

# Religion and Political Economy in an International Panel

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*Two important theories of religiosity are the secularization hypothesis and the religion-market model. According to the former, sometimes called a demand-side theory, economic development reduces religious participation and beliefs. According to the latter, described as a supply-side theory, religiosity depends on the presence of a state religion, regulation of the religion market, suppression of organized religion under Communism, and the degree of religious pluralism. We assess the theories by using survey information for 68 countries over the last 20 years, measuring attendance at formal religious services, religious beliefs, and self-identification as religious. In accordance with the secularization view, overall economic development—represented by per capita GDP—tends to reduce religiosity. Moreover, instrumental estimates suggest that this link reflects causation from economic development to religiosity, rather than the reverse. The presence of an official state religion tends to increase religiosity, probably because of the subsidies that flow to organized religion. However, in accordance with the religion-market model, religiosity falls with government regulation of the religion market and Communist suppression. Greater religious pluralism raises attendance at formal services but has no significant effects on religious beliefs or self-identification as religious. Although religiosity declines overall with economic development, the nature of the interaction varies with the dimension of development. For example, religiosity is positively related to education and the presence of children and negatively related to urbanization.*

## INTRODUCTION

Interactions between religion and political economy involve two causal directions. On one side, a nation's economic and political developments affect its religiosity. In this view, the dependent or endogenous variables are the extent of individual religious participation and beliefs and the role of organized religion in a country's political, legal, and social structure. On the other side, the nature and extent of religiousness influence economic performance. From this perspective, religious activities and beliefs are independent or exogenous variables.

A previous study (Barro and McCleary 2003) used cross-country data to investigate the effects of religious participation and beliefs on economic growth. In this article, we examine the reverse effects—that is, how religiosity responds to economic development and other variables.

Two important theories of religiosity are the secularization hypothesis and the religion-market model. According to the former, sometimes called demand-side theory, economic development reduces religious participation and beliefs. According to the latter, described as supply-side theory, religiosity depends on government intervention, including the establishment of state religion, regulation of the religion market, and suppression of organized religion, such as under Communism. Also important in this theory is the degree of religious pluralism, measured by the heterogeneity of religions represented in a country. Economists naturally think about combining demand- and supply-side forces, and we take that approach in this study.

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We begin with a sketch of the two types of theories. Our discussion focuses on how economic variables, religious doctrines, and government policies influence religious participation and beliefs. Then we discuss empirical measures of religiosity, based on international surveys aggregated to the country level. Finally, we use cross-country regressions to analyze how religiosity reacts to: economic and demographic variables; government institutions, including the presence of a state religion, regulation of the religion market, and Communist oppression; and the composition of religions. Our interpretations of these results synthesize ideas from the secularization hypothesis and the religion-market model. As part of this analysis, we use instrumental variables to isolate the causation from an overall indicator of economic development—per capita GDP—to religion, rather than the reverse.

## DETERMINANTS OF RELIGIOSITY

### Secularization and Related Hypotheses

Many theories that seek to explain religiosity rely on variants of the secularization hypothesis.<sup>1</sup> According to this view, economic development causes individuals to become less religious, as measured by attendance at formal religious services and religious beliefs. The beliefs refer to God, an after-life, heaven, hell, and so on, and also to tendencies of people to self-identify as religious. Finke and Stark (1992) and Iannaccone and Stark (1994), among others, argue that the evidence on religious trends conflicts with this hypothesis.

Bruce (2001) argues that the “strength and popularity” of religious beliefs are declining. People have lots of choices in religion; hence, they should find what they want. If they cannot find what they want, they can create it, but people are not doing this. Second, Bruce rightfully argues that beliefs change. We know these changes occur over a person’s lifetime. Why should these changes not apply also to populations as their economies industrialize? Bruce contends that Stark is wrong when he claims that people have an enduring need for religion. Hence, Bruce sees religious decline as due more to a lack of demand than to a lack of supply. If the demand for religious beliefs were constant, as Stark argues, we would see people finding other avenues of religious expression.

Stark’s (1999) counterargument is “*religious variation*,” whereby a decline of religious participation in one area leads to increases in other areas (the “water-balloon effect”). This process leads to a relatively stable level of religious commitment in a society over time.

Gill (1999) agrees with Bruce that the demand for religion can vary. As in Bruce’s scenario, Gill’s analysis posits that variations in socio-economic conditions explain why the demand for religion increases or decreases. Gill concludes that secularization can result from government regulation of religion (supply side), rather than changes in religious demand (demand side). Gill argues that God is not dead, just overregulated.

Froese and Pfaff (2001) hold that changes in the supply of religious goods in post-Communist Poland and East Germany account for the declines in religious participation. The new freedom of choice following the fall of Communism presented people with more choices, not just religious choices. Therefore, a monopoly religion (such as the Catholic Church in Poland) was unable to retain high levels of participation in the absence of conflict *vis-à-vis* the state. A large part of their explanation is *competition* from the liberalization of society. Democracy introduced people to new freedoms and choices and led, thereby, to diminished religious participation.

Wilson (1966), Berger (1967), and Chaves (1994) continued a theme from Weber (1905) by arguing that economic development leads to the secularization not only of individuals but also of political and social institutions, including religious hierarchies. For example, Europe saw the transfer of church property to princes (a secularizing process). Moreover, many parts of society were removed from the domination of religious institutions and symbols—a “desacralization” took place in Western Europe (Panham 1997:528–40). On the political level, the prediction is that organized religions would play a smaller role in governance and legislation. Notably, official

state religions would become less frequent, and separation between religion and state would become more common. However, our research on state religions (Barro and McCleary 2005) did not find much effect from the level of economic development, gauged by per capita GDP, on the probability of state religion.

The desacralization of society means that religion has to compete with secular activities. As a consequence, religious services become less stringent, for example, by abandoning the use of a “foreign” language, requiring smaller outlays of time by participants, reducing elaborate rituals, and requiring less ritualized practices by adherents. Part of this process, according to Weber (1905) and Troeltsch (1931), is that religious sects—to be popular and attract adherents—tend to become less other-worldly and stringent.

Secularization theories tend to stress particular aspects of economic development, such as increased education, urbanization, or life expectancy, or decreased fertility. However, the predicted sign of the effect on religiosity tends to vary across these dimensions of development. For example, more education has different implications from more urbanization.

With respect to education, one argument for secularization is that more educated people are more scientific and are, therefore, more inclined to reject beliefs that posit supernatural forces. Put in another way, if religious beliefs are based primarily on ignorance, more educated persons would tend to be less religious. This viewpoint accords with Hume’s (1757:182–83), who argued that religion is derived from irrational human fears and anxieties. He viewed religion as a mechanism for people to ward off forces that they could not rationally explain. According to this view, increased education should be accompanied by reductions in attendance at religious services and religious beliefs.

A contrary argument is that religious beliefs, like many theoretical hypotheses, require abstract thinking or “faith.” If highly educated persons are more capable of the speculative reasoning needed for intellectual inquiry, they may also be more able or willing to make the abstractions needed to support religious beliefs. From this perspective, more educated persons might be more religious.<sup>2</sup>

Sacerdote and Glaeser (2001) provide a different reason for why increased education would spur religiosity. They argue that education increases the returns from networks and other forms of social capital. Hence, they predict that more educated persons would participate more in various group activities, including religious services. However, in this approach, participation in services bears no special relation to religious beliefs—this participation is modeled as just one of many ways to build social capital. This analysis predicts no clear relation between education and religious beliefs, except in so far as more frequent attendance at services instills greater beliefs.

Models that focus on the role of salvation and the after-life,<sup>3</sup> such as Azzi and Ehrenberg (1975), predict that people become more religious as they age and, hence, get closer to death. Similarly, for a given age, increased life expectancy decreases religiosity. These conclusions follow if salvation depends on cumulated religious effort, including attendance at formal services and personal prayer, during one’s lifetime. Because of discounting of future expenditures, individuals find it desirable to postpone “outlays” until later in life.

The arguments about age and life expectancy are stronger if salvation corresponds to a stage toward the end of life, as in Hinduism, or if the religious doctrine provides little incentive to avoid wrongdoing when young, as in Catholicism. Weber (1905) observed that the Catholic religion allowed for a continual cycle of sinning and absolution.<sup>4</sup> Therefore, people have an incentive to accumulate sins early in life and then repent as they get closer to death. Weber argued that this pattern did not apply to Calvinist Protestantism, which dictated daily moral conduct throughout one’s life as the only means of finding a sign that one had been chosen.<sup>5</sup>

Islamic doctrine is similar to Catholic doctrine in that redemption is possible, even in Purgatory, by believing in Allah and ascribing to the Five Pillars of Islam. Thus, an older person—even one that has already been condemned—can always rise above past sins. Hence, Islam also motivates devout behavior especially at advanced ages.

In Buddhism, a person is continually searching for knowledge to acquire enlightenment and, therefore, has no incentive to defer religious investments. Hinduism—out of which Buddhism originated—is less clear-cut because lay persons are supposed to focus their pursuit of individual salvation in the last stage of their lives. However, earlier stages entail religious obligations that contribute indirectly to a person's ultimate enlightenment.

Economic reasoning predicts that increases in the cost of religious activities would, *ceteris paribus*, reduce these activities. For example, economic development raises the value of time, as measured by market wage rates. Hence, development implies a rising opportunity cost of participating in time-intensive activities, such as religious services and prayer. On this ground, development tends to reduce attendance at formal services and other religious activities. However, this argument assumes that the enhanced productivity that applies generally in the economy (as signaled by rising wage rates) is not accompanied by similar productivity gains for time spent on religion.

Aging can also affect the cost of attending services, especially for the sick and elderly. On this ground, the prediction is that people who are ill or very old would attend services infrequently and, perhaps, engage in relatively more prayer at home. These effects offset the influences mentioned before about a person's response to being relatively close to death. However, despite the relatively low rates of attendance at services, the sick and elderly may hold strong religious beliefs.

Children tend to attend services relatively often because their costs of attendance are comparatively low. This effect is reinforced because the productivity of attendance—in the sense of the beliefs engendered through “indoctrination”—is likely to be high at young, formative ages. This effect offsets the regular age influence discussed earlier. Moreover, the incentive to bring children to services tends to induce greater involvement of adults, who are likely to want to participate in the process of inculcating in their children and in ensuring that religious values and traditions are transmitted across generations.

Urbanization is another aspect of economic development that has been argued to have a strong negative effect on religiosity. One reason is that religious services have to compete in urban areas with many other forms of leisure activities, such as museums, theatres, and political organizations. A possible explanation for this urban/rural pattern is that economies of scale are important for museums and many other social organizations but are less significant for houses of worship. Since a community of believers can meet in a home, even sparsely populated rural towns can sustain a local congregation. Another argument is that rural areas are dominated by agriculture, which is especially prone to the uncertainties of nature. Greater attendance at religious services in rural areas may then reflect a greater demand for religion as a way to cope with these uncertainties.

