Is Fertility Related to Religiosity? Evidence from Spain

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DISCUSSION PAPER SERIES

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ABSTRACT

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The paper explores the relationship between religiosity and fertility among Catholics in Spain, thereby answering the question whether the two parallel trends of dramatic drops in fertility and in religiosity are inter-related. It looks at current religiosity as well as exposure to religiosity during childhood. A unique, rich, data set is employed. It includes various dimensions of religiosity: respondent's religious affiliation; if he is Catholic- his current mass attendance (six levels) and his current prayer habits (eleven levels); spouse's religious affiliation; parental (maternal and paternal) and respondent's mass attendance when the respondent was a child (nine levels); Catholic education during childhood (yes/no). The multi-facet data on religiosity (rather than a single dichotomous variable) facilitates a sophisticated analysis with rigorous conclusions. The sample is restricted to married Catholic (female and male) respondents who were raised by Catholic parents, and are married to a Catholic spouse, in order to have a homogenous sample and to focus on the effect of the level (intensity) of religiosity (rather than religious affiliation) on fertility. Fertility is related to the various dimensions of religiosity- first using cross-tabulation and then using OLS regression. We find that fertility is not related to current intensity of religiosity. Exposure to religious activities during childhood has a significant effect on fertility of women (but not men): interestingly a father who was actively attending mass services has a positive effect on his daughter's future fertility (increasing the number of kids by about 0.8) while the mother's active mass participation has a reverse negative effect (leading to a decrease of one kid). Own participation in mass services during childhood has a positive effect on fertility- leading to an increase of 0.6 kids if the girl attended mass services intensively This study indicates the significance of childhood experience in shaping the 'taste for children'. It also suggests that there is no direct link between the fast secularization in Spain and the decline in birth rates.

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1. Motivation

Spain is witnessing during the last decades two parallel trends: (1) a dramatic drop in fertility rates, from a birth rate of 3 children in the mid 1950s, to 2.8 in 1975, and to a mere of 1.2 in recent years. The very sharp drop started in 1975 (at the onset of democracy) and followed a constant sliding path till the late 1990s when it stabilized at a rate of 1.2 children (Fernández-Cordón, 1998). The decrease in birth rates is evident in many other European countries, but Spain has suffered the sharpest changes. Fertility in Spain was higher than in most European countries up to the mid 1980s and from then on, the Spanish fertility graph lies below fertility figures of most European countries (McDevitt, 1999, pp: A41-A42)[2]; (2) a very significant decline in religiosity: Spain has been considered a Catholic bastion, with high respect for the church even during the Franco regime when it was a State Church. A survey that will be used for our statistical analysis reveals that about two thirds of the respondents were attending mass services on a regular basis when they were 12 years old and only about 10% rarely participated (no more than 2-3 times a year). The rest quarter attended occasionally. When these individuals grew up (after one to three decades)[3], their mass attendance habits changed drastically: less than 15% attend on a regular basis (every week) and close to 70% rarely attend (never, up to 1-2 times a year).

An observation of these two parallel phenomena naturally leads to question and explore the inter-relationship between fertility and religiosity. This is precisely what we aim to do in the study presented in this paper: explore the effect of religiosity on fertility[4] for a representative sample of Spanish Catholics. It replicates and extends a paper by Adserá (2006a) who used two fertility surveys (the 1985 and 1999 Spanish Fertility Surveys- SFS) to study the significance of the effect of religiosity on fertility. Her findings suggest that while in the 1985 SFS family size was similar among practicing and non-practicing Catholics, this has changed in 1999. In the more recent sample, practicing Catholics exhibit significantly higher fertility

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[2] Fertility rates in other European countries in 1998: Iceland- 2.0; Denmark- 1.7; France- 1.7; Sweden- 1.8; UK- 1.6; Austria- 1.5; Belgium- 1.5; Croatia- 1.5; Hungary- 1.5; Ukraine-1.4; Estonia- 1.3; Germany- 1.3; Czech Republic- 1.2; Bulgaria- 1.1; Source: McDevitt (1999).

[3] The youngest respondent is 22 years old-10 years passed since the age of 12, the oldest is 48 years old- 36 past the age of 12.

[4] Throughout the paper we will relate to the number of children the interviewed (married) individual has. Various terms will be used: fertilty, fertility rates, birth rates, number of kids. All these terms relate to the same variable. We also assume that the desired number of kids is equal to the actual number.

rates. Adserá concludes that due to the decrease in church attendance (between 1985 and 1999), religiosity has acquired a more relevant meaning for demographic behaviour.

The Spanish Fertility Survey has rich data on fertility patterns (eg, spacing of births), but the data on respondents' religiosity is quite restrictive- it has data on the religious affiliation of the respondent and his spouse (only in the 1999 SFS). If the respondent is Catholic- she is asked whether she is a practicing Catholic or not. Practicing Catholicism is not well defined and could be perceived differently by different individuals. There is no information on parental religiosity and on the respondent's exposure to religiosity during the formative years of childhood.

In order to test the effect of religiosity on fertility we are using a data set that includes much richer information on several dimensions of religiosity. It was collected in 1998 by the Centro de Investigaciones Sociológicas (Center for Sociological Research, Spain), under the International Social Survey Program: Religion II, supported by UNESCO. It is based on 2488 personal interviews that were carried out in all 47 Spanish provinces and has information on several dimensions of religiosity: (1) the respondent's current religious denomination and his religious activity as evidenced by two dimensions of religiosity: mass attendance (a public religious activity with utilitarian/social motives- has six alternative levels) and prayer (an intimate/private religious activity with pure religious motives-11 levels). If he is married- the religious affiliation of his spouse; (2) the individual's exposure to religiosity during childhood: religious denomination and church attendance of the mother and father when the respondent was a child (9 alternative levels); church attendance of the individual when he was 12 years old (9 levels); Catholic education of the individual when he was a child (yes/no). A battery of personal and environmental socio-economic background questions (e.g. number of household members, marital status, age, education, personal income, household income, population size in place of residence, region) is also included[5].

While Adserá's study (and most other empirical studies that relate to religiosity) is employing one dichotomous variable to measure religiosity (practicing Catholic- yes/no), our data base provides much more details on religious activities of respondents and their parents, thus facilitating a more sophisticated analysis with more robust results.

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[5] This unique rich data set was also used by Iannaccone (2003) as part of an international comparative study; by Brañas-Garza (2004) to study secularization in Spain, by Brañas-Garza and Neuman (2004) to explore determinants of religiosity in Spain and by Brañas-Garza and Neuman (2006) to analyse the intergenerational transmission of 'religious capital'.

The economic literature on the relationship between religiosity and fertility[6] is mainly empirical and takes two complimentary directions: In the first set of studies the focus is on interdenominational differences in family size. A second set of papers looks at the effect of religious practice (in most studies it is proxied by church attendance) on birth rates. A more detailed discussion follows in the second section.

This paper belongs to the second set and analyzes the impact of religiosity on fertility for a sample of young Spanish Catholics who grew up in households composed of two Catholic parents. The novelty of the analysis stems from the very detailed information on religiosity of respondents that includes several indicators and dimensions of religiosity. This leads to a finer analysis and to the possibility of distinguishing between effects of current religiosity (expressed by church attendance and by prayer habits), of parental religiosity (mass attendance when the individual was a child) and of the respondent's exposure during childhood (reflected by Catholic education and by church attendance at the age of 12)[7]. The relationship between religiosity and fertility is examined using two types of statistical analysis: One is a descriptive table that relates parental and current religiosity to the number of children (measured by the mean, median and mode of number of children). The second type uses OLS regression analysis to present 'fertility equations'. The estimated equations include in addition to the variables that are the focus of our study (parental religious inputs, exposure during childhood and current religiosity) also other socio-economic variables that affect fertility, in order to control for their effects and to arrive at net effects of religiosity variables. The analysis is done for each of the genders separately (allowing gender differences).

We restrict our analysis to married Catholic respondents (with a Catholic spouse) who grew up in households of Catholic parents, in order to form a homogenous sample where all players belong to the same religion and are subject to the same rules of religious conduct. The respondents vary by the level of their current religious activity and by the exposure to religious practice that they have experienced during childhood.

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[6] Previous literature has also highlighted the relevance of religious affiliation and of religiosity on a wide range of economic and demographic factors, such as: educational attainment (Chiswick, 1988; Lehrer, 1999), marital stability (Lehrer and Chiswick, 1993) and economic growth (Barro and McCleary, 2003).

[7] Unfortunately the data set does not have information on the spouse's current level of religiosity (as indicated by church attendance and/or prayer) and/or information on parental and on childhood religiosity.

The paper is structured as follows: The next section has a short overview of the literature on religiosity and fertility. The third section outlines background information on the composition of our sample in terms of birth rates and the religious practice of the respondents and their parents. In the following section an empirical analysis of the effect of the diverse dimensions of religiosity on the respondents' fertility rate is presented and discussed. The last section summarizes and concludes.

