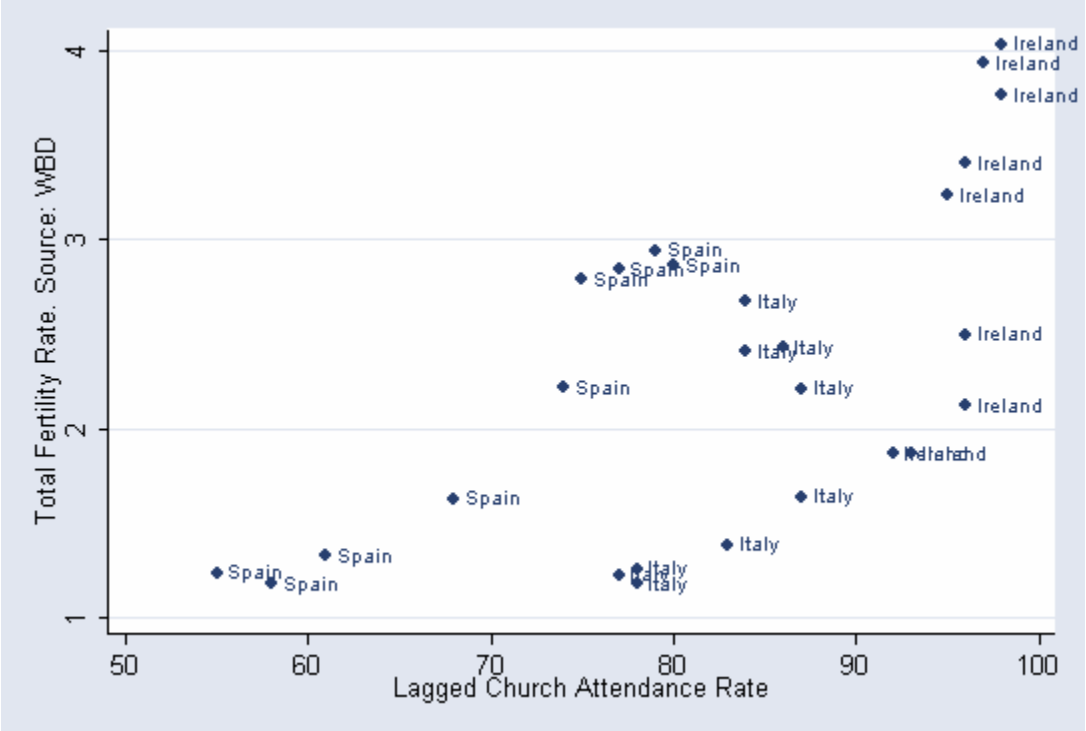
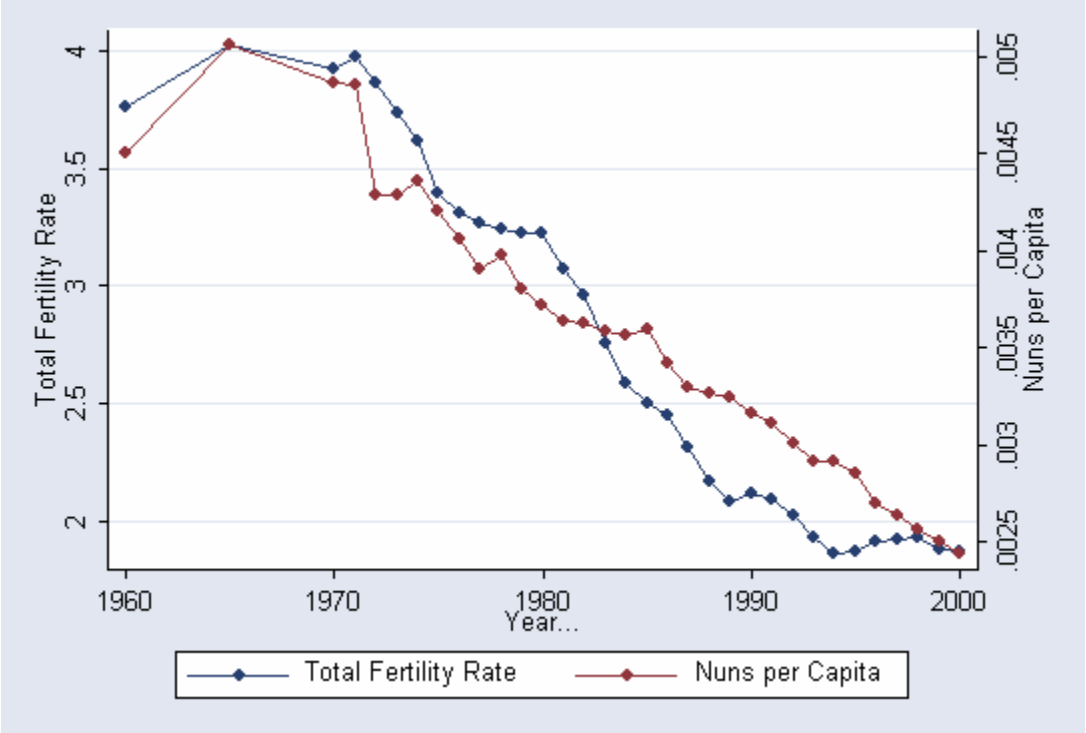