### **Religious Competition and the Religion-Market Model**

Another argument by secularization theorists is that religiosity is fostered by the existence in a country of a monopoly provider of religion, for example, by the presence of an established state religion. If competition existed, much of it would take the form of debunking the religious beliefs practiced by others. If the beliefs were based primarily on superstition and ignorance, the argument is that these beliefs could not withstand the competition. Hence, according to this view, the demise of official state religions—predicted to be a part of the secularization process—would tend to foster the decline in individual participation and beliefs. Some of this argument appears in Adam Smith (1791, Book V, Article III) and is attributed partly to Hume (1757).

However, Smith also notes that monopoly providers of religious services tend—as monopolies do generally—to become noninnovative and indolent. He particularly observed this behavior in the Catholic Church and the Church of England. Specifically, he argued that the behavior of state religions reflected the lack of strong connection between financial support and the provision of good service to “customers.” Under monopoly, state religions tended to lose the aspects of religious devotion that were relevant to people practicing their faith. Moreover, state religions

tended to become a religion for elites, and—to the extent that the clergy itself became an elite group—of elites. Consequently, instead of focusing on the religious needs of their congregants, the clergy tended to engage in secular activities, including politics, the arts, and intellectual learning. In other words, having reached a level of affluence and a substantial degree of disconnection between income and service quality, the clergy were not motivated to provide a high level of customer satisfaction.

Religions, such as Protestantism, whose clergy depend directly on customer contributions must continually address the needs of congregants to stay in business. Hence, new religious movements or “upstarts,” such as the Lutherans and Calvinists during the Reformation in Switzerland and Germany, the Methodists and Quakers in 18th-century England, and Evangelical Protestants today in the United States, Latin America, and Asia, are able to enter the religion market by providing better service to members. Similarly, Ekelund, Hebert, and Tollison (2002) argue that the medieval Roman Catholic Church lost popularity because of its monopolistic pricing practices and because of its inability to adapt to changing socio-political conditions, especially the decline of feudalism. The discontent with the Catholic Church fostered the popularity of Protestantism among the poor and the royalty. In response to this entry, the established state religions sometimes resorted to coercion, repression, and violence to maintain their financial, political, and social arrangements. The Inquisition in Spain in the late 1400s is an extreme example.

Religion, Smith argued, is more vibrant where there is a disassociation between religion and state because the absence of state religion creates a climate for competition among religion providers (Smith 1791, Book V, Article III). By showing no preference for a particular religion, but rather permitting any religion to be freely practiced, Smith argued that the state would create an open market in which rational discourse among religious groups generated a public display of “good temper and moderation.” In an open market, Smith predicted a continual subdividing of sects so that a pluralistic structure would emerge in which no religion dominated. He also contended that state support for religious monopoly would promote zealotry and the imposition of ideas on a public that lacks choices. In contrast, where there is an open market for religion, his prediction was that one would find moderation and reason.

Jeremy (1988, 1998) extended the Smithian view by arguing that deregulation of the religion market would unleash competitive forces even if the upstarts did not achieve large memberships. The focus of his argument is on the legal recognition of nonconformist Protestant denominations during the 1700s in England (see Ashton 1924; Hagen 1962). Part of the appeal of these groups was that they offered different visions of the link between salvation and economic activity. Although these groups did not become dominant in religious membership, they did become important in manufacturing.

The Smithian perspective on religious competition has been used by Stark and Bainbridge (1987); Finke and Stark (1992); Iannaccone (1991); and Finke and Iannaccone (1993) to develop a religion-market model of religious participation. Their argument is that greater religious pluralism—measured, for example, by an index of the diversity of religions present in a country or region—tends to promote better service and, hence, encourages religious participation.<sup>6</sup> Moreover, an established state religion—as in Scandinavia—is viewed as the typical source of a low degree of religious pluralism and, hence, of low participation in organized religion. However, the connection between pluralism and religious beliefs would be expected to be weaker than that between pluralism and attendance at formal services. For example, Davie (1994) argued for post-World War II Britain that people could curtail participation in formal religion while still maintaining high levels of religious beliefs.

Chaves and Cann (1992) extended the supply-side argument by using empirical measures of the extent of state involvement and interference with religious activities. Greater state regulation of religion—which Chaves and Cann measured by, among other things, whether the government appoints or approves religious leaders—was argued to decrease the efficiency of religion providers and, hence, to generate low rates of attendance. However, state religion also typically involves

subsidies, such as payments to employees and collections of taxes dedicated to religious purposes. Economic reasoning suggests that these subsidies would encourage formal religious activity. For example, if the government pays for additional employees, buildings, and religion students, we would expect to see more such employees, buildings, and students.<sup>7</sup> More personnel and improved facilities may, in turn, attract more participants. The point is that, through subsidies, a state religion may have a positive effect on attendance at formal services. Berman (1999) argues, however, from the Israeli experience that state subsidies tend to increase participation but reduce productivity.

The opposite of subsidy is suppression, and some governments have sought to suppress religion, either specific ones or in general. For example, Communist countries, such as the Soviet Union, East Germany, and the People's Republic of China, tried hard to eradicate organized religion.<sup>8</sup> A likely reason is that organized religion was regarded as competitive with the Communist quasi-religion. More recently, former Soviet republics in central Asia have sought to curtail Protestant and other "newcomer" religions (see Anderson 2002). These forms of oppression would be predicted to lower attendance at services. From an empirical perspective, it is interesting to examine not only the impact of Communism on participation and religious beliefs but also the changes that occurred since the elimination of Communist regimes in many countries in the 1990s.

Future research will be able to exploit the Religion and State (RAS) data set, described in Fox and Sandler (2003), to measure state subsidy and suppression of religion. The RAS tabulation describes the relation between religion and state in four categories: separation of religion and state, discrimination against minority religions, restrictions on majority religions, and religious legislation. These data will eventually be available for most countries back to 1960. However, we cannot use these data for our current study, because the tabulation is complete only for a subset of countries and only starting in 1990.

#### DATA ON RELIGIOSITY

Our empirical research began with a previously constructed broad cross-country data set. The data include national-accounts variables and an array of other economic, political, and social indicators. The main sources of these data are Heston, Summers, and Aten (2002), World Bank (2005), Barro and Lee (2001), Freedom House, and *International Country Risk Guide*.

We have expanded this data set to include measures of religiosity. The most useful sources of international data on attendance at religious services and religious beliefs are the surveys in the three waves of the World Values Survey (WVS) (1981–1984, mostly 1981; 1990–1993, mostly 1990; and 1995–1997, mostly 1995 and 1996), the two reports on religion by the International Social Survey Program (ISSP) (1990–1993, mostly 1991; and 1998–2000, mostly 1998), and the Gallup Millennium Survey (1999). Another wave of the WVS applies to 1999–2003 and has recently been made available for public use. We plan to use this new wave in a future extension of our research.

At present, we are using the international survey data only to form country averages of data. This perspective accords with this article's analysis of country-wide aspects of religion, notably the state of economic development and the presence of official state religions and regulation of the religion market. In subsequent analysis, we plan to use the individual data, which typically apply to 1,000–2,000 respondents in each more or less representative national survey.

Putting the various sources of religion data together, and considering the availability of data on other variables, we are presently able to carry out statistical analysis for up to 68 countries, which includes up to 24 countries observed around 1981, 38 around 1990, 21 around 1991, 39 around 1995, 27 around 1998, and 48 around 1999.<sup>9</sup> The maximum number of country-time observations is 197. The exact sample size depends on the measure of religiosity.

Table 1 shows the 68 countries in the sample. The coverage is better for rich countries than for poor ones and for countries that are primarily Christian.<sup>10</sup> The predominantly Muslim countries are

**TABLE 1**  
**STATE RELIGION, STATE REGULATION OF RELIGION, AND RELIGIOUS**  
**PLURALISM INDEX FOR COUNTRIES IN THE SAMPLE**

Country	State	State	Pluralism	Country	State	State	Pluralism
	Religion	Regulation	Index		Religion	Regulation	Index
	1970	1970s	1970		1970	1970s	1970
Argentina	1	1	0.13	South Korea	0	0	0.74
Armenia	0	1	0.22	Latvia	0	1	0.70
Australia	0	0	0.65	Lithuania	0	1	0.14
Austria	0	0	0.17	Luxembourg	1	1	0.17
Azerbaijan	0	1	0.15	Macedonia	0	0	0.26
Bangladesh	1	1	0.30	Malaysia	1	0	0.67
Belarus	0	1	0.29	Mexico	0	0	0.13
Belgium	0	0	0.09	Moldova	0	1	0.19
Brazil	0	0	0.25	Netherlands	0	0	0.61
Bulgaria	0	0	0.28	New Zealand	0	0	0.53
Cameroon	0	0	0.77	Nigeria	0	1	0.72
Canada	0	0	0.67	Norway	1	1	0.03
Chile	0	0	0.32	Pakistan	1	0	0.06
China	0	1	0.43	Peru	1	1	0.08
Colombia	1	0	0.07	Philippines	0	0	0.40
Croatia	0	0	0.22	Poland	0	0	0.06
Cyprus	0	0	0.40	Portugal	1	0	0.10
Czech Rep.	0	1	0.43	Romania	0	0	0.31
Denmark	1	0	0.04	Russia	0	1	0.60
Dominic. Rep.	1	0	0.27	Singapore	0	0	0.63
Estonia	0	1	0.54	Slovak Rep.	0	1	0.33
Finland	1	1	0.05	Slovenia	0	0	0.09
France	0	1	0.14	Spain	1	0	0.02
West Germany	0	0	0.59	Sweden	1	1	0.06
Ghana	0	0	0.76	Switzerland	0	0	0.57
Greece	1	1	0.11	South Africa	0	0	0.71
Hungary	0	1	0.44	Taiwan	0	0	0.56
Iceland	1	0	0.15	Thailand	1	1	0.14
India	0	0	0.30	Turkey	0	1	0.02
Ireland	1	0	0.17	United Kingdom	1	1	0.45
Israel	1	0	0.25	Ukraine	0	1	0.37
Italy	1	1	0.08	Uruguay	0	0	0.16
Japan	0	0	0.40	United States	0	0	0.69
Kazakhstan	0	1	0.54	Venezuela	1	1	0.16

*Note:* The presence of a state religion (value 1 for the dummy variable) refers to the situation around 1970, as designated by Barrett, Kurian, and Johnson (2001:834–35). We assigned the value 1 only if Barrett, Kurian, and Johnson (2001) designated an individual religion, not if they classified the state as favoring religion in general. State regulation (value 1) refers to a situation in which the state appoints or approves religious leaders. This designation comes from discussions in Barrett (1982) and Barrett, Kurian, and Johnson (2001) and elsewhere and applies during the 1970s. The pluralism index is one minus the Herfindahl index computed from the fractions of adherents in 1970 to 10 major religion groups, among persons expressing adherence to some religion. The religions are Buddhist, Catholic, Hindu, Jewish, Muslim, Orthodox, other Christian, other eastern religions, Protestant, and other religions. These data are from Barrett, Kurian, and Johnson (2001). The countries shown are the ones included in the subsequent statistical analysis (as dictated by data availability).