2. Literature Overview

Studies of religion explore how religion affects attitudes and activities of individuals. Family size might also be influenced by religious affiliation and by religiosity. There is a large body of literature on religiosity and fertility (by demographers, sociologists, anthropologists, psychologists, historians and economists). In our short overview we will only relate to a small number of (mainly economic) studies. As mentioned above the literature on religiosity and fertility has two lines of inquiry:

2.1 The religious denomination and fertility

The first line of research on fertility and religiosity relates to inter-denominational differences in birth rates. Goldscheider (1971) offers three kinds of hypotheses on the relationship between religion and fertility: the religious-values hypothesis; the characteristics hypothesis; and the minority-group-status hypothesis. (1) The religious values hypothesis suggests that religious ideology and teachings affect fertility. This is done both directly by rejecting contraceptives and abortions and elaborating rules on the timing and frequency of sexual intercourse, and indirectly by teachings on the desired (large) number of kids and on the appropriate roles for men and women. Religious values are more effective when religious institutions have the means to communicate values to their members and to establish mechanisms to promote compliance and to punish non-conformity (McQuillan, 2004); (2) The characteristics hypothesis claims that fertility differences between religions will disappear once the relevant socio-economic factors are controlled for (Anderson, 1986); (3) It is argued in the sociological literature that religious minority groups (eg, Jews) tend to adopt practices of reducing family size (Goldscheider, 1967; Knodel, 1974).

Many of the empirical studies on this topic analyze US data: In the late 1970s, after years of consensus that Catholics (in the US) have significantly larger families compared to non-Catholics, Westoff and Jones (1979) found that fertility rates of those two groups were rapidly converging due to a sharp decrease in Catholic fertility. This result has been confirmed by Lehrer (1996) for Catholics in the US and by O'Grada and Walsh (1995), for Northern Ireland. Mormons (in the US) average much higher than normal fertility, while Jews and people with no religious affiliation have birth rates that are below the US average. Fundamentalists are less likely than others to use effective methods of contraception and when faced with an unwanted pregnancy, are more likely to choose adoption over abortion (Medoff, 1993). Lehrer (1996) too found that Mormons (and to a lesser extent also Conservative Protestants and Catholics) have significantly larger families, due to the pro-natalist orientation of their church. Schellekens and van-Poppel (2006) examine fertility patterns of Catholics, Protestants and Jews in The Hague (Netherlands) between 1860 -1909 and conclude that religious ideology accounts for the low level of fertility control among Catholics.

Morgan et al. (2002) offer explanations why Moslems have higher fertility rates compared to non-Moslems and bring evidence from four Asian countries. They also present an overview of the literature on that subject.

A battery of studies examines differences in fertility between Hindu and Moslem women in India. Some embrace the religious-values hypothesis claiming that the higher total fertility rate of Moslems is the result of the Moslem religion that rejects family planning and embraces polygyny (eg, Iyer, 2002). Jeffery and Jeffery (2000) are proponents of the characteristics hypothesis, suggesting that factors that are unrelated (or only tangentially related) to religion explain the different fertility rates of the two religious groups and if these factors (eg, education, region of residence, economic status) were controlled for, the fertility differential would have disappeared. Borooah (2004) combines the two views, by introducing into his estimated fertility equations both the religious affiliation (Dalit Hindu, non-Dalit Hindu, Moslem) and socio-economic background variables. His econometric analysis suggests that over half of the observed births surplus of Moslems over Hindus, stems from differences in their responses toward fertility-influencing factors. Differences in the endowments of these factors explain the other half of the fertility surplus.

The economic literature also discusses the effect of the religious composition of the couple on the number of births within the marriage. Becker et al (1977) suggest that the lower stability of inter-faith marriages should reduce the number of births (compared to otherwise equal couples where both spouses have the same religious denomination). Chiswick and Lehrer (1993) find strong evidence for the fragility of inter-marriages. The larger the difference in religious background, the more likely conflict will arise. The couples are aware of the frailty of their union and desire less children. Lehrer (1996) finds a significant negative effect of out-marriage on fertility for Mormon and Catholic women. Adserá (2006a) also concludes that inter-faith unions in Spain are less fertile than unions of the same religion.

2.2 Religiosity and fertility (within a given religion)

The second (more limited) channel of studies explores the effect of the level of religiosity (of members of a given religion) on fertility: Neuman and Ziderman (1986) analyze a sample of Israeli Jewish male respondents, using a very rich data set on religious activities and find a significant positive relationship between religiosity (measured by time devoted to religious activities) and fertility[8]. Several papers analyze samples composed of Catholics and present findings that indicate that respondents with more frequent church attendance have higher fertility rates (Mosher and Hendershot, 1984; Williams and Zimmer, 1990; Sander, 1992; Adserá, 2006a). Amin et al. (1997) discuss the relationship between religiosity and fertility in Bangladesh. They argue that fertility is related to religiosity via the use of family planning. They found that contraceptive use is influenced mainly by the religiosity at the level of the district and not so much by individual religiosity.

In almost all published studies, religiosity is proxied by the respondent's church attendance (a dichotomous variable). There is no reference to parental religiosity or to the exposure to religious activities during childhood. As Bisin and Verdier (2000, 2001) suggest the cultural and religious environment in which children live shapes their future preferences. The formation of 'social capital' and of 'religious capital' begins early with childhood experiences (either by training by family members, or by watching them practicing social and religious activities). Children's preferences (including preferences for kids) are acquired

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[8] In the estimated 'fertility equations' socio-economic background variables of the respondents are controlled for in order to arrive at net effects of level of religiosity.

through an adaptation and imitation process that depends on their parents' socialization actions. Individuals who grew up in households with intensively practicing Catholic parents (who had high valuation for large families and had religious opposition for the use of contraceptives and for abortion), might internalize those values and opt for high birth rates.

Contrary to this process of imitation and adaptation, psychologists also mention a reverse process of negative reaction- if the individual grew up in a large family with many kids and suffered from the cost and implications of having a hard working mother and many siblings (such as, low attention of the mother), she/he might react with a desire for less kids.

In this paper we follow the second line and explore the effect of religiosity on fertility for a homogenous sample of Spanish Catholics. We do not look at inter-denominational comparisons. Such comparisons are more relevant in a pluralistic society- Spain is a country with one major religion and almost 90% of the population are Catholic (see Branas-Garza and Neuman, 2004 and 2006, for a more detailed analysis). Moreover, in Spain Catholic affiliation per-se seems to have lost in recent years some of its distinctive traits due to much lower church attendance and the wide use of family planning and contraceptives Adserá (2006a). Nevertheless, respondents who were raised by more religious practicing parents, who were exposed to church services during childhood and who are more religious (reflected in church attendance and in prayer habits), might have a taste for more children. This is precisely, what we aim to explore.

3. Sample and Data

The link between religiosity and fertility is examined for a sample of Catholic respondents who were raised in households composed of two Catholic parents- in order to have a homogenous sample of members of the same religious denomination. This facilitates the focus on the effect of intensity of religiosity on demographic behaviour. Unlike Adserá (2006a) who analyzed only a female sample, we estimate 'fertility equations' for (separate) samples of both female and male respondents[9]. Data on various aspects of religiosity are used: the respondent's current religious activity as expressed by church attendance (6 levels)

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[9] The decision on number of kids is a joint decision of both the wife and the husband- it would therefore be optimal to have information on the religious activities and the religious background (as well as the socio-

and by prayer habits (11 levels); the mother's and the father's mass attendance when the individual was a child (9 levels); the respondent's mass participation when he was 12 years old (9 levels); his Catholic education (yes/no);

The survey we use (collected in 1998 by the Center of Sociological Research in Spain, under the International Social Survey Program: Religion II), has very detailed information on religiosity but does not have an explicit question on number of children ever born. This core variable has been calculated using information on number of members of the household. Only married respondents are included and the age of respondents is restricted to 45 for women and to 48 for men. The age limit was set to eliminate the possibility of children who got married and left the parents' household[10]. Obviously, these restrictions lead to a significant drop in sample sizes but on the other hand yield a sample of a young cohort that was born in the early 1950s and married around mid 1970s at the onset of the Spanish democracy.

The survey also includes information on various socio-economic background variables, such as: age, schooling, population size in city of residence, region of residence, personal income and family income. They will be used in our 'fertility equations' to control for background effects and arrive at net effects of religiosity on fertility. The coefficients of these variables are also informative and add to the understanding of fertility patterns.