Figure 4: Fertility and Nuns / Catholic, Ireland 1960-2000



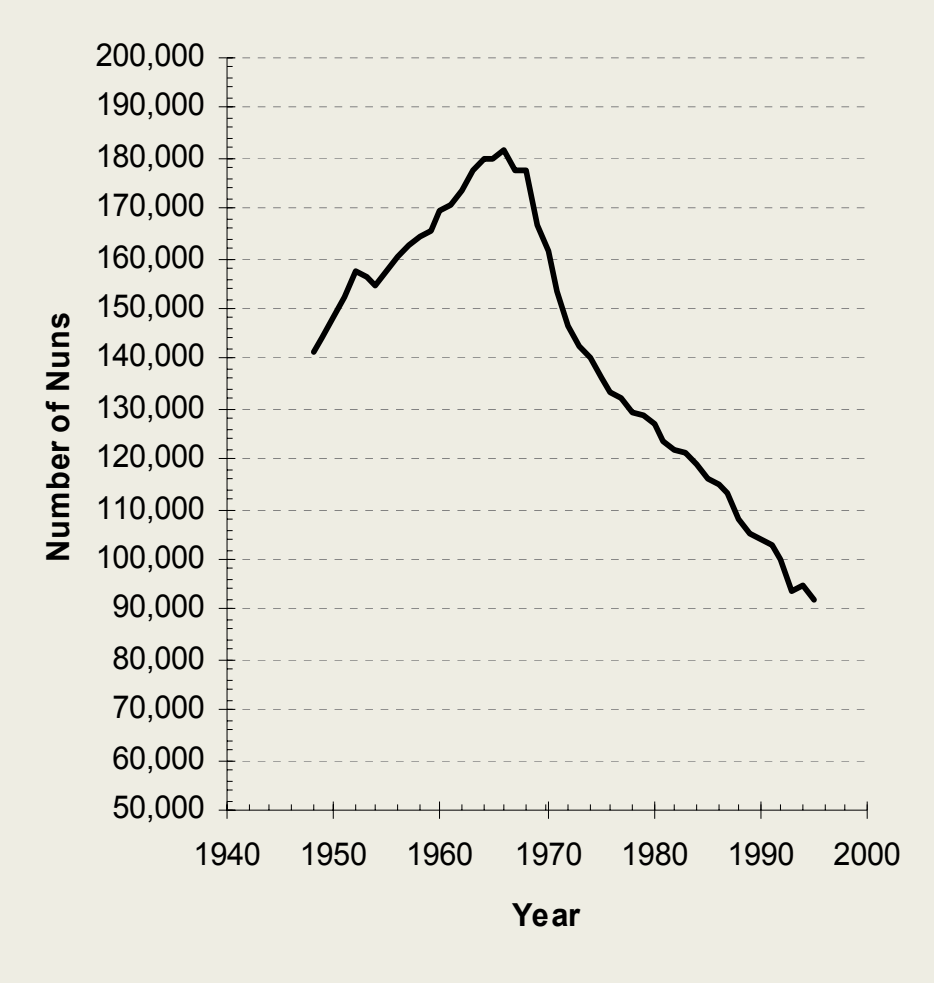
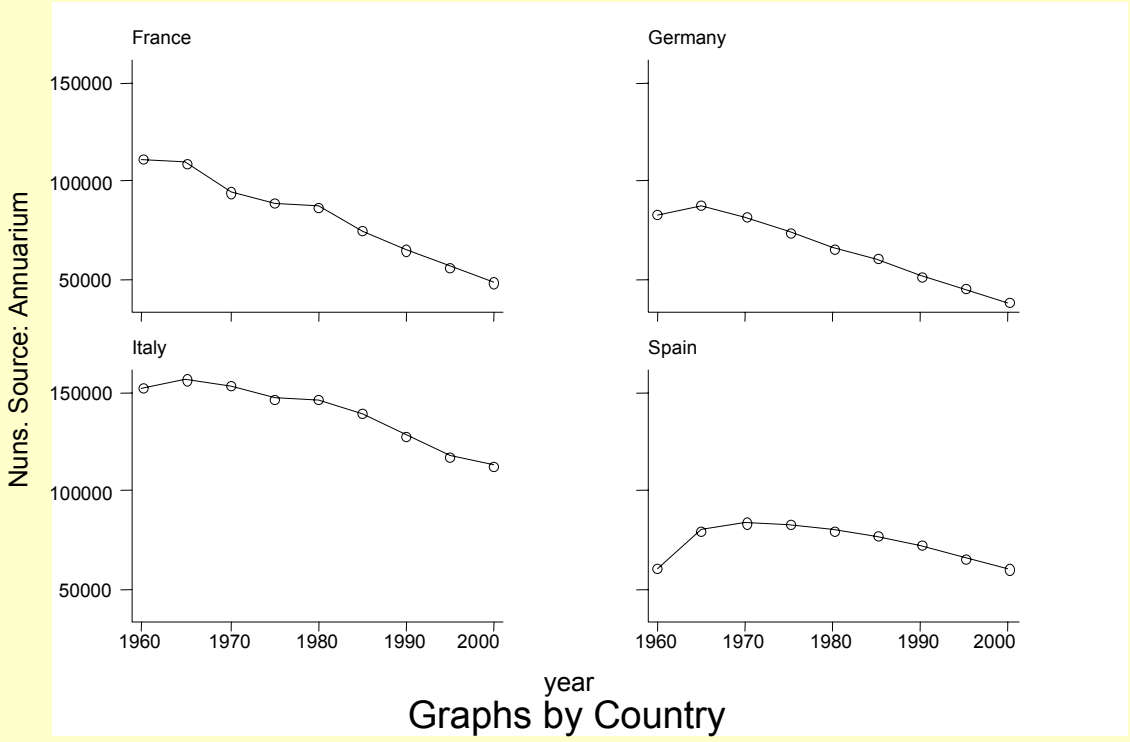