Azerbaijan, Bangladesh, Kazakhstan, Malaysia, Pakistan, and Turkey, with Nigeria also having substantial Muslim representation.<sup>11</sup> Countries that have predominantly eastern religions (including Buddhist), among persons expressing some religious adherence, are China, Japan, South Korea, Singapore, Taiwan, and Thailand.<sup>12</sup> Malaysia also has substantial representation in these religions.

Some of the survey questions relate to attendance at formal religious services. We use these responses to generate the fractions of the population that attended services at least weekly and at least monthly. Some of the surveys (the two ISSP waves and the 1990 WVS) include questions about time spent at prayer. Other queries concern religious beliefs and attitudes; for example, do you believe in heaven, hell, life after death, and God (in various senses)?<sup>13</sup> Other questions, which might be more robust across religions, are whether the respondent self-identifies as a religious person and whether religion plays an important role in a person's life.

We used Barrett's (2001) *World Christian Encyclopedia* to assemble information on religious adherence, as professed in surveys or censuses in which people are asked to state the religion, if any, to which they adhere. The Barrett data that we use apply to 1970 and 2000.<sup>14</sup> These data allow us to construct measures of religious pluralism, based on Herfindahl indexes of adherence to the various religions.<sup>15</sup> Table 1 shows the values that apply in 1970 to the countries used in the statistical analysis (as dictated by data availability). Countries with low levels of pluralism include some that are predominantly Catholic (Spain, Italy, Portugal, Belgium, Ireland, and much of Latin America), Protestant Scandinavia, Orthodox Greece, and Muslim Pakistan and Turkey. Places that exhibit high levels of pluralism include the United States, Germany, the Netherlands, Switzerland, Australia, Malaysia, Singapore, Nigeria, and South Africa.

We used Barrett, Kurian, and Johnson's (2001:834–35) tabulations to measure the presence or absence of a state religion. These classifications are clearer in some cases than others. In some of the straightforward situations, the constitution designates an official state religion and restricts or prohibits other forms. However, even without these designations or prohibitions, the government may systematically favor a religion through subsidies and tax collections or through the teaching of religion in public schools. These considerations caused Barrett to classify some countries as having a "state religion" despite the absence of an official state religion in the constitution. Controversial cases in this category include Italy, Portugal, and Spain, which are considered by Barrett to have a Catholic state religion even in 2000. Table 1 shows the classifications in 1970 for the countries used in the analysis. For further discussion, see Barro and McCleary (2005).

We used Barrett's (1982) and Barrett, Kurian, and Johnson's (2001) discussion of each country (supplemented in some cases by individual country reports) to obtain a proxy for state regulation of religion. We used one of the concepts suggested by Chaves and Cann (1992)—whether the government appoints or approves church leaders. Although this measure does not gauge regulation in all of its dimensions, it has the advantage of being measurable in a reasonably objective manner for most countries. The Barrett discussions that we used apply to the 1970s. The data are in Table 1.

## CROSS-COUNTRY FINDINGS ON THE DETERMINANTS OF RELIGIOSITY

### Setup of the Analysis

Table 2 shows the means and standard deviations of the variables used in the analysis. Table 3 reports the results from panel regressions in which measures of religiosity are related to a set of explanatory variables that includes per capita GDP as the indicator of economic development.<sup>16</sup> The other explanatory variables are the dummy variables for state religion and state regulation of religion, dummy variables for the presence and subsequent removal of Communist governments, the composition of a country's adhering population among the major religions, and the measure of religious pluralism, which is constructed from the adherence data.<sup>17</sup> Table 3 contains seven

**TABLE 2**  
**MEANS AND STANDARD DEVIATIONS OF VARIABLES**

Variable	Mean	Standard Deviation
Weekly attendance at religious services	0.27	0.23
Monthly attendance at religious services	0.38	0.24
Belief in heaven	0.55	0.24
Belief in hell	0.36	0.21
Belief in after-life	0.54	0.19
Belief in God in some form	0.80	0.16
Religious person	0.67	0.19
Log of per capita GDP, 1995	9.06	0.87
Years of education (years), 1995	7.81	2.40
Urbanization rate, 1995	0.66	0.19
Life expectancy, at age 1 (years), 2000	73.4	6.3
1/(life expectancy at age 1) ( $\times 100$ ), 2000	1.37	0.14
Population share > age 65, 1995	0.102	0.046
Population share < age 15, 1995	0.255	0.085
State religion, 1970	0.32	0.47
State regulation of religion, 1970s	0.43	0.50
Communist regime, pre-1990	0.29	0.46
Religious pluralism index, 1970	0.33	0.23
Catholic fraction, 1970	0.39	0.41
Eastern religion fraction, 1970	0.076	0.239
Hindu fraction, 1970	0.017	0.102
Jewish fraction, 1970	0.017	0.104
Muslim fraction, 1970	0.104	0.236
Orthodox fraction, 1970	0.144	0.295
Other Christian fraction, 1970	0.063	0.091
Other religion fraction, 1970	0.025	0.076
Protestant fraction, 1970	0.17	0.28
Nonreligious fraction, 1970	0.119	0.175
Average "superstition"	0.43	0.14

*Note:* The columns show the (unweighted) means and standard deviations of the variables used in Table 3, along with some other variables. The sample for most variables is the set of observations for which data are available for participation in formal religious services and for the explanatory variables used in Table 3. For the religious belief variables, the samples are smaller. The religious participation and belief variables come from the various international surveys. Each country with data on these religiosity variables appears only once in computing these averages. The value entered is for WVS 1990, if available. Otherwise, values from the other surveys are used in the sequence WVS 1981, ISSP 1991, WVS 1995, ISSP 1998, and Gallup 1999. Values from surveys other than 1990 WVS are adjusted based on the sets of overlapping observations, for example, from a comparison of WVS 1990 with WVS 1981. The religion fractions, aside from nonreligious, are relative to the population of adherents to some religion. The nonreligion fraction is relative to the total population. For superstition, the values refer to the average of the three indicators shown in Table 7 (available for 17 countries).

systems, corresponding to different measures of religiosity. The measures are the fraction of the population attending formal religious services at least weekly (Column 1), fraction attending at least monthly (Column 2), fraction who believe in heaven (Column 3), fraction who believe in hell (Column 4), fraction who believe in an after-life (Column 5), fraction who believe in God

**TABLE 3**  
**DETERMINANTS OF RELIGIOSITY (CELLS SHOW ESTIMATED COEFFICIENTS**  
**WITH STANDARD ERRORS IN PARENTHESES)**

Explanatory Variable	(1)	(2)	(3)	
	Weekly Participation	Monthly Participation	Belief in Heaven	
Log of per capita GDP	-0.79 (0.10)**	-0.82 (0.10)**	-1.04 (0.11)**	
State religion	0.61 (0.19)**	0.56 (0.17)**	0.36 (0.22)	
Regulation of religion	-0.61 (0.14)**	-0.61 (0.12)**	-0.42 (0.15)**	
Communist regime	-1.06 (0.22)**	-1.19 (0.21)**	-1.35 (0.23)**	
Ex-Communist (1995)	-1.13 (0.23)**	-1.15 (0.21)**	-1.41 (0.25)**	
Ex-Communist (1998–1999)	-0.88 (0.21)**	-0.82 (0.18)**	-1.16 (0.24)**	
Religious pluralism	1.43 (0.43)**	1.02 (0.38)**	-0.41 (0.47)	
ISSP data	-0.26 (0.10)*	-0.16 (0.09)	0.17 (0.10)	
Gallup data	0.01 (0.11)	-0.07 (0.10)	—	
Eastern religion fraction	-2.55 (0.33)**	-2.01 (0.29)**	-0.27 (0.38)	
Hindu fraction	-1.13 (0.68)	-1.31 (0.63)*	-3.30 (0.54)**	
Jewish fraction	-1.82 (0.56)**	-2.19 (0.51)**	-0.95 (0.46)*	
Muslim fraction	0.02 (0.32)	-0.38 (0.29)	0.80 (0.35)*	
Orthodox fraction	-2.10 (0.27)**	-1.37 (0.25)**	-0.73 (0.30)*	
Other Christian fraction	-0.01 (0.73)	-0.10 (0.65)	2.94 (0.72)**	
Other religion fraction	-2.13 (1.18)	-2.54 (1.14)*	2.78 (1.46)	
Protestant fraction	-2.37 (0.25)**	-1.82 (0.22)**	-0.60 (0.26)*	
Number of countries and total observations	68, 197	68, 194	58, 136	
Number of observations for each equation	24, 38, 21, 39, 27, 48	22, 37, 21, 39, 27, 48	21, 34, 15, 37, 29	
R-squared for each equation	0.78, 0.66, 0.70, 0.78, 0.64, 0.72	0.78, 0.57, 0.70, 0.74, 0.72, 0.72	0.53, 0.71, 0.73, 0.77, 0.66	
Explanatory Variable	(4)	(5)	(6)	(7)
	Belief in Hell	Belief in After-Life	Belief in God	Religious Person
Log of per capita GDP	-0.71 (0.11)**	-0.50 (0.09)**	-0.84 (0.08)**	-0.27 (0.12)*
State religion	0.33 (0.21)	-0.01 (0.18)	0.19 (0.15)	0.09 (0.20)
Regulation of religion	-0.27 (0.14)	-0.25 (0.12)*	-0.37 (0.11)**	-0.48 (0.14)**
Communist regime	-0.90 (0.21)**	-1.19 (0.19)**	-1.47 (0.20)**	-0.86 (0.22)**
Ex-Communist (1995)	-0.59 (0.25)*	-1.01 (0.20)**	-1.29 (0.20)**	-0.23 (0.24)
Ex-Communist (1998–1999)	-0.53 (0.24)*	-0.80 (0.20)**	-0.95 (0.16)**	-0.44 (0.26)
Religious pluralism	-0.74 (0.46)	-0.68 (0.38)	-0.21 (0.35)	-0.15 (0.45)
ISSP data	0.40 (0.10)**	0.24 (0.08)**	0.04 (0.09)	-0.61 (0.12)**
Gallup data	—	—	-0.33 (0.10)**	—
Eastern religion fraction	0.46 (0.38)	-0.12 (0.26)	-1.24 (0.24)**	-1.90 (0.32)**
Hindu fraction	-1.32 (0.58)*	-2.01 (0.45)**	-1.60 (0.58)**	-0.58 (0.71)
Jewish fraction	-0.27 (0.40)	-0.71 (0.37)	-0.89 (0.40)*	-1.59 (0.57)**
Muslim fraction	1.59 (0.37)**	0.22 (0.30)	0.61 (0.29)*	0.51 (0.38)
Orthodox fraction	-0.19 (0.30)	-0.35 (0.25)	-0.41 (0.21)	-0.13 (0.31)
Other Christian fraction	2.92 (0.72)**	1.77 (0.59)**	1.06 (0.55)	0.02 (0.75)

