Religion and Political Economy in an International Panel*

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Abstract

Economic and political developments affect religiosity, and the extent of religious participation and beliefs influence economic performance and political institutions. We study these two directions of causation in a broad cross-country panel that includes survey information over the last 20 years on church attendance and an array of religious beliefs. Although religiosity declines overall with economic development, the nature of the response varies with the dimension of development. Church attendance and religious beliefs are positively related to education (thereby conflicting with theories in which religion reflects non-scientific thinking) and negatively related to urbanization. Attendance also declines with higher life expectancy and lower fertility. We investigate the effects of official state religions, government regulation of the religion market, Communism, religious pluralism, and the denominational composition of religious adherence. On the other side, we find that economic growth responds positively to the extent of some religious beliefs but negatively to church attendance. That is, growth depends on the extent of believing relative to belonging. These results hold up when we use as instrumental variables the measures of official state religion, government regulation, and religious pluralism.

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Interactions between religion and political economy involve two directions of causation. On one side, a nation's economic and political developments affect its levels of 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 and the nature of political, legal, and social institutions. From this perspective, religious activities and beliefs are the independent or exogenous variables.

I. Religion as the Dependent Variable

A. Secularization and Related Hypotheses

The secularization hypothesis is a prominent idea in theories that view religion as endogenous.[1] In this analysis, economic development causes individuals to become less religious, as measured by church attendance and religious beliefs. The beliefs may refer to God, an after-life, heaven, hell, and so on, or may just refer to tendencies of people to characterize themselves as religious. The secularization hypothesis also encompasses the idea that economic development causes organized religion to play a lesser role in political decision-making and in social and legal processes more generally.[2] One manifestation of this force is a tendency for official state churches to be abandoned as countries develop. As examples, countries such as Mexico, Turkey, Japan, and South Korea dropped their

[1] The hypothesis can be viewed as one component of modernization theory, in which economic development leads systematically 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, for example, Marx (1913, pp. 11-12). The secularization hypothesis itself dates back at least to Weber (1930). For more recent discussions, see Wilson (1966), Berger (1967), and Martin (1978).

established state churches many years ago. The secularization hypothesis remains controversial, and an important aspect of the present study is to assess its empirical validity in modern data.[3]

Economic development typically encompasses an array of changes, which include increases in per capita income, education, life expectancy, and urbanization; reductions in fertility; and changes in age structure. The predicted effect on religiosity depends on the particular aspect of economic development. Hence, it is important in theoretical and empirical treatments to distinguish among these aspects.

Consider first increased education. One argument for the secularization hypothesis is that more educated people are more scientific and are, therefore, more inclined to reject beliefs that reflect mainly superstition and reliance on super-natural forces. In particular, if religious beliefs are based primarily on ignorance, then more educated persons would tend to be less religious. This viewpoint accords with Hume (1757, pp. 182-83), who argued that religion 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 church attendance and in an array of religious beliefs.

A contrary argument is that religious beliefs are fundamentally non-verifiable and, therefore, require a considerable degree of abstraction or "faith." Scientific analysis—and theoretical reasoning generally—also require a capacity for abstraction. If more educated persons are more capable of the abstractions needed to think scientifically,

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[2] This idea appears in Weber (1930) and has been extended in Wilson (1966), Berger (1967), and Chaves (1994).

[3] For discussions of evidence contrary to the hypothesis, see, for example, Finke and Stark (1992) and Iannaccone and Stark (1994).

then they may also be more able or willing to make the abstractions needed to support religious beliefs. Therefore, from this perspective, more educated persons might be more religious.[4] See Iannaccone, Stark, and Finke (1998) for further argument against Hume's linking of religion and irrationality.

Sacerdote and Glaeser (2001) provide a different reason for why increased education would spur church attendance. 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 church services. However, in this approach, church attendance bears no special relation to religious beliefs—this attendance is modeled as just one of many ways to build social capital. In this analysis, there is no clear relation between education and the extent of religious beliefs, except to the extent that more frequent church attendance instilled greater beliefs.

Models that focus on the role of salvation and the after-life,[5] such as Azzi and Ehrenberg (1975) and Glaeser and Glendon (1998), predict that people would become more religious as they age and, hence, get closer to death. Similarly, for a given age, the prediction is that religiousness would be higher the lower is one's life expectancy. These conclusions follow if salvation depends on cumulated religious effort, including church attendance and prayer, during one's lifetime. In this case, because of discounting of future expenditures, it would be desirable to postpone "outlays" until later in life.