Figure 5: American Nuns Since 1948
(Source: Official Catholic Directory, from Stark and Finke 2000)

Figure 6: Nuns in Italy, Ireland, Spain and France 1960-2000



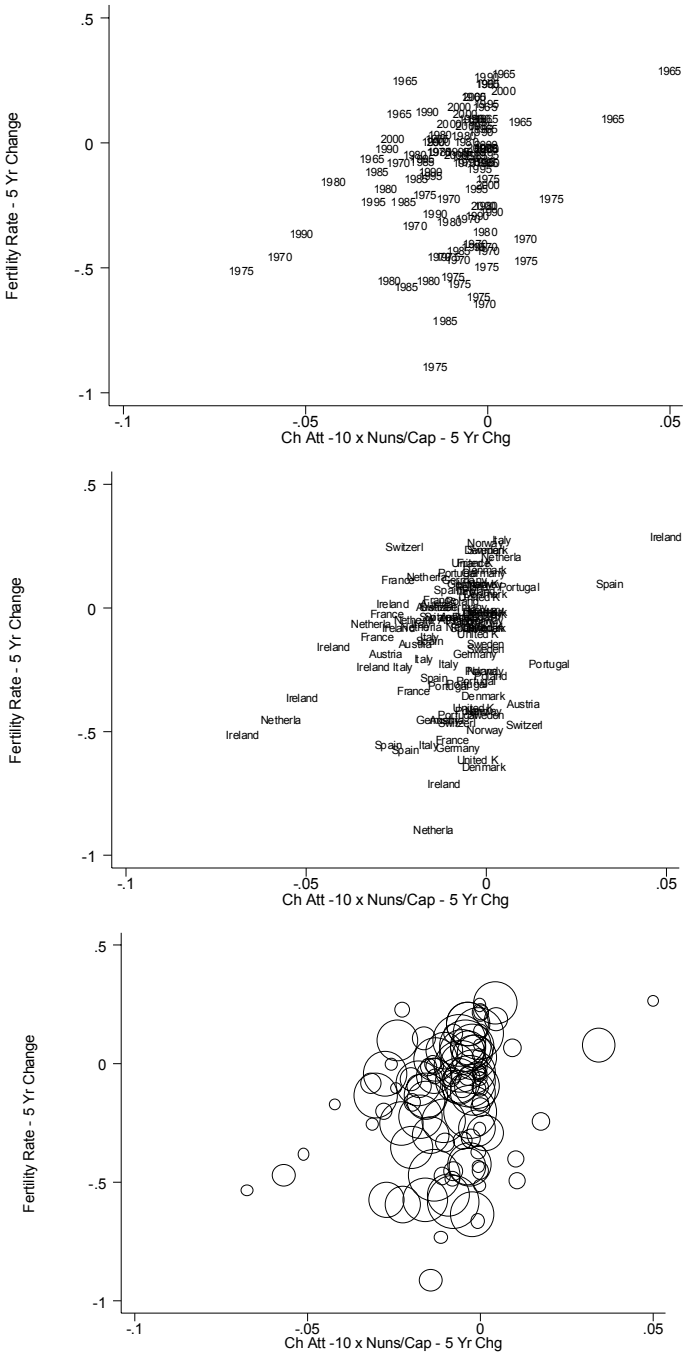


Figure 7: Fertility and Nuns/Capita - Scatterplots

Table 1: Nuns per Catholic in European Countries
1960-2000

Country	% Catholics (1970-2000 average)	Nuns / 10000 Catholics	
		1960	2000
Italy	98	31	20
Spain	97	21	15
Portugal	94	7	7
Poland	92	6.5	6.6
Austria	85	22	9
France	82	30	10
Ireland	75	60	32
Switzerland	47	36	18
Netherlands	39	77	18
Germany	36	32	13
United States (1990)	23	22 (in1990)	
United Kingdom	9	37	15
Norway	8	16	5
Sweden	1	15	19
Denmark	1	302	76

Note: Number of Nuns and Catholics are from the Annuarium Statisticum Ecclasiae and from the Annuario Ponteficio. The proportion catholic is averaged over the period 1970-2000. U.S. figures from the Catholic Directory and ARIS, www.adherents.com.

Table 2: Changes in Fertility, Attendance and Nuns Summary Statistics 1960-2000, 5 year intervals

Variable	Mean	Std. Deviation	Minimum	Maximum	Obs.
dTotal Fertility Rate	-0.14	0.24	-0.91	0.27	104
dNuns per Capita	-.0001	0.0001	-0.0008	0.0006	104
dAttendance Rate $_{t-15}$	-2.67	3.52	-15	5	104
d(Attendance $_{t-15}$ X Proportion Catholic)	-1.45	2.65	-12.2	4.7	104
d(Attendance $_{t-15}$ X Nuns per Capita)	-0.009	0.011	-0.068	0.055	104
dAttendance Rate	-2.93	4.17	-15	17	78
d(Attendance X Proportion Catholic)	-1.54	2.92	-12.2	6.6	78
d(Attendance X Nuns per Capita)	-0.009	0.012	-0.063	0.049	78
d(Female Labor Force Participation)	2.24	2.03	-2.79	13.4	104

Notes: Fertility and female labor force participation are from the World Bank. Nuns, and catholics are from the Vatican Statistical Annual (1970-2000) and from the Annuario Pontificio (1960-1970). The proportion Catholic is averaged over the period 1970-2000. The 13 countries included are those listed in Table 1 above, except for the U.S and Poland. Church attendance rates are calculated using the ISSP data retrospectively, as in Iannaccone (2003). Contemporaneous attendance rates are available only through 1990.