(Continues)

**TABLE 3**  
(Continued)

Explanatory Variable	(4) Belief in Hell	(5) Belief in After-Life	(6) Belief in God	(7) Religious Person
Other religion fraction	-0.64 (1.29)	-1.56 (1.09)	4.35 (1.146)**	2.67 (1.98)
Protestant fraction	-1.21 (0.25)**	-0.21 (0.22)	-0.80 (0.21)**	-0.86 (0.23)**
Number of countries and total observations	58, 136	60, 141	66, 183	58, 141
Number of observations for each equation	21, 34, 15, 37, 29	26, 34, 15, 37, 29	23, 32, 15, 37, 29, 47	21, 39, 14, 38, 29
R-squared for each equation	0.60, 0.57, 0.74, 0.64, 0.58	0.57, 0.55, 0.67, 0.59, 0.48	0.51, 0.55, 0.66, 0.76, 0.66, 0.69	0.60, 0.54, 0.52, 0.48, 0.47

\* $p$ -value < 0.05, \*\* $p$ -value < 0.01.

*Note:* Each system has five or six equations, corresponding to observations on the dependent variables at five or six points in time: 1981–1984, subsequently called 1981 (WVS data mostly for 1981, supplemented by information from Gallup surveys for a few countries); 1990–1993, subsequently called 1990 (WVS data mostly for 1990, plus observations on some variables for Greece in 1987 from *Eurodim*); 1990–1993, subsequently called 1991 (ISSP data mostly for 1991); 1995–1997, subsequently called 1995 (WVS data mostly for 1995 or 1996); 1998–2000, subsequently called 1998 (ISSP data mostly for 1998); and 1999 (Gallup Millennium Survey). The last source has data only for participation in formal religious services and belief in God. The dependent variables are population averages for countries of (1) weekly attendance, (2) monthly attendance, (3) belief in heaven, (4) belief in hell, (5) belief in an after-life, (6) belief in God, and (7) self-identification as religious. The measured value is the fraction of people attending, the fraction who hold the belief, or the fraction who consider themselves religious. For example, in System 1, weekly attendance at formal religious services is observed for 24 countries with 1981 data, 38 countries with 1990 data, 21 countries with 1991 data, 39 countries with 1995 data, 27 countries with 1998 data, and 48 countries with 1999 data. The form of each dependent variable is  $\log[x/(1-x)]$ , where  $x$  is the fraction of persons attending or believing or considering themselves religious.

The log of real per capita GDP, from Heston, Summers, and Aten (2002), is for 1980 in the 1981 equation, 1990 in the equations for 1990 and 1991, and 1995 in the equations for 1995, 1998, and 1999. The measure of state religion is for 1970 and that for state regulation of religion is for the 1970s—see the notes to Table 1. The data on religion adherence, discussed in the text, are for 1970. The religious pluralism variable, discussed in the notes to Table 1, is constructed from the religion adherence data for 1970. The dummy for the presence of a Communist regime applies to the pre-1990 period. The 1995 equation and the 1998 and 1999 equations have separate coefficients to represent the effect of ex-Communism. The dummy for the use of ISSP data applies to the 1991 and 1998 equations and that for Gallup applies to the 1999 equation (entering only for attendance at religious services and belief in God).

Each system is estimated by the SUR method, which allows for separate error variances in each equation and for correlation of the error terms over the time periods for each country. This procedure does not weight countries differentially for size or other characteristics. Constant terms, not shown, are included for each system. The constants vary by system but not across the equations within a system.

(Column 6), and fraction who consider themselves religious (Column 7).<sup>18</sup> We refer to the last variable as religiousness. The form of each dependent variable is the transformation  $\log[x/(1-x)]$  of the original series  $x$ . This logistic form confines the fitted value of  $x$  to the interval (0, 1).<sup>19</sup>

Each system comprises five or six equations corresponding to the religiosity survey data: the first is for data around 1981 from the WVS, the second is for data around 1990 from WVS, the

third is for data around 1991 from the ISSP, the fourth is for data around 1995 from WVS, the fifth is for data around 1998 from ISSP, and the last is for 1999 data from Gallup (available only for attendance at religious services and belief in God).

The panel estimation technique allows us to combine countries that are represented in different surveys, as well as to include multiple observations for a single country. We recognize, however, that observations at different points in time or from different survey sources for a single country would not be independent. Therefore, we use the method of seemingly unrelated regression (SUR), which allows for correlations of the error terms across the equations for the different surveys for a given country.<sup>20</sup> We also allow for differences in average survey results across the sources by including a different intercept term for each source—WVS, ISSP, and Gallup.<sup>21</sup>

For the composition of the population by religion, we use a nine-way breakdown for 1970 and 2000 among Catholic, eastern religions (including Buddhist), Hindu, Jewish, Muslim, Orthodox, Protestant, other Christian (independent Christian churches, unaffiliated Christians, and marginal Christians, such as Mormons and Jehovah's Witnesses), and other religions.<sup>22</sup> In each case, the variable refers to the fraction adhering to the specified religion among persons who expressed adherence to some religion.<sup>23</sup> The Catholic fraction is the omitted category. Hence, each coefficient should be interpreted as the effect from the indicated religion relative to that for Catholic.

### Relations with Economic Development

The results in Table 3 show significantly negative relationships between economic development, gauged by per capita GDP, and the measures of religiosity. For example, for monthly attendance at formal religious services, the estimated coefficient on the log of per capita GDP is  $-0.82$  (*s.e.* = 0.10). This coefficient means, when evaluated at the sample mean of monthly attendance (0.38), that a one-standard-deviation increase in the log of per capita GDP (by 0.87, as shown in Table 2 for 1995) reduces the attendance rate by 15 percentage points, from 0.38 to 0.23. For belief in heaven, the estimated coefficient is  $-1.04$  (*s.e.* = 0.11). This coefficient means that a one-standard-deviation increase in the log of per capita GDP reduces the belief rate by 22 percentage points, from the mean of 0.55 to 0.33.

The findings for the effects of per capita GDP accord with the secularization view. Moreover, we argue later that we can interpret these relations as effects of economic development on religiosity, rather than the reverse. However, we also find that, when we go beyond per capita GDP to bring in additional dimensions of economic development, the relations with religiosity depend a great deal on the particular dimension. For example, as conjectured before, the effects of education are very different from those of urbanization.

### Trends in Religiosity

We can think of trends in religiosity as stemming partly from trends in the explanatory variables in Table 3—for example, long-term increases in per capita GDP—and partly from trends that apply for given values of the explanatory variables. We consider here the second channel; that is, we examine whether there are trends in religiosity for given values of the explanatory variables.

For the systems in Table 3, the same constant applies for each survey year, except that dummy variables were included to allow for systematic differences in the three sources: WVS, ISSP, and Gallup. Within the WVS and ISSP data, the same constant terms apply to the surveys from different dates—WVS for 1981, 1990, and 1995; and ISSP for 1991 and 1998. Therefore, we can test for trends by allowing these constant terms to vary over these dates. This test considers whether, for the WVS surveys, there are systematic differences, for given explanatory variables, in the religiosity data for 1981, 1990, and 1995. Similarly, the test looks for systematic differences in the ISSP data for religiosity in 1991 and 1998.

The conclusion is that, at the 5 percent critical level, the only statistically significant trend is for *increasing* belief in hell. At the 10 percent critical level, there is also evidence for increasing belief in heaven. For both hell and heaven, the main evidence for the rising trends comes from comparisons of the 1995 WVS wave with the two earlier WVS waves. For attendance at formal religious services, the comparisons across the WVS and ISSP waves show some decrease over time, but the overall trends are not statistically significant. Thus, if we think of secularization as a downward trend in religiosity that applies for given economic and other variables, there is no evidence for secularization in this sense.

### State Religion, State Regulation, and Communism

Table 3 shows that the estimated coefficients on the state-religion dummy variable<sup>24</sup> are significantly positive for attendance at formal religious services. The coefficients are positive, but not statistically significant, for some of the religious beliefs. For example, for monthly attendance, the estimated coefficient of 0.56 (*s.e.* = 0.17) in Column 2 implies, if viewed causally, that the imposition of a state religion would raise the monthly attendance rate by 14 percentage points, from the mean of 0.38 to 0.52. This pattern conflicts with the predictions from the religion-market model, discussed earlier. In that model, state religion promotes monopoly and, therefore, poor service and low rates of participation. However, since state religion typically goes along with state subsidy, we do not find it surprising that the overall relation between state religion and attendance would be positive when we hold fixed a separate measure of government regulation of religion.

The results for state religion in Table 3 apply when we hold constant the index of religious pluralism (discussed below). One part of the argument in the religion-market model is that an established state religion will help to maintain monopoly in the religion market and, thereby, a low degree of religious pluralism. Hence, the pluralism variable could be getting credit for influences on religiosity that stem ultimately from the presence of an established religion. If we delete the pluralism variable from the system for monthly attendance, the estimated coefficient on the state religion dummy becomes 0.35 (*s.e.* = 0.16), which is smaller than before but still significantly positive at the 5 percent critical level.

Our analysis also includes the dummy variable for the presence of state regulation of religion. Since this regulatory system often accompanies a state religion (see Table 1), the regulatory variable might be getting credit for effects that stem ultimately from state religion. If we delete the regulatory variable, as well as the pluralism index, from the system for monthly attendance at religious services, the estimated coefficient on the state religion dummy falls further to 0.06 (*s.e.* = 0.16), which is statistically insignificantly different from zero. Thus, our finding of a positive relation between state religion and attendance at formal religious services depends on our holding constant the measures of religious pluralism and state regulation of religion.