[4] We are grateful to Greg Mankiw for suggesting this argument.

[5] 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 or *nirvana*. In terms of incentives, the potential for achieving *nirvana* can play a role analogous to that of an after-life. Buddhism is, in many respects, similar to Hinduism, but without the reliance on reincarnation. For further discussion, see McCleary (2002).

The arguments about age and life expectancy are stronger if salvation relates especially to activities toward the end of life—as seems to be true under Catholic doctrine, which allows for a continual cycle of sinning and absolution.[6] In this system, people have an incentive to accumulate sins early in life and then make up for them as they get closer to death. Weber (1930) argued that this pattern would not tend to emerge—or, at least, would be attenuated—under some forms of Protestantism. In particular, the Calvinist view posits daily moral conduct throughout one's life as the only means of ensuring God's grace—or, at least, of providing a sign that one has been chosen.[7]

The Muslim religion is, in some respects, similar to the Catholic religion in that redemption is possible at any time, even in Purgatory, by attaining belief in Allah and otherwise 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, this doctrine seems also to motivate devout behavior especially at advanced ages.

Under the Buddhist faith, 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 and, hence, salvation.

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[6] A recent example is the Pope's unwillingness to adopt a zero-tolerance policy for pedophile priests. Apparently, the Pope wanted to maintain the potential for absolution for past sinners. Another example is 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 (2001) for an economic analysis of the Reformation.

Economic reasoning implies that anything that raises the cost of religious activities would, *ceteris paribus,* reduce these activities. For example, economic development raises the value of time, measured by market wage rates and per capita incomes. On this ground, development implies a rising opportunity cost of participating in organized religion, which encompasses church services, retreats, and pilgrimages. The cost of time spent at informal religious activities, such as prayer at home, would also rise. Hence, the prediction is that economic development would reduce church attendance, as well as the time allocated to prayer and other religious activities.

This conclusion applies with lesser force to persons who are out of the labor force, such as retired persons. Historically in developed countries and even today in many developing countries, women are also typically not in the labor market. Therefore, women would tend to attend church more frequently than men. An increase in labor-force participation, notably of women, would be predicted to reduce church attendance and other religious activities.

The argument about the increasing value of time assumes that the enhanced productivity that applies generally in the economy (as signaled by rising wage rates) is not accompanied by a similar productivity gain for the time spent in church or at prayer. The usual assumption is that churchgoing and other aspects of religious participation are intensive in time and are, therefore, not subject to the usual productivity advances associated with technological progress and increases in physical capital. A question, however, is whether the improvements in human capital due to rising education would somehow also make the time spent on religion correspondingly more productive.

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[7] According to Weber (1930, p. 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

Aging can also affect the cost of churchgoing, especially for the sick and elderly. On this ground, the prediction is that people who are ill or very old would attend church relatively little 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 church attendance, the sick and elderly may hold strong religious beliefs, that is, they may invest heavily in personal "spiritual capital."

Children would tend to attend church 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. (However, this perspective on the productivity of religious investment may apply more to parents than to the children themselves.) This effect offsets the regular age influence discussed earlier. Moreover, the incentive to bring children to church tends to induce greater church attendance of adults, who are likely to want to participate in the process of inculcating their children.

Urbanization is another aspect of economic development that has been argued to have a substantial negative effect on religiosity. One reason is that urban areas offer an array of competing social activities, such as museums, theatres, and political organizations, which compete with church participation. A possible explanation for this urban/rural pattern of social amenities is that economies of scale are important for museums, etc., but are less significant for the erection and staffing of churches. That is, even sparsely populated rural towns can sustain a local congregation.

Catholic cycle of sin, repentance, atonement, release, followed by renewed sin."

Another argument is that rural areas are dominated by agriculture, which is especially prone to the uncertainties of nature. Greater church attendance in rural areas may then reflect a greater demand for religion as a way to cope with these uncertainties.