Table 3: Fertility, Attendance and Nuns Current Attendance

Dependent Variable: Total Fertility Rate	(1)	(2)	(3)	(4)	(5) [Mean Nuns]
Attendance Rate	-0.003	-0.012	-0.009	-0.010	-0.017
	(.008)	(.012)	(.012)	(.013)	(.013)
Attendance X Proportion		0.025	0.007	0.004	-0.013
		(.019)	(.018)	(.018)	(.030)
Attendance X Nuns per Capita			**5.91**	7.26	**23.4**
			(1.51)	(8.21)	(14.5)
Nuns per Capita				-104	
				(623)	
Female Labor Force	-0.017	-0.017	-0.021	-0.021	-0.023
	(.011)	(.012)	(.012)	(.012)	(.012)
Constant	-0.123	-0.125	-0.087	-0.087	-0.116
	(.051)	(.052)	(.056)	(.056)	(.052)
N	78	78	78	78	78

Notes: Countries are sampled each 5 years between 1960 and 2000, and five year differences are calculated. Fertility and female labor force participation are from the World Bank's World Development Indicators. Nuns and Catholics are from the Vatican Statistical Annual (1970-2000) and from the Annuario Pontificio (1960-1970). The proportion Catholic is averaged over the period 1970-2000. Church attendance rates are calculated using the ISSP data retrospectively, as in Iannaccone (2003). Contemporaneous attendance rates are available only through 1990. The thirteen countries included are those listed in

Table 4: Fertility, Attendance and Nuns
(10 and 15 year lags of attendance)

	10 year lag of attendance			15 year lag of attendance	
Dependent Variable: Total Fertility Rate	(1)	(2)	(3) [Mean nuns]	(4)	(5) [Mean nuns]
Attendance $_{t\text{-}lag}$ Rate	0.002 (0.013)	-0.001 (0.012)	-0.011 (0.014)	0.014 (0.017)	0.009 (0.018)
Attendance $_{t\text{-}lag}$ X Proportion Catholic	-0.001 (.020)	- 0.025	- 0.041 (.024)	-0.028 (.021)	- 0.028
Attendance $_{t\text{-}lag}$ X Nuns per Capita	**6.27** (1.79)	**23.7** (6.7)	**35.8** (12.4)	**6.17** (1.63)	11.3 (14.9)
Nuns per Capita		**-1397** (548)			
Female Labor Force Participation	-0.019 (.012)	-0.018 (.010)	-0.016 (.011)	-0.015 (.012)	-0.014 (.013)
Constant	-0.042 (.043)	-0.076 (.042)	-0.095 (.039)	-0.056 (.044)	-0.095 (.043)
N	104	104	104	104	104

Notes: Countries are sampled each 5 years between 1960 and 2000, and five year differences are calculated. Fertility and female labor force participation are from the World Bank's World Development Indicators. Nuns and Catholics are from the Vatican Statistical Annual (1970-2000) and from the Annuario Pontificio (1960-1970). The proportion Catholic is averaged over the period 1970-2000. Church attendance rates are calculated using the ISSP data retrospectively, as in Iannaccone (2003). Contemporaneous attendance rates are available only through 1990. The thirteen countries included are those listed in Table 1 above, except for the U.S. and Poland. Standard errors are heteroskedasticity-consistent and allow for an AR(1) component using the Newey-West procedure. In the "mean nuns" specification the variable nuns/capita is averaged over the sample period.

Table 5: Which Services Matter? Nuns and Priests

Dependent Variable: Total Fertility Rate	(1)	(2)	(3)
Attendance Rate	-0.009 (.012)	-0.011 (.013)	-0.009 (.012)
Attendance X Proportion Catholic	0.007 (.018)	0.018 (.027)	0.007 (.018)
Attendance X **Nuns** per Capita	**5.91** (1.51)		**9.16** (2.69)
Attendance X **Priests** per Capita		4.42 (11.9)	-17.7 (14.0)
Female Labor Force Participation	-0.021 (.012)	-0.018 (.012)	-0.021 (.012)
Constant	-0.087 (.056)	-0.118 (.054)	-0.091 (.054)
N	78	78	78

Notes: Countries are sampled each 5 years between 1960 and 2000, and five year differences are calculated. Fertility and female labor force participation are from the World Bank's World Development Indicators. Nuns and Catholics are from the Vatican Statistical Annual (1970-2000) and from the Annuario Pontificio (1960-1970). The proportion Catholic is averaged over the period 1970-2000. Church attendance rates are calculated using the ISSP data retrospectively, as in Iannaccone (2003). Contemporaneous attendance rates are available only through 1990. The thirteen countries included are those listed in Table 1 above, except for the U.S. and Poland. Standard errors are heteroskedasticity-consistent and allow for an AR(1) component using the Newey-West procedure.