The region of residence is a key variable because (1) regions differ in terms of macro-level variables that might affect fertility, such as: male and female unemployment rates, employment prospects, availability of more stable public-sector jobs, proportion of tenured jobs and of full-time employment (see Adserá 2006b, for a discussion of the effect of those variables on the desired number of kids of Spanish women[11]); (2) public facilities, such as education and health-care are also different in the various regions, due to different spending of the regional governments on education and health. For instance, reports of the "Bilbao-Vizcaya-Argentaria Stock of Public Capital Series" show that in 1998 Navarra ranked first in per capita public spending on health (352 euro, the regional average is 202 euro) and also on education (606 euro, compared to an average of 497). Andalucia ranked last (129 and 430

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economic background) of each of the spouses, in order to relate religiosity to fertility. However, as we have detailed data only for one spouse (the respondent), it is still informative to analyze seperately women and men.

[10] Children who left the household in order to study are still counted as household members.

[11] Adserá (2005) reports that when women in the 1995 SFS were asked why they have restricted their fertility, several of the responses related to economic factors such as: lack of economic resources (26.1%); needs to work outside the home (13.2%); unemployment of self/spouse (5.4%); small house (4.9%); lack of child care centres (2.1%). These factors most probably be region specific.

euro, on health and education, respectively). Obviously, this also means differential health and education facilities for kids that translate into different costs of raising children, resulting in a different demand for children. Also, unlike in other regions, in Castilla la Mancha and the in the Pais Vasco region schooling at all levels is free. In Andalucia there are very few public kindergarten, while in the north there are plenty. By including the region as one of the explanatory variables we (partially) control for the different economic, educational and health environments in which our respondents live, operate and make their family-planning decision; (3) regions also differ in terms of their religious make-up and the prevailing religious attitudes and norms. These differences might affect the desired (and actual) number of births of individuals living in the region. Amin et al. (1997) claim that religiosity at the level of the district has a stronger effect on demographic behaviour than the individual's own religiosity. At more traditional (and rural) districts there might be peer pressure towards larger families combined with group opposition to contraception. This reflects some sort of 'neighborhood effect'. The coefficients of the region dummies therefore reflect the effects of the employment, education and health prospects, as well as the religious attitudes of inhabitants of the various regions.

We start with some descriptive statistics of the fertility variable and of the various dimensions of religiosity.

The average and the distribution of the number of kids are pretty similar in the female and male samples (see Appendix Table 1). Recall that our samples are composed of married women and men. The women are younger than 46 and the men are younger than 49. Obviously, the samples include also individuals who have not reached yet their desired number of kids (in the regressions we control for that by including dummy variables for age groups). In the female sample, the number of children ranges from 0-to-7, with an average of 1.894 (SD is 1.379). In the male sample the number of children has the range of 0-to-6, with a mean of 2.013 (SD=1.354)[12]. About 15% have no kids, around one quarter have one child, the mode is 2 children (30%), close to 20% are parents of 3 children, around 10% have 4 kids and a mere of less than 5% are parents of 5 children or more.

Descriptive summary statistics on the various dimensions of religiosity that are employed in our statistical analysis of fertility are presented in Table 1 (parental mass attendance and the

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[12] The sample average is larger than the birth rate in 1998 (that was 1.2 children), because the sample includes respondents who had kids during the last 3 decades, when birth rates were higher.

individual's mass attendance when he was 12 years old) and in Table 2 (information on current mass attendance and current prayer habits).

For each of the three childhood variables there is data on a scale of 1 to 9 (1- never attended church services, to: 9- attended several times a week)[13]. The responses to the questions that relate to childhood are retrospective and might be inaccurate; we therefore created a variable with three broader categories by combing responses that are close. The 9 original options are reduced to the 3 following categories:

(1) rare =1: For original values of: 1 (she/he never attended); 2 (once a year); and 3 (one or two times a year). This category relates to very low practicing Catholic mothers/fathers/children.

(2) occasional=1: For original values of: 4 (attended few times at year); 5 (once a month); and 6 (two or three times a month). This category includes medium-level practicing Catholic mothers/fathers/children.

(3) intensive=1: For original values of: 7 (attended almost all weeks); 8 (every week); and 9 (several times a week). This is a category that is composed of intensively practicing Catholic mothers/fathers/children.

For current religiosity there are no measurement errors and the original values can be used and will be used in regression analysis. Additionally, we define in this case too three broader categories for both mass attendance and for prayer habits.

For mass attendance:

(1) mass-rare =1: For original values of: 1 (she/he never attends); 2 (once a year); and 3 (one or two times a year). This category relates to very low practicing Catholic respondents.

(2) mass-occasional=1: For original values of: 4 (attends once a month); and 5 (two or three times a month). This category includes medium-level practicing Catholic individuals.

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[13] Based on questions #28, for the mother, question #29, for the father and question #30 for the child: "When you where a child, did your mother/ father/yourself attend mass services at the church?". The options are: Never (1); once a year (2); one or two times a year (3); a few times a year (4); once a month (5); two or three times a month (6), almost every week (7); every week (8); several times a week (9).

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(3) mass-intensive =1: For original value of: 6 (every week). This is a category that is composed of intensively practicing Catholic respondents.

Similarly, we also define three broad categories for prayer habits:

(1) pray-rare =1: For original values of: 1 (she/he never prays); 2 (once a year); 3 (two times a year); and 4 (few times a year).

(2) pray-occasional=1: For original values of: 5 (prays once a month); 6 (two or three times a month); 7 (almost every week); 8 (every week); and 9 (several times a week).

(3) pray-intensive =1: For original values of: 10 (prays every day); and 11 (several times a day).

Similar definitions of childhood and of current religiosity measures facilitate more convenient comparisons between the two. The dummy variables version will also be used in regression analysis. The use of dummy variables does not require any assumptions on the type of relationship between fertility and religiosity, while the use of the continuous variables (for mass attendance and for prayer) is based on the assumption of linearity and monotony of the effects.

---Table 1 and Table 2- here---

As is evident from Tables 1 and 2, there is a dramatic decrease in religious practice of the offspring compared to the parents and of the adult respondents compared to their childhood religious experience. Our sample is restricted to women who are 18-45 years old and men who are 18-48 years old. This means that the observed huge decline took place during a relatively short time period. The youngest respondents are only few years past the age of twelve while the oldest are about three decades beyond their childhood experience.

As Table 1 demonstrates, over 50% of the mothers, and over one third of the fathers were intensively attending mass services (almost every week; every week; or several times a week). The respondents themselves when they were twelve years old were even more active than their parents- 65% of them were attending mass services intensively (with their parents or with the school).

This has changed dramatically when the individuals grew up- currently (in 1998) over two thirds of women and of men (66% of women and 73% of men) rarely go to church (never, up to two times a year). Only around 14% of respondents (both among women and among men) go to church frequently. This very significant intergenerational change stems from the rapid secularisation of the Spanish society (Branas-Garza, 2004) and from the weakening of the network effect of participation in church services. The social gains from church going diminished significantly at the onset of democracy in 1975, when the intimate link of State and Catholicism collapsed (Adserá, 2006a).

There are regional differences in mass participation. A break down of the sample by region[14] demonstrates considerable variability. The most 'religious' regions seem to be Castilla la Mancha, La Rioja, Navarra and Castilla Leon where more than 40% attend church services on a regular basis (every week). The least religious regions, according to our survey are: Cataluña, Pais Vasco, Canarias and Madrid, where close to 40% rarely go to church (the figures should be treated with some caution due to the small sizes of the regional samples).

Our respondents are somewhat more active at prayer (a more intimate/pure religious activity). Women pray more frequently than men, reflecting gender differences in the taste for religiosity[15]. Twenty percent of women and only 9% of men pray at least one time a day. About 45% of women and two thirds of men rarely pray. The rest one third of women and one quarter of men pray occasionally. A decomposition by region demonstrates differences similar to the regional differences in mass attendance: Castilla la Mancha, Castilla Leon and Navarra are at the top with over 40% praying at least once a day. A similar figure is also found in Madrid and Murcia.

The survey does not include questions on parental prayer habits and an intergenerational comparison is therefore not possible. There is most probably a significant intergenerational change in this religious activity too. However, many young Spaniards still cherish the religious practice of prayer. (see also Branas-Garza and Neuman, 2006, for descriptive statistics on mass attendance and on prayer habits for a larger sample of Spaniards).

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[14] We decomposed the larger sample of 2044 respondents who answered the relevant question (with no restrictions on marital staus and age). We are interested in the religious make-up of the region that forms a 'neighborhood effect'. Moreover, the restricted samples are too small for a break-down by region.
[15] See also Brañas-Garza and Neuman (2004) for a more detailed discussion of gender differences.

A description of the female and male samples in terms of the socio-economic and demographic characteristics is presented in Appendix Table 2. The samples are representative of the Spanish population at the age group under discussion.