Wilson (1966) and Berger (1967), picking up on an argument from Weber (1930), argued that economic development leads to the secularization not only of individuals but also of political and social institutions, including the churches themselves. On the political level, organized religions would be predicted to play a smaller role in governance and legislation. Notably, official state churches would become less frequent, and separation between church and state would become more common. Organized religion would be predicted to have a decreasing influence over regulations involving such matters as economic regulation, marriage, divorce, birth control, abortion, and euthanasia. Church services would be predicted to become less demanding, for example, by abandoning the use of a "foreign" language, requiring smaller outlays of time by participants, reducing elaborate rituals, and requiring less stringent practices by adherents. Part of this process, according to Weber (1930) and Troeltsch (1931), is that religious sects—at least successful ones—tend to become less other-worldly and more like the established denominations.

B. Pluralization and Religious Competition

Another argument by secularization theorists is that religiosity would be fostered by the existence in a country of a monopoly provider of religion, for example, by the presence of an established state church. If competition existed among churches, then the argument is that much of this competition would take the form of debunking the religious

beliefs or myths that were practiced by other groups. If the beliefs were based primarily on superstition and ignorance, then the conclusion is that these beliefs could not withstand the competition. Hence, according to this view, the demise of official state churches—predicted to be a part of the secularization process—would tend to foster the decline in individual church attendance and beliefs. Some of this argument appears in 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 non-innovative and indolent. He particularly observed this behavior in the Roman 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." In response, state religions tended to devolve, losing the aspects of religious devotion that are relevant to people practicing their faith and the authority of its doctrine. 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 and the arts, and to 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 very motivated to provide a high level of customer satisfaction.

In contrast, religious denominations that depend 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. In response, the established state religions have sometimes resorted to coercion, repression, and even violence to maintain their financial, political, and social arrangements. The Inquisition in Spain in the late 1500s is an extreme example of this response.

Religion, Smith argued, is more vibrant where there is a disassociation between church and state. 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 would generate a public display of "good temper and moderation." In an open religion market, Smith predicted a continual subdividing of sects so that a pluralistic structure would naturally emerge in which no single religion dominated. He also contended that, where there is state support for a religious monopoly or for an oligopoly among religions, one will find zealousness 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) modified the Smithian view by arguing that the relaxation of state regulation of religion could unleash competitive forces in the economic marketplace even if the upstart religions did not achieve large increases in membership. The focus of this argument lies with the legal recognition of non-conformist Protestant denominations during the 1700s in England (see Worsley [1816], Ashton [1924], and Hagen [1962]).

Part of the appeal of these groups was that they offered a different vision of the link between salvation and economic activity. Although these groups did not become near dominant in the religion market in terms of membership, they did come to dominate certain sectors of the economy, notably those associated with entrepreneurship.

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 "market" or "supply-side" model of religious participation. Their argument is that greater religious pluralism—measured, for example, by an index of the diversity of religious denominations that exist in a country or region—tends to promote better service and, hence, encourages religious participation.[8] Moreover, the presence of an established state church—notably in Scandinavian countries—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 church attendance. That is, individuals may sustain a high degree of religious beliefs even if they rely less on the support from organized religion.

Chaves and Cann (1992) extended the supply-side argument by using empirical measures of the extent of state involvement and interference with church activities. For example, greater state regulation of religion—which Chaves and Cann measured by, among other things, whether the government appoints or approves church leaders—was argued to decrease the efficiency of religion providers and, hence, to generate lower rates of church attendance. However, state religion also typically includes forms of subsidy, such as payments to church employees and the collection of taxes dedicated to church

uses. An economic perspective implies that these subsidies would encourage formal religious activity. Thus, despite Smith's eloquent thoughts on the evils of government supported monopoly, the overall impact of an official state church on religious participation could well be positive.

Governments can also suppress religion, either specific ones or in general. For example, Communist countries, such as the Soviet Union and China, tried hard to eradicate organized religion. A likely reason is that organized religion was regarded as competitive with the Communist quasi-religion. From an empirical perspective, it is therefore interesting to examine not only the impact of Communism on church attendance and religious beliefs, but also the changes that have occurred since the elimination of Communism in many countries in the 1990s.