In the literature, the Scandinavian countries are often cited as places in which state churches coexist with low rates of church attendance. That pattern does characterize the data in our study. However, the low rates of attendance in these countries are explained reasonably well by the model, despite the positive coefficient on the state-religion dummy. For example, Table 4 shows that, in 1990, the actual and fitted values of monthly attendance are, respectively, 0.11 and 0.16 for Denmark, 0.11 and 0.11 for Finland, 0.13 and 0.10 for Norway, and 0.10 and 0.11 for Sweden. The reason for the good fit for the Scandinavian countries is that the other variables contained in the system, especially per capita GDP and the composition of religions (discussed in the next section), predict low levels of participation.

The results in Table 3 indicate that government regulation of religion (for a given status of state religion) tends to depress attendance at religious services, religious beliefs, and religiousness. The estimated coefficients are all significantly negative except for the one for belief in hell (Column 4). Hence, in contrast to our results on state religion, our findings on regulation support the arguments

**TABLE 4**  
**ACTUAL AND FITTED VALUES OF MONTHLY ATTENDANCE AT RELIGIOUS SERVICES AND BELIEF IN HEAVEN FOR 1990 WVS SAMPLE**

Country	Monthly Participation	Fitted Participation	Belief in Heaven	Fitted Belief
Argentina	0.55	0.59	0.69	0.75
Austria	0.44	0.41	0.47	0.54
Belarus	0.06	0.10	0.12	0.22
Belgium	0.35	0.40	0.34	0.54
Bulgaria	0.09	0.17	0.16	0.37
Brazil	0.50	0.62	0.76	0.76
Canada	0.40	0.37	0.71	0.52
Chile	0.46	0.67	0.77	0.85
China	0.01	0.19	—	—
Czech Rep.	0.11	0.16	—	—
Denmark	0.11	0.16	0.19	0.46
Finland	0.11	0.11	0.55	0.40
France	0.17	0.27	0.32	0.42
Greece	0.29	0.20	—	—
Hungary	0.34	0.14	0.27	0.23
Iceland	0.09	0.18	0.57	0.49
India	0.71	0.66	0.43	0.51
Ireland	0.88	0.61	0.90	0.71
Italy	0.51	0.37	0.52	0.52
Japan	0.14	0.11	0.43	0.40
Latvia	0.09	0.11	0.12	0.19
Mexico	0.63	0.59	0.70	0.76
Netherlands	0.31	0.38	0.37	0.57
Nigeria	0.88	0.75	0.96	0.94
Norway	0.13	0.10	0.44	0.38
Poland	0.85	0.32	0.80	0.47
Portugal	0.48	0.61	0.62	0.73
Romania	0.31	0.19	0.58	0.38
Russia	0.06	0.09	0.18	0.25
Slovak Rep.	0.40	0.14	—	—
Slovenia	0.35	0.22	0.30	0.33
South Africa	—	—	0.90	0.83
Spain	0.40	0.57	0.52	0.68
Sweden	0.10	0.11	0.31	0.37
Switzerland	0.42	0.27	0.45	0.37
Turkey	0.38	0.38	0.87	0.85
United Kingdom	0.26	0.24	0.62	0.55
United States	0.58	0.33	0.87	0.68

*Note:* The table lists countries from the 1990 WVS (plus Greece from 1987 *Eurodim*). The fitted values for monthly attendance at religious services and belief in heaven come from the systems in Columns 2 and 3, respectively, of Table 3.

from the religion-market model. Better measurement of the indicator for regulation of the religion market may sharpen these results.

For monthly attendance, the estimated coefficient of  $-0.61$  (*s.e.* = 0.12) on the state-regulation-dummy variable in Column 2 of Table 3 means that the introduction of a government regulatory system for religion would lower monthly attendance by 13 percentage points, from

the mean of 0.38 to 0.25. As already noted, state religion and government regulation of religion often come as a package—see Table 1. If a state religion is imposed along with regulation, the estimated net effect on monthly attendance (for given religious pluralism) is close to zero.

The presence of a Communist regime has a substantial negative effect on the religiosity variables. For example, for monthly attendance, the estimated coefficient of  $-1.19$  ( $s.e. = 0.21$ ) in Column 2 of Table 3 implies that the imposition of Communism would lower the attendance rate by 22 percentage points, from the mean of 0.38 to 0.16.

By comparing the three later surveys—WVS 1995, ISSP 1998, and Gallup 1999—with the three earlier ones, we can estimate how the downfall of the Communist systems in the 1990s affected religiosity. The results show that religiosity tended to recover in the former Communist countries during the 1990s.<sup>25</sup> For example, for monthly attendance in Column 2 of Table 3, the estimated effect in 1998–1999 from the presence of Communism before 1990 is given by the coefficient  $-0.82$  ( $s.e. = 0.18$ ). This coefficient is significantly lower than that for contemporaneous Communism,  $-1.19$  (0.21), with a  $p$ -value for a one-sided test of 0.01. Similarly, for belief in hell, the coefficient of  $-0.53$  (0.24) for ex-Communism in 1998–1999 is significantly less (with a  $p$ -value for a one-sided test of 0.03) than the coefficient of contemporaneous Communism,  $-0.90$  (0.21).

### Religious Pluralism and the Composition of Religions

Table 3 shows that the religious pluralism indicator (shown in Table 1) has significantly positive coefficients in the systems for attendance at formal religious services. This pattern accords with the religion-market model's argument that greater pluralism would encourage competition among religion providers and lead, thereby, to better service and higher rates of attendance. The estimated coefficient in Column 2 of 1.02 ( $s.e. = 0.38$ ) means that an increase in pluralism by 0.23 (its standard deviation in 1970) raises monthly attendance by 6 percentage points, from the mean of 0.38 to 0.44. This effect is weak compared to the influences of variables already discussed—per capita GDP, state religion, and state regulation of religion. Moreover, there is no evidence in Table 3 that greater religious pluralism leads to stronger religious beliefs or more religiousness.

Chaves and Gorski (2001) and Voas, Olson, and Crockett (2002) criticize the use of religious pluralism measures as determinants of religious participation. The authors point out problems that arise when the pluralism measure is constructed as a transformation of the same data used to form the dependent variable. For example, in some studies, pluralism was calculated from the fractions of the population affiliated with various religions (Catholic, Protestant, etc.), and the dependent variable was computed as the fraction of the population affiliated with any of the religions. We agree that this procedure is problematic because it creates a mechanical relation between the dependent and independent variables; that is, a relation that does not involve a causal link between religious diversity and religiosity. However, our situation is different because the independent variable is calculated from the fractions of the adhering population affiliated with the various religions, whereas the dependent variable is the fraction of the total population who attend religious services, or hold a religious belief, or self-identify as religious. In these cases, no mechanical relation exists between the dependent and independent variable.

In any event, our main results remain intact if we eliminate the religious pluralism variable from the regressions. Consider, for example, the specification with monthly attendance at formal religious services as the dependent variable (Column 2 of Table 3). If we omit the religious pluralism variable, the estimated coefficients become  $-0.82$  ( $s.e. = 0.10$ ) on the log of per capita GDP (the same as before up to two decimal places), 0.35 (0.16) on state religion,  $-0.60$  (0.12) on regulation of religion,  $-1.20$  (0.21) on Communist regime,  $-1.17$  (0.21) on ex-Communist in 1995, and  $-0.86$  (0.19) on ex-Communist in 1998–1999. Thus, the only noticeable change is

the reduced magnitude of the state-religion coefficient; however, this coefficient remains positive and statistically significant.<sup>26</sup>

The effects on the other coefficients from eliminating the religious pluralism variable are similar when weekly attendance is the dependent variable (Table 3, Column 1). For the other systems, the religious pluralism variable was not statistically significant in the first place (Columns 3–7 of Table 3). In these cases, the effects on the other coefficients from eliminating the religious pluralism variable are even less noticeable.

Another way to look at our specification is that it includes linear terms in religion shares (fractions of the adhering population who are Protestant, Muslim, etc.), as well as a variable—the pluralism indicator—constructed from the squared values of the religion shares. Thus, the issue for us is not, *per se*, whether the pluralism indicator is a satisfactory independent variable but whether the religion shares are appropriate. In this context, the key matter is whether the religion shares are endogenous variables; that is, whether shifts in religiosity (attendance at religious services and religious beliefs) affect these shares. Possible channels for endogeneity of the religion shares include religious conversion and differential fertility and immigration by type of religion. Recall, however, that we consider only adherence to each type of religion in relation to the overall adhering population—obviously, the fraction of the population that is nonreligious could not be treated as exogenous with respect to the religiosity measures.

Consider now the coefficients on the various religion shares in Table 3, recalling that each coefficient gives the effect relative to that for Catholic (the omitted category). Most of the religions are lower than Catholic in their rates of attendance at formal religious services.<sup>27</sup> The main exceptions are Muslim and other Christian (which tends to pick up Evangelicals). For the religious beliefs, most of the religions are again lower than Catholic. However, the Muslim and other Christian coefficients are positive. Particularly noteworthy are the large, significantly positive coefficients for Muslim and other Christian in the systems for belief in heaven and hell.

### Actual and Fitted Values

The estimates shown in Table 3 do not, of course, explain all of the cross-country variations in religiosity. To get a sense of what is explained and unexplained, Table 4 shows the actual and fitted values of monthly attendance at religious services and belief in heaven for countries included in the 1990 WVS (37 observations for attendance and 34 for belief). As an example, the United States has often been cited as a country that is surprisingly religious, given its level of per capita GDP and other variables. The table shows that the residuals are indeed positive—the actual attendance of 0.58 compares with the fitted value of 0.33, and the actual belief in heaven of 0.87 contrasts with the fitted value of 0.68. However, the United States is not unique as a country with substantial residuals. The largest errors are for Poland, which has much higher levels of religiosity than predicted by the model.

Despite the presence of substantial residuals, the model does explain a good deal of the cross-country variation in religiosity. The *R*-squared values shown in Table 3 indicate the overall fits. The model's explanatory power, including that for the United States, improves noticeably when we add additional explanatory variables to describe more detailed aspects of economic development. However, as we discuss later, that extension also makes causal inferences more difficult.

### Causality and Instrumental Estimates

A major issue in the interpretation of the estimates in Table 3 is whether they reflect causation from the independent variables to religiosity, rather than the reverse. We think that the main concern arises for per capita GDP—Do the coefficients reflect the effect of economic development on religiosity or, in reverse, the effect of religiosity on development?

In our previous study (Barro and McCleary 2003), we estimated effects of religiosity—attendance at formal services and religious beliefs—on economic growth. To isolate causation from religiosity to growth, we used instrumental variables suggested by the types of results reported in Table 3.<sup>28</sup> Specifically, our instruments were the dummy variables for state religion and state regulation of religion, the composition of adherence across the religions, and the religious pluralism index (constructed from the adherence shares). The results indicated that growth responded positively to higher religious beliefs, notably beliefs in hell, heaven, and an after-life, but negatively to higher attendance for given beliefs. Growth was not much related to the overall level of religiosity—that is, if beliefs and attendance moved together in their usual manner, the net impact on growth was small. Hence, countries that were more or less religious overall tended to grow neither faster nor slower than average.