4. **Religiosity and Fertility- an Econometric Analysis**

The inter-relationship between religiosity and fertility among young Spaniards is analysed (1) using a cross-tabulation descriptive presentation where each dimension of religiosity is examined separately, and (2) estimating 'fertility equations' that use the multiple dimensions of religiosity as explanatory variables and also include socio-economic determinants of religiosity. The coefficient of each variable represents the net effect of that variable. Inclusion of interaction terms facilitates the examination of possible trade-offs and cross-effects of pairs of variables. While the first type of statistical analysis is possibly more intuitive, the econometric estimation of fertility equations is a more accurate and sophisticated tool- the net effects are revealed as well as their significance.

4.1 Cross-tabulation of average number of children versus religiosity variables

Table 3 presents the average number of children, sorted by levels of religiosity, using all five religiosity variables, namely: individual's current church going; her/his current prayer activity; mother's mass attendance; father's mass attendance; respondent's mass participation when he was 12 years old; Each variable has three levels (rare, occasional and intensive- see definitions on pages 11 and 12) to facilitate comparison between the five religiosity variables. Descriptive statistics are presented for women and for men separately.

Starting with the female sample we observe that: The intensity of current religious activities (both mass attendance and prayer) does not seem to have an effect on fertility. The number of kids seems to increase with an increase in intensity of the father's mass attendance (1.76, 1.88 and 1.91 children, for respective levels of rare-, occasional- and intensive practice) and with the respondent's mass participation during childhood (1.48, 1.88 and 1.91 children for levels of rare-, occasional- and intensive mass participation at the age of 12). The mother's intensity of church attendance affects negatively the number of children that her daughter will have (an average of 2 kids if the mother was rarely practicing and 1.73 kids if she was intensively participating).

In the male sample, current mass attendance does not seem to affect the number of kids but respondents who pray more frequently also have more children. Both the father and the mother seem to have a negative effect on fertility (number of kids drops with an increase in parental intensity of church attendance) and exposure to church services during childhood does not affect fertility.

It is not possible to test the effect of a Catholic education on birth rates, due to the negligible number of individuals who were not educated in Catholic schools: one woman and 3 men.

All in all, childhood experience that affects preferences and the 'taste for children', seems to have a more pronounced effect on fertility compared to the current religious activity.

---Insert table 3 about here---

4.2 Multiple regression estimates of fertility equations

As mentioned above, the descriptive statistics can serve as some intuitive preliminary information on the inter-relationship between religiosity and fertility. Regression analysis is a more powerful tool that is capable of yielding net effects when all explanatory variables are considered. The significance of the effects (coefficients) of the various independent variables is also tested. Robust conclusions can therefore be derived only from the multiple regression analysis that estimates 'fertility equations'.

We are using a 'reduced form' model in which fertility decisions are analysed conditional on the constraints embodied in the outcomes of other decisions of the household that have been made before (such as: educational attainments, age at marriage, labor force participation of spouses) and also conditional on exogenous environmental constraints[16]. Appendix 2 outlines a formal presentation of the econometric model.

---Insert table 4 about here---

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[16] An alternative approach is a 'structural' model followed by the estimation of a set of simultaneous equations that relate to the variety of decisions made in the household (eg, fertility, education, labor force participation). The structural model has the advantage of clarifing the the inter-related processes that take place at the household. However, it has major statistical identification problems that lead to estimation problems and biases. The coefficients of the 'reduced form' equation are unbiased estimates of the effects of the explanatory variables (constraints) on fertility.

Table 4 presents fertility equations based on the formal econometric model. The independent variables include the following sets: (1) current religiosity which is our core variable and is expressed by two types of religious activity, mass participation and prayer. Current religiosity is included using two alternative definitions: (a) the continuous definition where all possible values are used (eq. 1). Dealing with current activities, the respondent gives an accurate response and all values can therefore be employed. However, using a continuous variable embodies the assumption of a linear and monotone effect and of similar distances between each two consecutive values. This might not be very realistic in our case, we therefore use the alternative definition of (b) dummy variables (occasional=1, if is a medium-level mass/prayer practitioner; intensive=1, if is practicing intensively; the reference group is rare=1, if is rarely attending/praying- eq. 2[17]); (2) exposure to religiosity during childhood when the individual's norms, attitudes and tastes are shaped- maternal, paternal and respondent's mass attendance at the age of 12. Parental and childhood intensity of mass participation are introduced by two dummy variables (occasional- and intensive-practice; with rare-practice as the reference group). Only dummy variables are used to avoid measurement errors due to the retrospective nature of these variables. The parallel use of dummy variables for current religiosity allows a comparison between the various dimensions of religiosity. The respondent's Catholic education (yes/no) is also one of the independent variables; (3) a set of socio-economic background variables: schooling, age groups, size of city of residence (10,000 or less=1); and (4) region of residence that controls for different regional public policies and institutions. Table 4 outlines the two alternative fertility equations, for each of the genders separately, to allow for differential effects by gender.

Reference to parental and childhood exposure to religious activities is innovative and it appears that it has not been done before. Fertility has been related to current religiosity only (in most cases measured by one dichotomous dummy variable). In order to make our results more compatible with existing empirical studies (in particular with Adserá, 2006a, who studied the Spanish case), we present in Table 5 fertility equations that exclude the parental and childhood variables and include only current religiosity variables. Here too, both the continuous- and the dummy variables version are estimated, separately for the two genders.

--Insert Table 5 about here---

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[17] For the definition of the three dummy variables see pages 11 and 12. The breakdown of all possible values into three grouped variables is based on background information and on experience. Obviously, it is somewhat arbitrary.

4.2.1 Current religiosity variables

Neither the women nor the men in our sample seem to be affected by their religious activities when they decide on the number of children. The coefficients of current mass participation and current prayer habits are insignificant (at a 5% significance level), in the two versions (continuous[18] and dummy variables) and also when the childhood exposure variables are excluded (Table 5). The descriptive statistics in Table 3 indicated a positive effect of prayer habits on the men's number of children. This seemingly positive relationship fades out when the more accurate regression analysis is employed.

There is some indirect indication that the religious make-up of the region of residence has an effect on fertility. Regions that are populated with a more religious population (eg, La Rioja and Navarra) have on average higher fertility rates. This is due to prevailing religious norms and pressure that encourage large families. A more detailed discussion of regional effects follows.

Table 5 presents estimates of fertility equations that do not include the parental and the childhood religiosity variables. This is done to facilitate comparisons with previous studies that did not have information on those dimensions of religiosity. As is evident from a comparison of Tables 4 and 5, the estimates of the effects of current mass attendance and of prayer are similar in terms of size and significance[19]- none of the religiosity variables has a significant effect on fertility (even not at a 10% significance level). Our findings are different from what is found in Adserá (2006a), who also studied the Spanish population. She used the Spanish Fertility Survey that was conducted in 1999 (only one year after our 1998 survey) and includes women who are 15-49 years old (not very different from our upper age limit of 45)[20]. Adserá too examined marital fertility. She found that Spanish Catholic practicing women have significantly more children than non-practicing women- the fertility differential is about 0.1 children. While the difference is statistically significant, it is obviously very low. The different results probably stem from the different definition of the religiosity variable- 'practicing Catholic' is a subjective measure that is not well defined and could be perceived differently by different respondents. We are using instead a much more objective and

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[18] In one case (the female equation with the continuous version of mass attendance) we have a negative small coefficient (0.11 kids less, if the mother is intensively church going), significant at 8.1%.

[19] There is a minor change in the significance level of the mass attendance variable in the female continuous version (equation 1): the significance level dropped from 8.1% (t=1.76) to 16.1% (t=1.46).

[20] Experimenting with larger upper age limits did not lead to different results.

accurate measure, namely, the frequency of participation in mass services (and the frequency of prayer). In any case the difference in birth rates of practicing- versus non-practicing Catholics is extremely low and Adserá too basically finds a negligible difference.

4.2.2 Exposure to religiosity during childhood: the shape of values and preferences

Exposure to religiosity during childhood is proxied by maternal/paternal/child's mass participation at the age of 12 and by his type of education (Catholic or not).