II. Religion as the Independent Variable

A. Effects on Economic Development

Weber's (1930) principal thesis is that religion can be an important positive or negative force on economic development. He stressed that the stimulus to economic growth would be positive if religion looked favorably on the accumulation of material wealth, perhaps in conjunction with rewards obtained in an after-life. Weber found this favorable element especially in the Calvinist Protestantism that arose in parts of Western Europe during the Reformation.[9] Notably, a life of good works, reflected in material

[8] For a critical survey of this work, see Chaves and Gorski (2001).

[9] Weber's analysis focuses on the causal link from religious doctrine to the incentives for economic performance. Tawney's (1926) suggestion is that the economically favorable beliefs contained in some forms of Protestantism may have been a response to the rise of capitalism. In this view, the causal arrow points from economic performance to religious beliefs, as well as in the opposite direction. Tawney also argued that a general decline of religious authority would help to make acceptable the acquisition of wealth and, thereby, promote economic growth. Troeltsch (1931, pp. 34-36) argued that religions that would

success, was viewed as the only way to attain some epistemological certainty of having received God's Grace.[10] However, Weber also predicted that, once capitalistic modes of labor and production were firmly established, the relationship between religion and economic activity would weaken. He argued that the Protestant ethic would become embodied in general ethical codes and social and legal institutions and would, therefore, no longer depend on specific forms of religious practices and beliefs.[11] Thus, Weber would not predict a close association in modern data between religious affiliations or practices and economic outcomes.

Another line of argument involves the moral codes advocated by some religious doctrines. Religion can encourage economic development by promoting a positive attitude toward honesty. Notably, religion may increase levels of trust and reduce levels of corruption and criminal activity. In this connection, Lipset and Lenz (2000) argue empirically that Protestant countries are less corrupt than Catholic ones. Stulz and Williamson (2001) find that Protestant countries provide greater legal protection than Catholic countries for creditors, although not for shareholders. Protestant countries also seem to be better in various dimensions of the rule of law, including the efficiency of the judiciary. However, probably because of limited data, Stulz and Williamson do not reach clear conclusions about the differences between Christian and non-Christian countries.

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support economic progress were those based on reason and rational activity, which he particularly found in Calvinist Protestantism. He contrasted these denominations with others, such as Lutheranism, that were founded on "imagination and simplicity of feeling with a non-reflective habit of mind, a primitive energy, and an urgent sense of need."

[10] More generally, Weber focused on the connection between an individual's belief in salvation and the incentives for that individual to attain material success on earth. See Weber (1963, Ch. 9). His most famous discussion of the relationship between salvation and achievement is in Weber (1930). For survey essays on contemporary treatments of this theme, see Fischoff (1944) and Sprinzak (1972). For specific treatments of the relationship between Protestantism and entrepreneurship, see Jeremy (1988, 1990, 1998), McClelland (1961), and Hagen (1962). For a discussion of the relation between salvation and economic incentives in the main religious doctrines, see McCleary (2002).

Religion may also influence a country's openness to strangers and, hence, the propensity to interact with outsiders in domestic or international business. For example, a religion that makes familial relations paramount would tend to be suspicious of contracts and commerce involving outsiders. In this context, La Porta, et al (1998) find that legal traditions that originate from France (and, hence, perhaps ultimately from Catholicism) tend to provide less protection for outsiders than those that originate from England. Consequently, businesses in French-origin countries tend to rely more on concentrated ownership and internal finance, rather than access to broad, impersonal equity and credit markets.

Further analysis along these lines could lead to a general interaction between religion and the extent of international trade and finance. That is, in countries where the dominant religion discourages interactions with strangers, the prediction is that international openness would be low. For similar reasons, religion may influence the extent to which societies absorb the advanced technologies that originate in foreign countries.

Another channel for economic effects of religion involves the role of a work ethic. Religions that instill a strong work ethic would stimulate labor effort and, thereby, increase productivity. Religion may also encourage thrift and, hence, stimulate saving, investment, and growth. In addition, religion may be productive by discouraging participation in "sinful" activities, such as gambling, sex outside of marriage, and consumption of alcohol and other drugs. Through these channels, religion may lead to better health, which is a dimension of human capital that is known to raise productivity.

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[11] This theme was developed further by Berger (1967), who argued that, as countries modernized, economic practices would become institutionalized and, therefore, lose their religious underpinnings.