In Table 3, the dependent variables are levels of religiosity. The main sample variations in these variables—attendance, beliefs, and religiousness—reflect the overall extent of religiosity in a country. Therefore, our previous results suggest that these religiosity measures would not have much overall influence on economic growth. Hence, we do not anticipate much reverse causation from levels of religiosity to levels of per capita GDP.

To test this conjecture, we reestimated systems of the form shown in Table 3 by using instrumental variables for the log of per capita GDP. The instruments are exogenous geographical features of countries. The two variables used are the distance from the equator and a dummy variable for land-locked status. The distance variable (measured as the absolute value of degrees latitude) affects climate and, therefore, aspects of agricultural productivity and disease. Land-locked status influences the convenience of transport and, hence, the potential for international trade. These two variables have considerable explanatory power for the log of per capita GDP. As an example, we estimated a SUR system for 151 countries for observations on the log of per capita GDP at 10-year intervals from 1960 to 2000. The system also includes dummy variables for Communism and has separate intercepts for each time period. The *R*-squared values in the five equations are around 0.5, and the estimated coefficients are 4.14 (*s.e.* = 0.27) on the absolute value of degrees latitude and  $-0.36$  (*s.e.* = 0.10) on the dummy variable for land-locked status.<sup>29</sup>

The first row of Table 5 reproduces the estimates of the coefficients on the log of per capita GDP from Columns 2–4 of Table 3: those for monthly attendance at formal services and beliefs in heaven and hell. The second row of Table 5 shows the estimates of the coefficients of log per capita GDP when the systems for religiosity are reestimated using our instrumental variables. (That is, the second row uses three-stage least-squares (3SLS), whereas the first row uses the SUR technique.) The coefficients of the other explanatory variables are not shown, and the results do not differ much from those in Table 3. The important finding is that the instrumental estimates are similar to those found before. That is, our allowance for endogeneity of per capita GDP leaves intact the conclusion that economic development decreases religiosity.

Although our main concern with reverse causation is with the link between religiosity and per capita GDP, it is possible that endogeneity issues could also arise for other explanatory variables in Table 3. We mentioned that greater religiousness might help to explain why a country has a state religion or regulates religion. In addition, we noted that differences in religiosity might influence the composition of religion adherence and, therefore, also the religious pluralism index.

To assess the implications for the coefficient of per capita GDP, we reestimated the systems for religiosity while dropping the other possibly endogenous variables.<sup>30</sup> The third and fourth rows of Table 5 show the effects. In both cases, we dropped the explanatory variables for religion shares, religious pluralism, state religion, and state regulation of religion. Not surprisingly, the fits of the equations deteriorate substantially. However, the estimated coefficients on the GDP variable change only in minor ways. This conclusion applies whether we estimate by the SUR technique used in Table 3 (Line 3 of Table 5) or by 3SLS using our instrumental variables (Line 4). The robustness of these results enhances our confidence that increases in the standard of living lower the various measures of religiosity.

**TABLE 5**  
**ALTERNATIVE ESTIMATES OF GDP COEFFICIENTS IN SYSTEMS FOR**  
**RELIGIOSITY (CELLS SHOW ESTIMATED COEFFICIENTS WITH STANDARD**  
**ERRORS IN PARENTHESES)**

	(1) Monthly Attendance	(2) Belief in Heaven	(3) Belief in Hell
SUR estimates: Table 3 specification	-0.82** (0.10)	-1.04** (0.11)	-0.71** (0.11)
3 SLS estimates: latitude and land-locked status as instruments	-0.79** (0.11)	-1.04** (0.13)	-0.69** (0.13)
SUR estimates: exclude religion shares, pluralism, state religion, regulation of religion	-0.84** (0.09)	-0.93** (0.10)	-0.95** (0.10)
3SLS estimates: exclude religion shares, pluralism, state religion, regulation of religion; latitude and land-locked status as instruments	-0.87** (0.09)	-0.90** (0.10)	-0.98** (0.11)

\**p*-value < 0.05, \*\**p*-value < 0.01.

*Note:* The systems from Table 3 for monthly attendance at religious services and for belief in heaven and hell were reestimated under alternative specifications. The cells show only the estimated coefficients on the log of per capita GDP. (Other coefficients were estimated but are not shown.) The first specification is from Table 3, which uses SUR estimation. The second reestimates the systems by 3SLS, where the instruments are the explanatory variables included in Table 3 except for the log of per capita GDP. This variable was replaced in the instrument lists by a country’s absolute value of degrees latitude and a dummy variable for whether the country is land-locked. The next specification uses SUR estimation, as in Table 3, but with the exclusion of the explanatory variables for religion adherence shares, religious pluralism, and the dummy variables for state religion and state regulation of religion. The last specification excludes the same variables but estimates by 3SLS, with the instruments for the log of per capita GDP as described above.

**Dimensions of Economic Development**

Our results for per capita GDP indicate that the overall effect of economic development is to reduce religiosity. However, as mentioned before, economic development has various dimensions, including increases in education, urbanization, and life expectancy, and reductions in fertility. The patterns in life expectancy and fertility imply that richer countries have an age structure that is tilted more toward the old and away from the young. When we measure economic development solely by per capita GDP, we implicitly combine all of these aspects of development into a single variable. However, the theoretical reasoning in our first section suggests that the different aspects of economic development would relate differently to religiosity.

The present panel data set contains enough observations to distinguish the effects from the various dimensions of development. Therefore, we now extend the analysis from Table 3 to include five additional economic/demographic variables: educational attainment, the urbanization rate, life expectancy, and the fractions of the population aged over 65 and under 15. The education data are from Barro and Lee (2001) and the other data are from World Bank (2005). Life expectancy at age one is entered as a reciprocal and, therefore, measures the average mortality rate per year.

Table 6 shows the estimated coefficients for the new economic-demographic variables, along with the coefficients for the log of per capita GDP. (The other explanatory variables in Table 3 are included, but their coefficients are not shown.) These estimates do not use instrumental variables,

**TABLE 6**  
**DETERMINANTS OF RELIGIOSITY: EFFECTS OF ADDITIONAL ECONOMIC AND**  
**DEMOGRAPHIC VARIABLES (CELLS SHOW ESTIMATED COEFFICIENTS WITH**  
**STANDARD ERRORS IN PARENTHESES)**

Explanatory Variable	(1)	(2)	(3)	
	Weekly Participation	Monthly Participation	Belief in Heaven	
Log of per capita GDP	0.11 (0.16)	0.13 (0.15)	-0.34 (0.20)	
Years of education	0.226 (0.037)**	0.214 (0.034)**	0.217 (0.041)**	
Urbanization rate	-1.66 (0.36)**	-1.46 (0.32)**	-1.80 (0.42)**	
1/(life expectancy at age 1)	6.4 (1.3)**	6.8 (1.2)**	1.1 (1.7)	
Population share > age 65	0.1 (3.0)	-1.6 (2.7)	-11.3 (4.1)**	
Population share < age 15	3.8 (2.0)	4.2 (1.9)*	1.9 (2.8)	
Number of countries and total observations	58, 178	58, 176	50, 126	
Number of observations for each equation	23, 36, 21, 31, 27, 40	22, 35, 21, 31, 27, 40	21, 32, 15, 29, 29	
R-squared for each equation	0.82, 0.79, 0.69, 0.94, 0.72, 0.77	0.83, 0.75, 0.74, 0.92, 0.81, 0.78	0.71, 0.77, 0.84, 0.86, 0.84	
Explanatory Variable	(4)	(5)	(6)	(7)
	Belief in Hell	Belief in After-Life	Belief in God	Religious Person
Log of per capita GDP	-0.46 (0.18)*	-0.13 (0.18)	-0.16 (0.17)	0.35 (0.20)
Years of education	0.218 (0.038)**	0.115 (0.036)**	0.086 (0.038)*	0.150 (0.046)**
Urbanization rate	-2.24 (0.40)**	-1.30 (0.34)**	-0.66 (0.34)	-0.85 (0.48)
1/(life expectancy at age 1)	0.8 (1.5)	-1.9 (1.5)	3.8 (1.4)**	4.9 (1.8)**
Population share > age 65	-12.9 (3.6)**	-7.6 (3.7)*	-6.7 (3.1)*	-9.4 (4.4)*
Population share < age 15	-1.5 (2.4)	2.2 (2.4)	2.2 (2.1)	-2.0 (2.8)
Number of countries and total observations	50, 126	52, 131	56, 165	50, 131
Number of observations for each equation	21, 32, 15, 29, 29	26, 32, 15, 29, 29	22, 31, 15, 29, 29, 39	21, 37, 14, 30, 29
R-squared for each equation	0.79, 0.75, 0.68, 0.87, 0.75	0.72, 0.60, 0.71, 0.60, 0.71	0.81, 0.64, 0.69, 0.80, 0.71, 0.75	0.49, 0.72, 0.49, 0.64, 0.52

\* $p$ -value < 0.05, \*\* $p$ -value < 0.01.

*Note:* Five explanatory variables (for education, urbanization, life expectancy, and population age shares) were added to the systems shown in Table 3. The cells show the coefficients for these variables and for the log of per capita GDP. Estimation is by the SUR technique. The other explanatory variables in Table 3 are included, but their coefficients are not shown.

because we lack instruments that can distinguish satisfactorily among the various dimensions of economic development. Hence, we have to be cautious about causal inferences—the coefficients in Table 6 represent partial correlations with the religiosity measures.

The results in Table 6 reveal very different patterns for the individual dimensions of economic development. One result is a significantly positive coefficient for education in all of the religiosity systems. For example, the estimated coefficient of 0.214 (*s.e.* = 0.034) in Column 2 implies, if interpreted causally, that an increase in average schooling by 2.4 years (the sample standard deviation for 1995 in Table 2) would raise monthly attendance at formal services by 13 percentage

points, from the mean of 0.38 to 0.51. The positive partial association between education and attendance accords with Sacerdote and Glaeser's (2001) analysis, which focused on the incentives of educated people to attend group activities, including religious services. However, in contrast with their findings, the results in Table 6 also reveal positive partial associations between education and religious beliefs. One clear inference is that the overall negative effect of economic development on religiosity (found in Tables 3 and 5) does not work through education. That is, we cannot conclude that richer societies are less religious because people are better educated.