In the female sample, parental and childhood exposure to religious practices does affect significantly the number of children the woman has. Daughters of fathers who were intensively attending mass services, have on average 0.8 kids more than daughters of rare- and occasional-practicing fathers (there is no significant difference between the effects of the two latter levels). This is a quite remarkable size, in view of the average number of children that is around two. The mothers have an adverse effect on fertility: women who grew up in households where the mother was practicing intensively, have on average one child less compared to daughters of rare- and occasional-practicing mothers (the effects of the two latter levels are not significantly different). The negative effect of the mother is more pronounced than the positive effect of the father. These results are very robust and are almost identical in the equations with the two different definitions of current religiosity. Moreover, they do not change even when the current religiosity variables are excluded (not reported: for the father: coefficient=0.759, t=2.36; for the mother: coefficient=-1.015, t=3.00). The reversed effects of the father and the mother probably stem from different channels of influence on preferences. Daughters of intensively practicing Catholic mothers had a model of a mother who had numerous pregnancies, was overloaded with work caring for a large family and 'sacrificing' herself for the kids (at the cost of time and energy for herself). They might therefore have a high tendency to react negatively and opt for few kids. Moreover, religious Catholic parents tend to educate their daughters in a very restrictive manner, within a family setting in which the father is the dominant figure and the mother is the 'servant'. This stereotypical orthodox education could also lead to the desire of the daughters to be different than their mothers (and also have fewer kids). On the other hand, a practicing Catholic father is the Head of the family and is perceived as an honest man and as a great educator- his teachings on the importance of a large family and of family values are respected and internalized by the daughters. Women are therefore caught between two opposing forces that shape their preferences- they want to be different from their 'poor' mothers but they also want

to follow the teachings of their respected fathers. As our regression results suggest- the negative effect of the mother is more pronounced and nets out the positive effect of the father.

We also experimented with interaction terms of the mother's and the father's levels of church attendance- none of them was significant, indicating independence of the paternal and the maternal effects.

Own exposure to church services during childhood has a positive effect on fertility (but only at a 10.7% significance level). Women who were intensively exposed to mass services have on average 0.55 children more than those who had a low- or medium exposure. Catholic education does not have a significant effect on birth rates, most probably due to the extremely low variance of this variable (99.5% of women received a Catholic education).

We can conclude that exposure to religious conduct and norms during the formative years of childhood has an effect on women's 'taste for children' that later on translates into the number of kids the woman will have.

In the male sample none of the parental and of the childhood variables has a significant effect on the number of kids that the male respondents have. This gender difference needs more exploration and further study. One possible explanation could be that the household follows mainly the preferences of the women who decide on the number of kids. Their decisions are affected by their own religiosity background variables. Variables that relate to the male spouses are therefore irrelevant (resulting in insignificant coefficients). An alternative explanation might be that the number of kids is jointly determined, but the husbands' decisions are not affected by their religious childhood background. If we use the term of 'taste for children', we can formulate the following conclusion: either men's 'taste for children' is not affected by childhood religious experience and norms, or- it is not playing a significant role in the couple's choice of the desired (and actual) number of kids.

4.2.3 Socio-economic and demographic background

The effect of schooling on fertility is insignificant in the female and the male samples. We also experimented with a non-linear version and included both schooling and schooling squared (assuming a parabolic relationship). The coefficients of the two variables were

insignificant. Inclusion of schooling groups dummy variables also yielded insignificant results.

Obviously, age is positively correlated with the number of children. Older couples are also married for more years and could have more children: women who are in the age group of 31-to-40 have 0.7 kids more than women who are under the age of 31 (the reference group). At the age of 41-to-45 the number of children further increases by 0.4 kids (1.1 more compared to the age group of 30 or under). Men who are 31-to-48 years old have 1.1 kids more than young men under the age of 31 (no significant differences between the 31-to-40 and the 41-to-48 age groups). The positive age coefficients might also reflect cohort effects- the constant decline in the desired number of children over time.

The population size in the place of residence does not affect fertility rates. The insignificant coefficient might result from opposing effects that probably cancel out each other- on the one hand residents of smaller, rural, more traditional cities are expected to have higher fertility rates. On the other hand- bigger cities usually have better facilities, in particular education and health services, which encourage parents to have more children.

An inclusion of household income and/or personal income led to a major drop in sample sizes (due to many missing values) and yielded insignificant effects of these variables (probably as a result of the small samples).

4.2.4 Regional public policies and institutions

The region dummies control for the different public policies and institutions of the seventeen regions of Spain (with Cantabria as the reference region).Women are much more responsive to the regional variables compared to men. This might be an indication that they are more vulnerable and more affected by macro-economic variables such as the regional unemployment rate and insecurity of jobs, and/or that because they are the principal care-givers they are also more responsive to regional facilities of health and education. It could also be that social and religious norms and pressures (the neighbourhood effect) have a more pronounced effect on women.

Most impressive are the large positive coefficients for La Rioja and Navarra. In La Rioja women have on average (everything else being equal) 4.9(!) children more compared to the average in Cantabria. In Navarra the average is larger by 4.2 kids than in the Cantabria

reference region. Recall that Navarra has the largest regional per capita spending on education and health and that Navarra and La Rioja have the largest share of intensively practicing inhabitants. The regions of Andalucia, Castilla la Mancha and Galicia also exhibit higher fertility rates, with a differential of more than two kids. In the male sample the only significant regional effect is in Canarias where the average is larger by about 1.8 (eq. 2, Tables 4, 5).

The region dummy variables have a major contribution to the explanatory power of the regressions: when they are excluded from the female sample, R squared drops from 39% (Table 4) to 17% (not reported). In the male sample R squared decreases from 0.30 to 0.10. Interestingly, the basic results that relate to the religiosity variables do not change (there are minor changes in the size and significance of coefficients. None of the insignificant variables becomes significant and the significant coefficients stay significant).

5. **Summary and Discussion**

The data set employed in this study has a rich array of religiosity variables: current mass attendance; and current prayer habits; maternal and paternal church attendance (when the individual was a child); own church attendance at the age of twelve; Catholic education at childhood;. Participation in mass services and prayer have each a sequence of alternatives, ranging from 'never' to 'several times a week' (for mass participation) or 'several times a day' (for prayer). This detailed information facilitates a careful analysis of inter-generational religiosity and of the possible effects of various religiosity determinants on fertility.

An examination and comparison of the various religiosity variables demonstrates a dramatic inter-generational drop in religiosity, expressed by church attendance: While the majority of parents attended mass services on a regular basis (over half of the mothers and more than a third of fathers), their offspring is rarely going to church. Over two thirds of the respondents rarely attend services at the church. Less than 15% go to church on a regular basis. Moreover, these non-religious individuals used to attend mass services intensively when they were twelve years old (more than two thirds of respondents went to church every week). Prayer is a bit more common- about 20% of women and 10% of men pray at least once a day.

Estimation of 'fertility equations', using samples of married young Spanish women and men and including a set of current, parental and childhood objective religiosity measures leads to the following findings: Current religiosity (expressed by mass participation and by prayer

habits) does not seem to have an impact on fertility of the two genders. The number of children of women is affected by parental religiosity (church attendance) and to some extent also by childhood exposure to mass participation. The two parents have major effects on women. However, interestingly, while an intensively practicing father (goes to church every week) encourages the daughter to have more kids (by 0.8 on average), an intensively practicing mother has a negative effect on the daughter's birth rate (leading to an average decrease of 1 kid). This finding probably expresses a negative reaction of women who had a hard-working mother raising many kids with very little time left for her own needs, thus leading to a negative effect on her 'taste for children'. Men's fertility patterns do not seem to be affected by any of the childhood religiosity variables.

These empirical findings suggest that causality does not run from religiosity to fertility- more religious individuals do not have more children. Childhood exposure to religiosity of parents has an effect on women apparently via the route of shaping their 'taste for children'. Empirical studies that looked at differences in fertility between religious denominations presented evidence of a significant effect of the religion on fertility. Theses differences are most probably related to the differences in the use of contraceptives and abortions. In the Spanish case, the use of contraceptives and family planning (in the 1990s) is not significantly different among practicing compared to non-practicing Catholic women (82% and 91%, respectively; Adserá, 2006a), leading to non-significant differences in fertility.

The answer to the question that was posed at the start of this study- are the parallel trends of decreasing religiosity and decreasing fertility interrelated- is therefore negative. It is beyond the scope of this paper to explore the economic/social/political forces that are responsible for each of these two phenomena. They both started and accelerated around 1975 right after the Franco regime ended. Adam (1996) and Adserá (2006a) suggest that macro-level economic conditions (such as high unemployment, low job security) are responsible for the drop in fertility in Spain. The trend of secularization was provoked by social rather than economic factors. In any case, our econometric analysis suggests that the two phenomena are not inter-related.

The study presented in this paper has several unique features:

- Unlike other empirical studies that are using one dichotomous variable to represent the respondent's religiosity level, we have two measures of

religiosity (mass attendance and prayer), each with several objective levels of the intensity (frequency) of the religious activity. The detailed informative measures of religiosity facilitate a more sophisticated statistical analysis with more rigorous results.

- In addition to information on current religiosity, our data set includes information on parental mass attendance (9 levels) and on the respondent's exposure to church services when he was twelve years old (9 levels). It appears that data on exposure to religiosity during childhood has not been available and was not examined in the existing published literature. It is well recognized that childhood experience has a significant role in the formation of the individual's attitudes and preferences (including preferences for kids)[21]. Such information is therefore a primary explanatory variable in the 'fertility equation'. Moreover, it facilitates a distinction between maternal and paternal effects; between parental influence and the influence of own exposure during childhood; and between early age and current religiosity variables. The results of this case study are therefore much richer, covering a much broader spectrum of the relationship between religiosity and fertility.