Not all aspects of religion are favorable to economic performance. For example, religion may retard growth by discouraging capital accumulation and the profit motive or by interfering with free-market activities, notably credit markets. The prohibition of interest in the Koran is a well-known example.[12] Religion might also be a negative factor if it diverts time and resources away from market activities and toward church attendance, the building of cathedrals, and the support of ascetic communities and mendicants.

Religion's role in discouraging or encouraging violent behavior domestically and internationally is an additional important issue that can interact with economic development. The Crusades and the Inquisition demonstrate that religious extremism can sometimes be manifested in forms of international and domestic violence. This pattern also appears in present day religious based conflicts, such as in Northern Ireland and in the international terrorism associated with Islamic extremists.

In the various forces outlined in this section, the key elements were individuals' beliefs, for example, with respect to salvation, honesty, thrift, and so on. The analysis did not place weight on church attendance, *per se*, except to the extent that this participation in organized religion served to promote or diminish the various religious beliefs.[13] To put it another way, the theoretical analysis suggests a distinction between "believing versus belonging." For most purposes, the expectation is that believing is the force that counts. For given levels of religious beliefs (measured empirically in the subsequent

[12] For an analysis of the economics of usury restrictions, see Glaeser and Scheinkman (1998). Kuran (1993) provides a general analysis of the economic effects of Islam.

[13] An exception to this approach is Sacerdote and Glaeser's (2001) argument that church-going is important for social capital in the form of networking. Then, if this type of social capital were socially productive, Sacerdote and Glaeser would predict a positive effect of church attendance on economic performance, for given religious beliefs.

analysis from survey information), the extent of belonging may be unimportant for economic performance. In fact, belonging could be a negative force if it reflects time diverted away from productive activities and, perhaps, adverse effects from organized religion on political decision-making.

B. The Determination of Economic Growth

Much of the first author's research over the past decade has used the experience of a broad group of countries to assess the determinants of economic growth—see, for example, Barro (1991, 1997, 2000). One conclusion from this work is that explanations of economic performance have to go beyond narrow measures of economic variables to encompass political and social factors. In particular, the empirical results reveal important influences on growth from policies and institutions.

Some researchers have argued that explanations for economic growth should go further to include independent variables that measure a nation's "culture," of which religion is one part.[14] Culture is usually thought to matter by affecting the kinds of traits already mentioned in the discussion of religion: honesty, willingness to save and work hard, openness to strangers, and so on. The arguments about culture mattering seem reasonable on an *a priori* basis, but much of the work in this literature is impressionistic, rather than quantitative or rigorous. Therefore, one of our goals is to include quantifiable dimensions of culture, notably of religious participation and beliefs, into the kind of cross-country empirical analysis of economic growth that was implemented before.

[14] See, for example, Huntington (1996) and Landes (1999).

III. Data on religiosity across countries

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.

We have expanded this data set to include measures of religiosity. The most useful sources of international data on church attendance and religious beliefs seem to be the surveys reported in the three waves of the *World Values Survey* or *WVS* (1981-84, mostly 1981; 1990-93, mostly 1990; and 1995-97, mostly 1995 and 1996), the two reports on religion by the *International Social Survey Programme* or *ISSP* (1990-93, mostly 1991; and 1998-2000, mostly 1998), and the Gallup Millennium Survey (1999). We have also used a survey on religious behavior in Greece for 1987 and information for a few countries in the early 1980s from Gallup international surveys. Another wave of the *WVS* applies to 2000-01 and will soon be available. At present, we are using these data only to form country-wide averages of data at each survey date. In subsequent analysis, we plan to use the individual data, which typically apply to 1000-2000 respondents in each 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 59 countries, which includes up to 23 countries observed around 1981, 37 around 1990, 22 around 1991, 32 around 1995, 28 around 1998, and 41 around 1999.[15]

[15] 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 church attendance data were unavailable from the 1991 *ISSP*, we used information from the 1993 or 1994 *ISSP* (which has information on church attendance but not religious beliefs). These countries are Canada, Israel, Japan, Spain, Sweden, Bulgaria, Czech Republic,

The maximum number of country-time observations is 183. The exact sample size for the various years depends on the particular measure of religiosity. The forthcoming fourth wave of the *WVS* for 2000-01 appears to provide religion data for up to 71 countries for which data on other variables are also available. Hence, this new wave may allow a substantial increase in the sample.