Another clear pattern in Table 6 is the significantly negative partial relation between the measures of religiosity and the urbanization rate. For example, the estimated coefficient of  $-1.46$  ( $s.e. = 0.32$ ) for monthly attendance in Column 2 means, if viewed causally, that an increase in the urbanization rate by 0.19 (its sample standard deviation in 1995) would lower monthly attendance by 6 percentage points, from the mean of 0.38 to 0.32. Thus, as predicted from theoretical arguments, one reason that richer societies are less religious is probably that the population is more urban.

Table 6 shows that a greater presence of children (higher population share under age 15) goes along with significantly higher participation in formal services, as predicted. However, there is no clear relation with beliefs or religiousness. Higher mortality (the reciprocal of life expectancy at age one) also goes along with significantly higher participation in formal services, again as predicted. The relation with beliefs is less clear, although there is a significantly positive relation with belief in God and religiousness. For the over-65 age share, the relations with participation differ insignificantly from zero—these results could reflect the offsetting effects from aging noted earlier. More difficult to interpret are the significantly negative relations with beliefs and religiousness.

The estimates in Table 6 indicate that, once the other economic and demographic variables are held constant, the relations between the religiosity measures and per capita GDP are statistically insignificantly different from zero. Thus, it is likely that the effects of economic development on religiosity do not involve higher income, *per se*. Rather, the main effects work through education, urbanization, the presence of children, and so on.

The addition of the five explanatory variables in Table 6 substantially improves the fits of the relationships—the *R*-squared values shown can be compared with the corresponding values in Table 3. As an example, for the United States in the 1990 WVS, monthly church attendance is 0.58 and the fitted value computed from the system in Table 6, Column 2, is 0.45, compared to the fitted value in Table 4 of 0.33. Similarly, for belief in heaven, the actual value is 0.87 and the fitted value from Table 6, Column 2, is 0.78, compared to the value from Table 4 of 0.68. Thus, when the detailed dimensions of economic development are considered, the United States is no longer so much of an outlier with respect to religiosity. However, despite the improvement in fits, the causal interpretations of the results in Table 6 are a concern.

## Superstition

As discussed before, one dimension of the secularization hypothesis—which the data failed to confirm—is that increased education would generate lower levels of attendance at religious services and religious beliefs. The theoretical rationale for this linkage was that religion amounted to superstition and ignorance and, hence, that religious activities would decline as people became better educated.

Another way to assess this hypothesis is to look at other beliefs that seem clearly to reflect superstition and ignorance. The ISSP surveys offer three good candidates: belief in fortune tellers (“some fortune tellers really can foresee the future”); belief in horoscopes (“a person's star sign at birth, or horoscope, can affect the course of their future”); and belief in good-luck charms (“good luck charms sometimes do bring good luck”). The predictive content from these forecasting

**TABLE 7**  
**SUPERSTITION VARIABLES**

Country	Average of Three Beliefs	Fortune Tellers	Horoscopes	Good-Luck Charms
Canada	0.29	0.36	0.23	0.28
Philippines	0.32	0.32	0.32	0.32
Austria	0.32	0.26	0.38	0.33
France	0.35	0.39	0.41	0.24
West Germany	0.36	0.32	0.38	0.38
Hungary	0.39	0.44	0.40	0.34
Ireland	0.25	0.30	0.19	0.25
Portugal	0.34	0.28	0.30	0.45
Switzerland	0.42	0.40	0.47	0.40
United Kingdom	0.32	0.42	0.30	0.24
New Zealand	0.38	0.46	0.35	0.33
Bulgaria	0.67	0.65	0.65	0.72
Czech Republic	0.58	0.71	0.53	0.50
Latvia	0.73	0.80	0.66	—
Russia	0.60	0.68	0.56	0.57
Slovak Republic	0.55	0.68	0.49	0.48
Slovenia	0.42	0.55	0.41	0.31

*Note:* The data on belief in fortune tellers, horoscopes, and good-luck charms come from ISSP 1991 and 1998. The values shown refer to the fraction of the respondents believing in each category. The numbers are averages of the 1991 and 1998 waves if both are available. Otherwise, the value refers to the available wave. For Latvia, belief in good-luck charms is unavailable, and the average of beliefs refers to the other two variables.

“tools” should be scientifically testable. Although we have not done the analysis, we take it as plausible that none actually has predictive content.

Data on the three superstition variables are available from the ISSP only for 17 Christian countries, listed in Table 7. The table shows the fraction of persons holding each of the beliefs. We were surprised by the high levels—they range from 19 percent of the Irish population believing in horoscopes to 80 percent of the Latvian population believing in fortune tellers. Table 8 shows that there is a strong positive correlation among the three superstitious beliefs. Therefore, we focus on the simple average of the three, as shown in the first column of Table 7. These values range from 25 percent in Ireland to 73 percent in Latvia.

Table 9 shows, for the 17 countries included in Table 7, the correlations among the religiosity variables considered before. These correlations are strongly positive whether we look at attendance at religious services, religious beliefs, or religiousness. However, the most interesting finding, shown in the first column of Table 9, is that the correlation between the average superstition indicator and each of the religiosity variables is negative. These values range from  $-0.37$  for belief in hell to  $-0.63$  for belief in heaven.

One conclusion is that religious beliefs and superstitious beliefs are very different. A possible reason is that religious beliefs are compatible with increased education and knowledge, whereas the superstitious beliefs are not.<sup>31</sup> However, another possibility is that the superstitions tend to substitute for religious beliefs and activities in societies where the standard religious practices are suppressed or are unavailable for other reasons. Notably, folk religions anchored in superstition and lacking in the infrastructure of organized religion are likely responses to religious suppression

**TABLE 8**  
**CORRELATIONS AMONG SUPERSTITION VARIABLES**

	Average of Three Variables	Fortune Tellers	Horoscopes	Good-Luck Charms
Average of three variables	1.0	0.90	0.94	0.90
Fortune tellers	0.90	1.0	0.78	0.66
Horoscopes	0.94	0.78	1.0	0.82
Good-luck charms	0.90	0.66	0.82	1.0

*Note:* The table shows the correlations of the indicated column and row variables. The underlying data are in Table 7.

**TABLE 9**  
**CORRELATIONS FOR RELIGIOSITY VARIABLES (ISSP DATA)**

	Average Super- stition	Weekly Attendance	Monthly Attendance	Belief in Heaven	Belief in Hell	Belief in God	Belief in After-Life	Religious Person
Average superstition	1.0	-0.57	-0.55	-0.63	-0.37	-0.47	-0.56	-0.45
Weekly attendance	-0.57	1.0	0.98	0.89	0.81	0.78	0.75	0.82
Monthly attendance	-0.55	0.98	1.0	0.91	0.87	0.86	0.79	0.87
Belief in heaven	-0.63	0.89	0.91	1.0	0.91	0.87	0.92	0.82
Belief in hell	-0.37	0.81	0.87	0.91	1.0	0.82	0.79	0.84
Belief in God	-0.47	0.78	0.86	0.87	0.82	1.0	0.81	0.91
Belief in after-life	-0.56	0.75	0.79	0.92	0.79	0.81	1.0	0.67
Religious person	-0.45	0.82	0.87	0.82	0.84	0.91	0.67	1.0

*Note:* The table shows the correlations of the indicated column and row variables. The data for the average of the three superstition variables are in Table 7. The religiosity variables, also from the ISSP waves, are for the same set of countries.

by the central authority. These ideas accord with the observation that the superstition variables, shown in Table 7, are the highest in the formerly Communist countries of Eastern Europe.

Another point is that organized religions, notably the Catholic Church, try to suppress superstitions, including the labeling of some of these practices as sins. Possibly, as in the attempts of Communist governments to eradicate “respectable” religions, the idea is to suppress competition.<sup>32</sup> The success of this anti-superstition campaign may explain why the superstition variables are particularly low in the most devout Catholic countries included in Table 7, Ireland and the Philippines. This pattern also shows up in a comparison of mostly Protestant Great Britain with mostly Catholic Northern Ireland. The average of the three superstition indicators for Great Britain is 0.32, compared to 0.25 for Northern Ireland.

### CONCLUDING OBSERVATIONS

Our empirical work used a cross-country panel that includes country-level information on religiosity—attendance at formal religious services, religious beliefs, and religiousness (measured by whether people self-identify as religious). These data derive from individual information collected in six international surveys between 1981 and 1999.

We found that the various measures of religiosity tended to decline as an indicator of economic development—per capita GDP—increased. Moreover, results from instrumental estimation suggest that this linkage represents causation from economic development to religiosity, rather than the reverse.

The presence of a state religion tended to raise attendance at religious services but had weaker relationships with religious beliefs and religiousness. We think that the effect on participation reflects the subsidies that typically flow to the established religions. Religiosity tended to decline in response to government regulation of the religion market and with the presence of a Communist government. The elimination of many Communist regimes led to a recovery of religiosity in most of these countries during the 1990s.

Greater religious pluralism, measured by the diversity of adherence among the major religions, tended to raise attendance at formal services but was not significantly related to religious beliefs or religiousness. For most religions—Protestant, Orthodox, Hindu, Jewish, and eastern religions (including Buddhist)—attendance at formal services, beliefs, and religiousness were lower than Catholic. The main exceptions were Muslim and other Christian religions (which particularly picks up Evangelicals). Muslim and other Christian were particularly high on religious beliefs, notably in heaven and hell.

We examined the relation of religiosity to detailed dimensions of economic development: education, urbanization, life expectancy, and the shares of the population over age 65 and under age 15. The measures of religiosity were positively related to education and negatively related to urbanization. Participation in religious services was positively related to the fraction of the population under age 15 and negatively related to life expectancy. When these detailed aspects of economic development were held fixed, religiosity was virtually unrelated to per capita GDP. Although the fits improve by including multiple dimensions of economic development, the causal interpretations become more difficult.

Future research could usefully extend our findings in a number of directions. One extension would be to use Fox and Sandler's (2003) data to sort out the effects on organized religion from various governmental regulations, subsidies, and prohibitions. Other work we have been pursuing (Barro and McCleary 2005) takes a political-economy approach to explain the presence or absence of state religions. It would also be valuable to assess the relationships between religiosity and political and social indicators, including measures of electoral rights and civil liberties. Finally, the recently released WVS for 1999–2003 will allow for a check on our findings and for extensions to a broader set of countries.

#### ACKNOWLEDGMENTS

We have benefited from comments by Gary Becker, Francesco Caselli, Mark Chaves, Ed Glaeser, Jason Hwang, Laurence Iannaccone, Greg Mankiw, James Montgomery, Thomas Osang, Robert Woodberry, and participants in several seminars and classes.