- Our findings also lead to a speculation on the causality between religiosity and fertility. Combining our two core findings- that current religiosity does not affect fertility while childhood exposure does- leads to the suggestion that religiosity does not have a causal effect on fertility. Childhood religiosity affects attitudes and preferences and in particular the latent variable of 'taste for children' that later on has a significant effect on women's demand for children[22].

- Unlike many fertility surveys that include women only, our data set includes parallel information on male and on female respondents, thus facilitating an estimation of separate fertility equations for the two genders. The desired number of children is most probably a joint decision of the two spouses and

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[21] Parental religiosity has also a significant effect on current religiosity via an inter-generational transmission of religious capital (Branas-Garza and Neuman, 2006). However, as we also include current religiosity as one of the explanatory variables, this effect is captured by the latter.
[22] Guiso et al. (2003) use a similar argument to explain the effect of religiosity (of countries) on economic performance.

therefore an optimal data base should have information on the two partners. This information could then be used to estimate a 'fertility equation' of the couple. However, in the absence of such dual information, it is still informative to estimate separate equations for the two genders. It can indicate if and to what extent there are gender differences in the relationship between fertility and the various religiosity dimensions. Our main finding is that the number of kids is significantly affected by the mother's parental and own religious behavior during childhood. However, the father's childhood religious exposure does not have any (significant) impact on fertility. These differences could indicate that the main decision makers on the number of children are the women and therefore the fathers' religious background is irrelevant. Alternatively, it could be that men do take part in fertility decisions but religiosity variables do not affect their fertility preferences.

- This study (hopefully) starts a new line of research that uses childhood religious exposure to explain current behavior of individuals. Is Spain unique in terms of this inter-generational impact of religiosity on fertility? To answer this question we plan to extend our investigation and to do parallel studies for other countries as well, starting with Catholic countries like Italy, Portugal and Ireland. (thus holding constant the religious affiliation and focusing on the relationship between childhood exposure to religiosity and fertility). The availability of similar data sets for several European countries will facilitate such comparative studies and will contribute to the growing interest of the European Union in religiosity patterns.

- Our findings, combined with parallel findings for other countries, might lead to a revision of the literature that assumes a positive relationship between fertility and religiosity on the one hand, and ignores the impact of childhood religiosity variables on the other hand.

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TABLE 1

Mass Attendance of Parents and of the Respondent at the Age of Twelve,

by Gender

Young Catholic Spanish Women and Men, 1998

Mass attendance	of mother		of father		at twelve	
Levels	number	%	number	%	number	%
never (1)	33	6.3	91	17.7	34	6.3
once a year (2)	9	1.7	23	4.5	11	2.0
2-3 times a year (3)	32	6.1	50	9.7	16	3.0
few times a year (4)	75	14.3	105	20.4	60	11.2
once a month (5)	23	4.4	26	5.0	24	4.5
2-3 times a month (6)	45	8.6	44	8.5	41	7.6
almost all weeks (7)	82	15.7	54	10.5	94	17.5
every week (8)	191	36.5	111	21.6	223	41.5
several times a week (9)	33	6.3	11	2.1	34	6.3
Statistics (for levels)						
mean	6.17		4.71		6.43	
median	7		4		7	
mode	8		4		8	
Aggregated levels						
rare	74	14.1	164	31.9	61	11.4
occasional	143	27.3	175	33.9	125	23.3
intensive	306	58.5	176	34.2	351	65.3
sample size	523		515		537	

Notes: - The samples include Catholics who grew up in households with two Catholic parents and are married to a Catholic spouse. Women in the sample are under the age of 46 and men are under the age of 49.
- For the definition of the aggregated levels, see pages 11 and 12.
- Sample sizes are a bit different for the various dimensions of religiosity, due to differences in the number of missing values.

TABLE 2

Current Mass Attendance and Prayer Habits, by Gender

Young Catholic Spanish Women and Men, 1998

Mass attendance					Prayer habits				
number (total)	%	% among:			number (total)	%	% among:		
Levels			women	Men	**Levels**			women	men
never (1)	97	20.1	18.2	22.4	never (1)	140	25.9	18.7	33.9
once a year (2)	72	14.9	13.3	16.9	once a year (2)	36	6.7	4.9	8.6
1-2 times a year (3)	165	34.2	34.8	33.3	twice a year (3)	38	7.0	3.5	10.9
once a month (4)	34	7.0	8.7	5.0	few times a year (4)	87	16.1	17.0	15.2
2-3 times/month (5)	47	9.7	10.6	8.7	once a month (5)	20	3.7	4.6	2.7
every week (6)	68	14.1	14.4	13.7	2-3 times a month (6)	47	8.7	11.3	5.8
					almost every week (7)	31	5.7	7.4	3.9
					every week (8)	36	6.7	8.5	4.7
					several times a week (9)	26	4.8	4.6	5.1
					once a day (10)	73	13.5	18.4	8.2
					several times a day (11)	6	1.1	1.1	1.2
Statistics (levels)					**Statistics (levels)**				
mean	3.13		3.23	3.20	mean	4.78		5.54	3.98
median	3		3	3	median	4		6	3
mode	3		3	3	mode	1		1	1
Aggregated levels					**Aggregated levels**				
rare	334	69.2	66.3	72.6	rare	301	55.7	44.1	68.6
occasional	81	16.7	19.3	13.7	occasional	160	29.6	36.4	22.1
intensive	68	14.1	14.4	13.7	intensive	79	14.6	19.5	9.4
sample size	483		264	219	sample size	540		283	257

Notes: - The samples include Catholics who grew up in households with two Catholic parents and are married to a Catholic spouse. Women in the sample are under the age of 46 and men are under the age of 49.

- For the definition of the aggregated levels, see pages 11 and 12.

- Sample sizes are a bit different for the various dimensions of religiosity, due to differences in the number of missing values.

TABLE 3

Average Number of Children, by Various Dimensions of Religiosity:

Mass Attendance of the Mother; the Father; the Individual at Age of Twelve; Current Mass Attendance; and Current Prayer Habits

Young Spanish Women and Men, 1998

Women

Levels	Current:		Retrospective mass attendance of:		
	prayer	mass attendance	mother	father	Child at 12
rare	1.84	1.85	2.00	1.76	1.48
occasional	1.78	1.91	2.01	1.88	1.88
intensive	2.03	1.81	1.73	1.91	1.91
sample size	281	261	272	266	276

Men

Levels	Current:		Retrospective mass attendance of:		
	prayer	mass attendance	mother	father	Child at 12
rare	1.81	1.96	2.20	2.10	2.05
occasional	1.93	2.00	1.98	1.90	1.81
intensive	2.25	2.00	1.80	1.74	1.89
sample size	256	218	247	245	257

Notes:
- For the definitions of the three levels see pages 11 and 12.
- The sample includes Catholics who grew up in households with two Catholic parents and are married to a Catholic spouse. Women in the sample are under the age of 46 and men are under the age of 49.
- Sample sizes are a bit different for the various dimensions of religiosity, due to differences in the number of missing values.

TABLE 4
Fertility Equations, by Gender
Young Catholic Spanish Women and Men, 1998