Table 1 shows the 59 countries in the sample. The coverage is better for rich countries than for poor ones and for countries that are primarily of the Christian faith.[16] The predominantly Muslim countries included are Bangladesh, Malaysia, Pakistan, and Turkey.[17] Countries in the sample that have predominantly eastern religions (including Buddhist), among persons expressing some religious adherence, are China, Hong Kong, Japan, South Korea, Singapore, Taiwan, and Thailand.[18] Malaysia also has substantial representation in these religions.

Some of the survey questions relate to attendance at churches or analogous places of worship. Specifically, we can use the responses to generate the fractions of the population that attended church at least weekly, at least monthly, and so on. Some of the surveys (the two *ISSP* waves and the forthcoming 2000-01 *WVS*) include questions about time spent at prayer. Other queries concern religious beliefs and attitudes; for example,

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and Slovenia. For Israel and Slovenia, the 1991 *ISSP* has data on religious beliefs but not church attendance. The data for Israel from the 1991 and 1993 *ISSP* refer to the Jewish population only. The 1998 *ISSP* data refer to the overall Israeli population and were not used (because of this inconsistency) in the present study.

[16] Included here are several countries that are predominantly Orthodox—Cyprus, Greece, Bulgaria, Romania, and Russia. Estonia and Latvia also have high Orthodox representations.

[17] Nigeria has religion data and is primarily Muslim. However, missing data on other variables, such as educational attainment, prevent the inclusion of Nigeria in the statistical analysis.

[18] Some of these countries, most notably South Korea, have experienced large increases in Christian adherence over the last 30 years.

do you believe in God (in various forms), heaven, hell, and life after death?[19] Another question, which might be more robust across religious denominations, is whether the respondent considers himself or herself to be a religious person.

We have used tables from the first edition of the *World Christian Encyclopedia* (Barrett [1982]) to assemble information on religious denominations (as professed in surveys or censuses in which people are asked to state the religion, if any, to which they adhere). The data used in the present study apply to 1970 and 1980.[20] The second edition of the encyclopedia (Barrett, Kurian, and Johnson [2001]) has updated information on religious adherence and will be used in subsequent analysis.

The data on religious denominations allow us to construct a measure of religious pluralism, based on a Herfindahl index of adherence to the main religious denominations.[21] Table 1 shows the values that apply in 1980 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

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[19] The meaning of some of these questions is unclear for some religions. For example, Buddhism has no concept of hell. Also, heaven does not appear, at least literally, in Hinduism and Buddhism. See McCleary (2002) for further discussion.

[20] For some of the eastern European countries, which did not exist or were not covered in Barrett's (1981) first edition, the data come from Barrett, Kurian, and Johnson (2001) and refer to 1970 and 1990.

[21] The pluralism measure is one minus the Herfindahl index for religious denominations among those professing some religion. For this purpose, we grouped data on religious adherence from Barrett (1982) for 1970 and 1980 into nine major categories: Catholic, Muslim, Protestant, 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 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 think of weighting denominations in accordance with the extent of differences among 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 religious denominations each of which has a negligible fraction

Muslim Pakistan and Turkey. Places that exhibit high levels of pluralism include the United States, Germany, the Netherlands, Switzerland, Australia, Malaysia, and Singapore.

We have used Barrett, Kurian, and Johnson's (2001, pp. 834-35) tabulations to measure the presence or absence of a state religion. These classifications are clearer in some cases than in others. In some of the straightforward situations, the constitution designates an official state church and restricts or prohibits other forms of religion. 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, et al, to classify some countries as having a "state religion," despite the absence of an official state church in the constitution. Controversial cases that fall into this category include Italy, Portugal, and Spain, which are considered to have a Roman Catholic state religion even in 2000. Table 1 shows the classifications in 1970 for the countries used in the statistical analysis. In subsequent work, it might be feasible to go beyond this dummy-variable classification to consider gradations in the practice of state religion.

We have 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 the concept suggested by Chaves and Cann (1992)—whether the government appoints or approves church leaders. The Barrett, et al, discussions of this concept typically refers to the late 1970s. However, the information is incomplete in many cases and is not fully consistent across countries.

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of the population. With nine groupings, the lowest possible value of the Herfindahl index is 0.11, so that the highest possible value of the pluralism measure is 0.89.