#### NOTES

1. The hypothesis can be viewed as a part of modernization theory, whereby economic development leads to an array of changes in social and political institutions. Modernization theory, as discussed in Bell (1973) and Inglehart and Baker (2000), relates to the economic determinism of Karl Marx; see Marx (1859:11–12). The secularization hypothesis appears in Weber (1905), but he credits the idea to Wesley (1760). For more recent discussions, see Wilson (1966), Berger (1967), and Martin (1978).
2. We are grateful to Greg Mankiw for this argument.
3. In religions outside of Judaism-Christianity-Islam, the role of an after-life is less clear. For example, Hinduism does not have an after-life or heaven, *per se*, but does allow for reincarnation and the potential to reach eventually a state of perfection or enlightenment. In terms of incentives, the potential for achieving this enlightenment can play a role analogous to that of an after-life. Buddhism is, in many respects, similar to Hinduism, but without the stress on physical reincarnation. For further discussion, see McCleary (2006).

4. This cycle is consistent with the old Catholic practice of selling dispensations to sinners. Luther's dissatisfaction with the corruption of this regime was an important force behind the Protestant Reformation. See Ekelund, Hebert, and Tollison (2002) for an economic analysis of the Reformation.
5. According to Weber (1905:117): "The God of Calvin demanded of his believers not single good works, but a life of good works combined in a unified system. There was no place for the very human Catholic cycle of sin, repentance, atonement, release, followed by renewed sin."
6. For a critical survey of this work, see Chaves and Gorski (2001).
7. Other forms of subsidy, such as the favorable tax treatment of the religion sector in the United States, would have a similar effect.
8. See Froese (2005) particularly on the attempts to eliminate organized religion in East Germany and the Soviet Union.
9. For the 1981 data, the information from WVS is combined with Gallup data on weekly church attendance and belief in God for Bulgaria, Poland, and Romania and with Gallup data on belief in life-after-death for Brazil, India, Philippines, Singapore, and Thailand. For the 1990 data, the information from WVS is combined with data from *Eurodim* for Greece in 1987 on church attendance and belief in God. For the 1991 data, for some countries for which data on attendance at formal religious services were unavailable from the 1991 ISSP, we used information from the 1993 or 1994 ISSP (which has information on attendance but not religious beliefs). These countries are Canada, Israel, Japan, Spain, Sweden, Bulgaria, Czech Republic, and Slovenia. For Israel and Slovenia, the 1991 ISSP has data on religious beliefs but not attendance at religious services. The data for Israel from the 1991 and 1993 ISSP refer to the Jewish population only, whereas the 1998 data refer to the overall Israeli population. Our analysis takes account of these differences in religious composition. The data from WVS and ISSP give separate information for Great Britain and Northern Ireland. In the present analysis, we combined these results into single observations for the United Kingdom, based on the relative populations of Great Britain and Northern Ireland.
10. Included here are several countries that are predominantly Orthodox—Armenia, Belarus, Cyprus, Greece, Bulgaria, Macedonia, Moldova, Romania, Russia, and Ukraine. Estonia and Latvia also have high Orthodox representations.
11. The 1999–2003 wave of the WVS will allow a substantial increase in observations on Muslim countries.
12. Some of these countries, notably South Korea, have experienced large increases in Christian adherence over the last 30 years.
13. The meanings of some of these questions are clearer for some religions than for others. For example, Hinduism and Buddhism view heaven and hell as intermediate stages between reincarnations, whereas Christianity regards heaven and hell as ends, not means, to salvation. See McCleary (2006) for further discussion.
14. An alternative procedure would be to use the country-wide averages of religion data from the various surveys. We did not proceed this way because the categories of religion differ across the surveys. In addition, the WVS has a number of coding errors related to religious denominations.
15. The pluralism measure is one minus the Herfindahl index for religions among those professing some religion. For this purpose, we grouped data on religious adherence from Barrett for 1970 and 2000 into 10 major categories: Catholic, Muslim, Protestant, other Christian, Hindu, Buddhist, other eastern religions, Jewish, Orthodox, and other religions. The Herfindahl index—the sum of the squares of the fractions belonging to each religion—can be interpreted as the probability that two randomly selected persons in a country, among those professing some religion, belong to the same religion. Hence, one minus the Herfindahl index is the probability that they belong to different religions and can, therefore, be viewed as an indicator of religious pluralism. (Implicitly, the differences between the religious groupings are assumed to be the same for all pairs. Otherwise, one could weight religions in accordance with the extent of differences between them.) The Herfindahl index equals one and, hence, the pluralism indicator equals zero if everyone belongs to the same religion. If there are two religions of equal size, the Herfindahl and pluralism variables each equal one-half. The Herfindahl index equals (almost) zero and, hence, the pluralism indicator equals (almost) one if there are a large number of religions, each of which covers a negligible fraction of the population. With 10 groupings, the lowest possible value of the Herfindahl index is 0.10, so that the highest possible value of the pluralism measure is 0.90.
16. The GDP data are from Version 6.1 of the Penn World Tables, as described in Heston, Summers, and Aten (2002). These values, available on the Internet, adjust for purchasing power differences across countries.
17. Inglehart and Baker (2000) use a single cross-section from the WVS to assess the relation of religious and other values to per capita GDP and industrial structure. They also look at effects from different religions and from a history of Communist government.
18. In the WVS and ISSP surveys, we coded an individual's dummy for belief in heaven or hell, respectively, as one if the respondent answered yes to the question "Do you believe in Heaven?" or "Do you believe in Hell?" These questions are not in the Gallup Millennium Survey. We coded an individual's dummy for belief in an after-life as one in WVS if the respondent answered yes to the question "Do you believe in life after death?" For ISSP, we coded the dummy as one if the respondent answered yes, definitely, or yes, probably, to the question "Do you believe in life after death?" The after-life question was not in the Gallup Millennium Survey. We coded an individual's belief-in-God dummy as one in WVS if the respondent answered yes to the question "Do you believe in God?" For ISSP, we coded the dummy as one if the respondent selected any of the following: "I know God really exists and I have no doubts about

it;" "While I have doubts, I feel that I do believe in God;" "I find myself believing in God some of the time, but not at others;" and "I don't believe in a personal God, but I do believe in a Higher Power of some kind." (Results were similar if we used a more stringent definition of belief in God from the ISSP surveys.) For the Gallup Millennium Survey, we coded the dummy as one if the respondent answered yes to whether "there is a personal God" or whether "there is some sort of spirit or life force." We coded an individual's religiousness dummy as one in WVS if the respondent answered yes to the question "Independently of whether you go to church or not, would you say you are a religious person?" For ISSP, we coded the dummy as one if the respondent selected any of the following: "Would you describe yourself as (1) extremely religious, (2) very religious, or (3) somewhat religious?" The religiousness variable was not in the Gallup Millennium Survey.

19. In this form, the marginal effect of an independent variable on  $x$  equals the coefficient of the variable multiplied by the quantity  $x(1 - x)$ . Hence, the marginal effect of an explanatory variable on  $x$  diminishes in magnitude as  $x$  approaches zero or one. For a broad range of  $x$ —say between 0.2 and 0.8—the functional form is roughly linear.
20. This method also allows for different error variances in each equation. For a discussion of the SUR technique, see Wooldridge (2002: ch. 7).
21. Formally, we included a constant term and two dummy variables, one for ISSP and one for Gallup. The Gallup dummy was included only in the systems for attendance at formal religious services and belief in God, for which the Gallup data were available.
22. Buddhist and other eastern religions were combined because of a lack of sufficient data from Asian countries to distinguish these two categories. For the pluralism indicator, we used a 10-way breakdown that distinguished Buddhist from other eastern religions. Our present data do not allow us to differentiate among theological subgroups, for example, types of Muslims.
23. The composition of religion adherence across persons who exhibit some adherence may be exogenous with respect to attendance at religious services and religious beliefs. However, it would be unreasonable to regard the breakdown between some and no adherence (appearing in the data as nonreligious or atheist) as exogenous with respect to attending services or holding religious beliefs. Therefore, it would be inappropriate to include among the explanatory variables a measure of the fraction of the population that expressed no religious adherence.
24. We also have information from Barrett, Kurian, and Johnson (2001) on governments that are officially religious, although not maintaining a single religion. Examples in 1970 for countries in our sample are South Africa, Brazil, Philippines, Belgium, Cyprus, Germany, Switzerland, and Australia. If we enter an additional dummy variable into the systems of Table 3 to capture this officially religious category, the estimated coefficients on this new variable are close to zero.
25. Poland is an exception, as it exhibits a small decline in church attendance during the 1990s. However, Poland is even more of an outlier with respect to its high rates of church attendance before the 1990s. The model explains little of the high attendance rate in 1990—see Table 4. Some observers explain the high religiosity during the Communist period by observing that the Catholic Church occupied a chief position of political opposition to the government and was popular and important for these reasons. The decline in religious participation in the 1990s could then reflect the elimination of this political role for the church once the Communist regime collapsed. Although these arguments seem reasonable, they have the shortcoming of explaining the vibrancy of religion in Poland up to 1990 by observing that it was vibrant. The question is, why did religion occupy a different place in Poland than, say, in Hungary or Czechoslovakia, which were also historically predominantly Catholic?
26. The reason for these results is that most of the explanatory variables, including the log of per capita GDP, have a partial correlation with the religious-pluralism variable that is small in magnitude. The exception is the state-religion variable, which has a negative partial correlation with the pluralism variable (consistent with our analysis of the determinants of state religion in Barro and McCleary (2005)).
27. These results can reflect differences across religions in the role of attending formal services. For example, religions vary by the weight that they attach to organized services versus personal prayer—a form of direct communication with God.
28. For a discussion of instrumental variables, see Wooldridge (2003: ch. 15).
29. Being too close to the equator is clearly bad for an economy. However, being too far away is also bad because eventually temperatures get too cold. To capture this last effect, we entered the square of degrees latitude into the regressions. The coefficient of this variable differed insignificantly from zero because our sample does not include places, such as Greenland and Antarctica, that are excessively far from the equator. There is a possibility that land-locked status is endogenous in a long-run sense. However, dropping this variable from the instrument lists has little effect on our findings.
30. This procedure is not ideal because the omission of explanatory variables that are correlated with the log of per capita GDP would bias the estimated coefficient of the log of per capita GDP. Thus, if we could come up with enough additional instruments, we would instead retain the other endogenous variables in the systems and estimate by three-stage least-squares.
31. We lack sufficient data on the superstition variables to carry out the sort of cross-country statistical analysis done in Tables 3 and 6.

32. The Catholic Church may also have competed by incorporating magical practices into its own ceremonies, notably the Eucharist, in which a wafer and wine are ontologically identified as the body and blood of Christ. Luther and subsequent forms of Protestantism denounced these practices as untenable.

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