Independent Variables		Women		Men	
(1) Current religiosity		Eq. 1	Eq. 2	Eq. 1	Eq. 2
Mass attendance	occasional	-	-0.097 (0.40)	-	-0.460 (1.10)
	intensive	-	-0.051 (0.17)	-	0.223 (0.61)
	continuous (1-6)	-0.111(1.76)		0.047 (0.57)	
Prayer habits	occasional	-	-0.175 (0.82)	-	0.102 (0.33)
	intensive	-	0.206 (0.82)	-	-0.204 (0.50)
	continuous (1-11)	0.033 (1.10)	-	-0.011 (0.24)	-
(2) Exposure to religiosity during childhood: formation of values and preferences					
Mother	Occasional	-0.379 (1.13)	-0.401(1.18)	-0.523 (1.17)	-0.4871 (1.06)
	Intensive	-1.026 (3.02)	-1.053 (3.06)	-0.614 (1.47)	-0.594 (1.42)
Father	Occasional	0.397 (1.37)	0.415 (1.41)	0.154 (0.47)	0.188 (0.57)
	Intensive	0.806 (2.51)	0.795 (2.45)	0.0563 (0.17)	0.133 (0.35)
Child (at 12)	Occasional	0.476 (1.30)	0.483 (1.31)	0.113 (0.27)	0.185 (0.44)
	Intensive	0.547 (1.62)	0.548 (1.61)	0.096 (0.26)	0.139 (0.37)
Catholic education		-0.847 (0.70)	-0.750(0.61)	-0.304(0.38)	-0.114 (0.14)
(3) Socio-economic and demographic background					
years of schooling		-0.027 (1.15)	-0.027 (1.15)	-0.022 (0.87)	-0.024 (0.94)
age 31-to-40		0.695 (3.31)	0.695 (3.31)	1.108 (2.61)	1.129 (2.67)
age 41-to-45 (48)		1.024 (3.84)	1.024 (3.84)	1.114 (2.48)	1.159 (2.57)
city of 10000 or less inhabitants		0.120 (0.57)	0.120 (0.57)	0.121 (0.47)	0.130 (0.50)
(4) Regional public policies and institutions (regions)					
Andalucía		1.893 (2.20)	2.041 (2.33)	0.848 (1.29)	1.003 (1.50)
Aragón		0.972 (1.05)	1.029 (1.09)	0.271 (0.28)	0.399 (0.40)
Asturias		1.142 (1.19)	1.343 (1.38)	-0.534 (0.59)	-0.389 (0.42)
Baleares		0.600(0.58)	0.840 (0.81)	0.291 (0.37)	0.478 (0.60)
Canarias		1.406(1.48)	1.515 (1.57)	1.485 (1.67)	1.820(1.96)
Castilla la Mancha		2.138(2.26)	2.254 (2.30)	-0.942 (1.06)	-0.920 (1.04)
Castilla León		1.351(1.53)	1.483 (1.62)	-0.340 (0.50)	-0.223 (0.33)
Cataluña		1.029(1.17)	1.210 (1.35)	-0.490(0.76)	-0.377(0.57)
Valencia		1.176(1.34)	1.261 (1.41)	-0.347 (0.50)	-0.199 (0.28)
Extremadura		1.316(1.38)	1.469 (1.51)	0.693 (0.72)	0.724 (0.76)
Galicia		2.142(2.30)	2.280 (2.41)	0.955 (1.19)	1.309(1.57)
Madrid		1.384(1.51)	1.560 (1.68)	0.236 (0.36)	0.454(0.68)
Murcia		0.420(0.44)	0.656 (0.68)	0.335 (0.36)	0.684 (0.72)
Navarra		4.121(4.03)	4.167 (4.05)	1.444 (1.53)	1.513 (1.56)
País Vasco		1.444(1.50)	1.594 (1.62)	0.548 (0.77)	0.583 (0.82)
La Rioja		4.942(4.18)	4.953 (4.16)	-1.806 (1.28)	-1.617 (1.11)

Constant:	0.781(0.49)	0.539(0.34)	1.587(1.34)	1.238(0.99)
Sample size:	207	207	157	157
R^2	0.3944	0.3921	0.2940	0.3065

Notes:
- The sample includes Catholics (women younger than 46, men younger than 49), raised by two Catholic parents and married to a Catholic spouse.
- t-statistics in parentheses.
- Reference groups (of dummy variables) are: for level of religiosity- rare (for definitions see pages 11 and 12); for age groups: age<=30; for city size- more than 10,000 inhabitants; for region -Cantabria.

TABLE 5

Fertility Equations (Childhood Variables Excluded), by Gender

Young Catholic Spanish Women and Men, 1998

Independent variables			Women		Men	
(1) Current religiosity			**Eq. 1**	**Eq. 2**	**Eq. 1**	**Eq. 2**
Mass attendance		Occasional	-	-0.106(0.43)	-	-0.481(1.19)
		Intensive	-	-0.046 (0.16)	-	0.182 (0.52)
		continuous (1-6)	-0.089 (1.41)	-	0.036 (0.46)	-
Prayer habits		Occasional	-	-0.122 (0.57)	-	0.116 (0.41)
		Intensive	-	0.132 (0.52)	-	-0.206 (0.53)
		continuous (1-11)	0.022 (0.74)	-	-0.015 (0.37)	-
(3) Socio-economic and demographic background						
years of schooling			-0.016 (0.71)	-0.022 (0.96)	-0.026 (1.08)	-0.027 (1.14)
age 31-to-40			0.663 (3.18)	0.630 (2.99)	1.116 (2.72)	1.126 (2.75)
age 41-to-45 (48)			1.138(4.42)	1.076(4.10)	1.120 (2.59)	1.158 (2.65)
city of 10000 or less inhabitants			0.103 (0.50)	0.104 (0.49)	0.071 (0.29)	0.087 (0.35)
(4) Regional public policies and institutions (regions)						
Andalucia			1.929 (2.20)	2.036 (2.29)	0.765 (1.25)	0.902 (1.46)
Aragón			0.871 (0.92)	0.912 (0.95)	0. 260(0.28)	0.381 (0.41)
Asturias			1.157 (1.20)	1.301 (1.33)	-0.733 (0.87)	-0.613 (0.72)
Baleares			0.871 (0.83)	1.044 (0.98)	0.251 (0.33)	0.417 (0.54)
Canarias			1.407(1.45)	1.492 (1.52)	1.376 (1.63)	1.692 (1.93)
Castilla la Mancha			2.114 (2.20)	2.172 (2.20)	-0.989 (1.16)	-0.967 (1.14)
Castilla León			1.348 (1.49)	1.414(1.51)	-0.434 (0.66)	-0.316 (0.48)
Cataluña			1.068 (1.19)	1.197 (1.32)	-0.438 (0.71)	-0.340 (0.55)
Valencia			1.302 (1.46)	1.362 (1.51)	-0.363 (0.55)	-0.258 (0.39)
Extremadura			1.514 (1.56)	1.615 (1.63)	0.603 (0.66)	0.655 (0.72)
Galicia			2.229 (2.35)	2.318 (2.41)	0.932 (1.23)	1.279 (1.62)
Madrid			1.431 (1.55)	1.564 (1.68)	0.130 (0.21)	0.339 (0.53)
Murcia			0.633 (0.65)	0.780 (0.81)	0.478 (0.57)	0.763 (0.89)
Navarra			4.483 (4.32)	4.520 (4.33)	1.317 (1.43)	1.406 (1.49)
País Vasco			1.757 (1.79)	1.862 (1.87)	0.430 (0.63)	0.494 (0.72)
La Rioja			4.806 (4.02)	4.818 (4.00)	-1.923 (1.39)	-1.733 (1.21)
Constant			0.087(0.09)	-0.035(0.04)	1.106(1.47)	1.017(1.34)
Sample size			207	207	157	157
			0.3391	0.3367	0.2794	0.2930

Notes: - The sample includes Catholics (women younger than 46, men younger than 49), raised by Catholic parents and married to a Catholic spouse.

- t-statistics in parentheses.

- Reference groups (of dummy variables) are: for level of religiosity- rare (for definitions see pages 11 and 12); for age groups: age<=30; for city size- more than 10,000 inhabitants; for region- Cantabria.

Appendix 1: Sample Characteristics
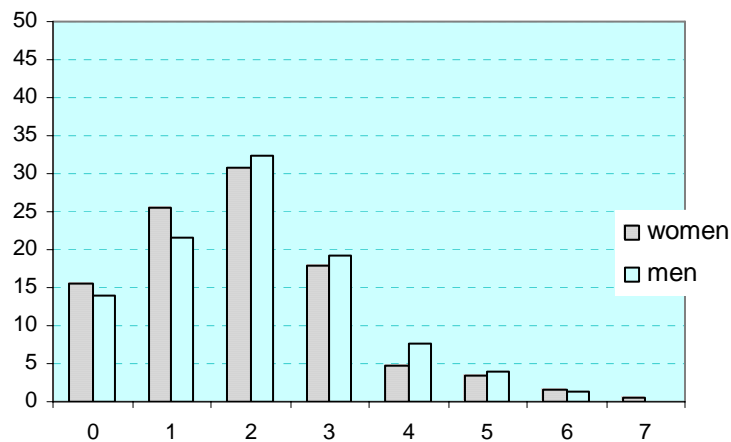
Appendix Table 1

Distribution of Number of Children, by Gender

Young Spanish Women and Men, 1998

# of children	women number	%	men number	%
0	32	15.46	22	14.01
1	53	25.60	34	21.66
2	64	30.92	51	32.48
3	37	17.87	30	19.11
4	10	4.83	12	7.64
5	7	3.38	6	3.82
6	3	1.45	2	1.27
7	1	0.48	0	0.00
sample size	207		157	
statistics				
mean	1.894(1.38)		2.013(1.35)	
mode	2		2	
median	2		2	

Notes: - The samples include Catholic individuals who were raised in Catholic households and are married to Catholic spouses. Women are younger than 46 and men are younger than 49.
  - Figures relate to the samples used for regression analysis.
  - Standard deviations in parentheses.

Graphical Presentation

As is evident from Appendix Table 1, the distributions of number of children in the household are similar in the female and male samples (as expected). The average number is about two and so are the mode and median.