Hence, further analysis of other sources would likely improve the measure of state regulation of religion. The data used in the present study are reported in Table 1.

IV. Cross-Country Empirical Findings on the Determinants of Religiosity

A. Setup of the Statistical Analysis

Table 2 shows cross-country econometric results for measures of church attendance and religious beliefs. There are six systems corresponding to the different measures of religiosity—fraction of the population attending church at least weekly in column 1, fraction attending at least monthly in column 2, fraction of the population who believe in heaven in column 3, fraction who believe in hell in column 4, fraction who believe in an after-life in column 5, and fraction who believe in God in some form in column 6.[22] The form of each dependent variable is the transformation $\log[x/(1-x)]$ of the original series x. This form confines the fitted value of x to the interval (0,1).[23]

Each system consists of five or six equations corresponding to the religiosity survey data: the first is for data around 1981 from the *World Values Survey* (*WVS*), the second is for data around 1990 from *WVS*, the third is for data around 1991 from the *International Social Survey Programme* (*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 church attendance and belief in God).

In each system, the dependent variable is related in a regression framework to an array of explanatory variables. These explanatory variables include four measures of

[22] Similar results are obtained if the dependent variable is measured by the fraction of persons who consider themselves to be religious.

[23] In this form, the marginal effect of an independent variable on x is given by the coefficient of the variable multiplied by the quantity $x \cdot (1-x)$. This formula shows that the marginal effect of an explanatory variable

economic development: real per capita gross domestic product (GDP), average years of school attainment of the adult population aged 25 and over, the urbanization rate (typically the fraction of the population living in places with at least 2500 people), and the log of life expectancy at birth. The systems also include two measures of age structure: the fraction of the population aged 65 and over and the fraction aged 15 and under.[24] The first age variable gauges the extent of the elderly population, and the second one relates to the number of children per adult in the overall population.

Previous analyses of the determinants of religiosity have tended to look at economic development as a single dimension. However, the present data set includes enough observations to allow separation of the effects from the various dimensions of development that were discussed in the theoretical section. The breadth of the data is crucial when trying to disentangle, for example, the effects of education, urbanization, per capita GDP, and life expectancy, all of which typically rise along with economic development.[25]

Another set of variables included in Table 2 involves the composition of the population by professed religious affiliation in 1980. The present analysis uses an eight-way breakdown into major categories: Catholic, Muslim, Protestant, Hindu, eastern religions (including Buddhist), Jewish, Orthodox, and other religions. In each case, the variable refers to the fraction adhering to the specified religion among persons who

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on the variable 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 can be reasonably approximated as linear.

[24] The GDP data are the Summers-Heston measures (which adjust for purchasing power differences across countries) and are available from www.nber.org. These figures were updated from the World Bank, *World Development Indicators*. The schooling data were assembled by Barro and Lee (2001) and are available from post.economics.harvard.edu/faculty/barro/barro.html. The other variables are from the World Bank.

[25] Inglehart and Baker (2000) use a single cross-section from the World Values Survey to assess the relation of religious and other values to per capita GDP and industrial structure. They also look at effects from different religious denominations and from a history of Communist government.

expressed adherence to some religion.[26] The econometric specification omits the Catholic fraction as a normalization. Hence, each coefficient should be interpreted as the effect from the indicated religion relative to that for Catholic.

The regression systems also include the previously discussed pluralism measure, which is computed from the Herfindahl index for the various religious affiliations in 1980 (or for 1990 for some eastern European countries). The Herfindahl measure was calculated from a nine-way breakdown of affiliations that distinguishes Buddhist from other eastern religions. (For the denominational variables, Buddhist and other eastern religions were combined because of a lack of sufficient data from Asian countries to distinguish these two categories.)

Finally, the system includes a number of variables related to government influences on the religion market. These variables are the dummy for the presence of an official state religion, the dummy for whether the government regulates the religion market (by appointing or approving church leaders), and dummies for the presence and subsequent removal of Communist regimes.

Table 3 shows the means and standard deviations of the variables used in the regressions. Tables 4 and 5 show actual and fitted values of the dependent variables for selected observations. (Many of these countries have been viewed as "interesting" in the literature and are, therefore, not a random selection.) Table 4 applies to monthly church attendance and Table 5 to belief in heaven.