Appendix Table 2 presents the socio-economic characteristics of the respondents in our sample. Our study is focusing on married young Spaniards. The age range of women is 22-45 with an average of 35. The men have an age average of 38 and the age range is 24-48. Half of the women and over 70% of men are in the age group of 31-to-40.

Men are somewhat more educated than the women- the average number of years of schooling is 11.7 for men and 11.2 for women. Over 40% (44% men and 42% women) have an academic (partial or full) education.

As we already discussed, there is a dramatic inter-generational drop in the frequency of church attendance. Moreover, the respondents themselves used to go to church (at the age of 12) much more often than they do today. Prayer is a bit more common- about 20% of the women and 10% of men, pray at least one time during the day.

Close to 30% of respondents live in small cities that are populated by 10,000 inhabitants or less. The regional distribution reflects the national distribution. The largest shares live in Andalucia, Cataluna, Valencia, Madrid and Castilla Leon. The shares of Cantabria, La Rioja and Navarra are the smallest.

Appendix Table 2

Sample Characteristics, by Gender

Young Spanish Women and Men, 1998

Variables	Women	Men
Number of children	1.894 (1.38)	2.013(1.35)
(1) Religiosity variables:		
Current mass attendance (%)		
rare	67.150	73.885
occasional	19.324	10.828
Intensive	13.526	15.287
Current prayer habits (%)		
rare	44.927	62.420
occasional	34.783	26.752
Intensive	20.290	10.828
(2) Exposure to religiosity during childhood:		
Mother's mass attendance (%)		
rare	18.357	11.465
occasional	27.053	28.662
Intensive	54.589	59.873
Father's mass attendance (%)		
rare	20.469	26.752
occasional	35.749	39.490
Intensive	34.782	33.758
Mass attendance at the age of 12 (%)		
rare	9.179	12.739
occasional	21.739	22.293
intensive	69.082	64.968
Received a Catholic education (%)	99.517	98.089
(3) Socio-economic and demographic variables:		

Years of schooling	11.183 (4.12)	11.726 (4.50)
Formal education (%)		
did not complete primary	2.415	1.910
primary	14.976	17.834
secondary	40.580	35.669
Academia	42.029	44.586
Age (years)	35.063(6.01)	38.357(5.89)
Age groups (years) (%)		
18-to-30	27.053	8.280
31-to-40	52.174	73.885
41-to-45 (48)	20.773	17.834
Population at city of residence		
10,000 or less (%)	28.502	29.936
(4) Regional public policies and institutions/regions		
Andalucía	21.739	17.834
Aragón	4.348	1.911
Asturias	3.382	2.548
Baleares	1.932	3.822
Canarias	3.865	2.548
Cantabria	0.966	3.185
Castilla la Mancha	3.382	2.548
Castilla León	8.212	8.917
Cataluña	15.459	14.650
Valencia	10.628	9.554
Extremadura	2.898	1.911
Galicia	4.831	3.822
Madrid	8.212	15.287
Murcia	3.865	2.548
Navarra	1.932	1.911
País Vasco	3.382	6.369
La Rioja	0.966	0.637
Sample size	207	157

Notes: - The samples include Catholic individuals who were raised in Catholic households and are married to Catholic spouses. Women are younger than 46 and men are younger than 49.

     - Figures relate to the samples used for regression analysis; In parentheses standard deviations.

     - For definitions of religiosity variables see pages 11 and 12

Appendix 2*:* A Formal Presentation of the Econometric Model

Denote by $N = \{1, 2....n\}$ the group of individuals in our data set and by $b_i, i \in N$ the number of children individual *i* desires (and has). It is assumed that the desired number of children is determined by four groups of factors.

(1) Current religiosity:

This is the core variable of our paper. Our sample includes Catholic individuals. The effect of the Catholic religion on fertility is therefore part of the constant. However, within the Catholic religion there are different levels of religious practice that reflect levels of religiosity. To test the assumption of a positive relationship between religiosity and fertility the regression equation should include levels of current religious practice. These could be included in two alternative fashions, which reflect different underlying assumptions: a) using

a continuous variable for levels of religious practice that includes a set of values, ranging from the lowest (denoted by 1) to the highest. Using a continuous variable implies that we assume a monotonic, linear relationship with constant differences between any two consecutive values.

Formally, denote by a_i the level of religiosity of individual i. In a pro-natalist religion, such as the Catholic religion, birth rates will be a positive function of the level of religiosity of the individual, i.e.,

$$\frac{\partial b_i}{\partial a_i} > 0, \forall i \in N \text{ and therefore } a_i > a_i' \rightarrow b_i > b_i'$$

We may conjecture that $\forall i, j \in N$, it is satisfied,

$$a_i > a_j \rightarrow b_i > b_j$$

b) Alternatively, the assumptions of linearity and monotony can be relaxed, and the level of religious practice can be defined using a set of dummy variables which represent broader levels of religious practice. These levels can be referred to as sub-denominations: non-practicing-, occasionally practicing- and intensively- practicing Catholics. Each sub-group has a different pro-natalist policy and all individuals who belong to a given group follow the rules of conduct of that group.

Formally, denote by $D_1, D_2, ..., D_d$ the set of different sub-denominations and by c_i^k the birth rate that the Dk sub-denomination claims for any of its members i.

If the D_h sub-denomination claims larger families for its believers compared to D_z, then individuals who belong to D_h will have more children than those in the D_z,

$$c_i^h > c_j^z \Leftrightarrow b_i > b_j, \forall i \in D_h, \forall j \in D_z$$

However, within the same sub-denomination, there are no differences in fertility rates (every-thing else being constant), i.e.,

$$b_i = b_j, \forall i, j \in D_k, k = 1...d$$

(2) Childhood exposure to religiosity- shapes the respondent's values and preferences, including his 'taste for children':

Preferences are part of the individual's endowments and can therefore be combined with,

(3) Socio-economic endowments:

Socio-economic factors that affect fertility include: education, income, age, city size (urban/rural).

Denote the set of socio-economic endowments (including preferences shaped by religiosity during childhood) by $X_i = \left\{ x_{i1,\dots,} \, x_{is} \right\}, i \in N$ where x_{ij} is the j-th variable for individual i and s represents the total number of influencing variables.

The derivative $\dfrac{\partial b_i}{\partial x_{ij}}$ represents the marginal effect of this attribute (variable) on fertility and could be either positive or negative.

(4) Regional public policies and institutions:

A fourth set of variables that affect birth rates are related to local (national) regulations that include: availability of public schools, kindergarten and day-care centers; regional spending and subsidies for health and education; labor laws and regulations (such as minimum wages, unemployment benefits, maternity leave, job security). These are region specific.

Let's assume that there are two regions $\overline{R}$ and $\underline{R}$. R_i is the region individual i lives in and p_i is public spending of this region on education, health and other facilities that are used for raising kids. For simplicity we assume that regions differ only in terms of the spending of the regional government. If $\overline{R} = R_i$ spends more than $\underline{R} = R_j$, then,

$$ p_i > p_j \rightarrow b_i > b_j, \forall i \in R_{i,} \forall j \in R_j $$

And, everything else being constant, the effect of the regional variable is similar for all inhabitants of the region, i.e.,

$$ b_i = b_j, \forall i, j \in R_{k,} R_k \in \left\{ \overline{R}, \underline{R} \right\} $$

The regional variable p_i, can be extended to a vector of policies of region R_i, i.e.,
$P_i = (p_{i1},\dots, p_{im})$, where each component of the vector represents a different aspect of public macro-level regional policy.

The 'fertility equations':

Based on the above formal presentation, we arrive at:

(1) $b_i = F(a_i, X_i, P_i), \forall i \in N$, assuming a continuous effect of current religiosity, or

(2) $b_i = F(D_i, X_i, P_i), \forall i \in N$, if we assume aggregated effects of sub-denominations

Assuming linearity, we arrive at the following equations:

$$(1) \ b_i = \zeta a_i + \beta_j \sum_{j=1}^{f} x_{ij} + \eta_k \sum_{k=i}^{m} p_{ik} + \varepsilon_i , \ \text{or}$$

$$(2) \ b_i = \sum_{k=i}^{d} \delta_k D_i + \beta_j \sum_{j=1}^{f} x_{ij} + \eta_k \sum_{k=i}^{m} p_{ik} + \varepsilon_i ,$$

where ζ captures differences among subjects with different levels of religious practice (proxied by mass attendance and by prayer habits), and δ_k reflects the effect of the k-religious sub-denomination (defined using aggregated levels of mass attendance and of prayer) and is equal for all the respondents who belong to this sub-denomination; the vector β_j captures the effects of the socio-economic endowment variables that have an impact on fertility, including preferences shaped during childhood by exposure to parental and own religious practice; finally, η_k represents the impacts of public policies (that are fertility related) and ε_i is the error term.