[26] Our idea is that the composition of religious adherence across persons who exhibit some adherence may conceivably be exogenous with respect to church attendance and religious beliefs. However, it is unreasonable to regard the breakdown between some and no adherence (appearing in the data as non-religious or atheist) as exogenous with respect to attending church 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.

B. Effects of Economic Variables

The data reveal an overall pattern in which economic development is associated with less religiosity, measured by church attendance or beliefs. This pattern can be seen by looking at simple relations (where no other variables are held constant) between a measure of religiosity and per capita GDP, which we take as the basic indicator of development. As examples, negative associations with per capita GDP appear for monthly church attendance in Figure 1 and for belief in heaven in Figure 2.

The statistical results shown in Table 2 reveal very different patterns for the individual dimensions of economic development. One result that shows up clearly is a significantly positive estimated coefficient for education in all of the equations for church attendance and religious beliefs. These results reflect partial relationships. For example, the regression framework isolates a positive relation between education and church attendance, while holding constant the correlated development indicators—per capita GDP, urbanization, life expectancy, and age structure—as well as the other explanatory variables shown in Table 2. The estimated coefficient of 0.191 (s.e.=0.035) in column 2 implies that 2 extra years of average schooling (the sample standard deviation of this variable) would raise monthly attendance by 9 percentage points, starting from the mean value for attendance of 36%.

The positive, partial relation between monthly church attendance and education is shown graphically in Figure 3. Note that this diagram holds constant the influence on monthly church attendance from the explanatory variables other than education that are included in Table 2. (See the notes to figures for a discussion.) This positive association

accords with Sacerdote and Glaeser's (2001) analysis, which focused on the incentives of more educated people to attend group activities, including church services.

However, Figure 4 shows that a similar positive, partial relation appears for belief in heaven. Similar patterns also apply for beliefs in hell, an after-life, and God (and also for a person's tendency to classify himself or herself as religious). The positive, partial relations of religious beliefs to education suggest that the beliefs do not rely on ignorance or non-scientific thinking. Thus, these relations conflict with Hume's (1757) views on the irrationality of religion. As mentioned before, a positive relation between education and religious beliefs might arise because these beliefs can never be proved or disproved and, therefore, depend on faith and the capacity for abstraction. Hence, believing may come more readily to more educated or scientific persons, who have a greater capacity to engage generally in abstract or theoretical reasoning.

Another clear pattern in Table 2 is the significantly negative relation between the measures of religiosity and the urbanization rate. The estimated coefficient of -1.41 (s.e.=0.32) for monthly church attendance in column 2 means that an increase in the urbanization rate by 0.15 (its sample standard deviation) would lower monthly attendance by about 5 percentage points. The negative, partial relation between monthly attendance and the urbanization rate is shown graphically in Figure 5.

The inverse relation between church attendance and urbanization is consistent with the argument that church services would have little competition from other forms of social interaction in rural areas. This negative association would be expected to carry over to religious beliefs if participation in organized services were conducive to the maintenance of these beliefs. Another possible explanation for the inverse relation

between urbanization and beliefs is that the uncertainty of economic conditions—and, hence, the demand for religious assistance—is greater in rural settings. The estimated coefficients are, in fact, negative for the various religious beliefs. The relation with belief in heaven is shown graphically in Figure 6.

Table 2 also shows significantly negative relations between church attendance and life expectancy. The estimated coefficient of -4.9 (s.e.=1.7) in column 2 means that a rise in life expectancy by 7% (the sample standard deviation) would lower monthly church attendance by about 8 percentage points. This relation is depicted graphically in Figure 7. An inverse effect of life expectancy on church attendance is consistent with theories in which people defer investments in churchgoing when they are far away from their anticipated deaths. (Recall that age structure is held constant in the regressions.)

In contrast, the results show positive relations between life expectancy and religious beliefs, although the estimated coefficients are statistically significant only for the beliefs in heaven, hell, and an after-life. The relation for heaven is shown in Figure 8. One might have expected the inverse relation between life expectancy and church attendance to carry over to religious beliefs. However, aside from the channel working through church attendance, the theoretical analysis makes no clear predictions about how life expectancy would relate to these beliefs. That is, people who are further away from death may have low incentives to spend time at church, but they need not have low levels of religious conviction.

The estimates shown in Table 2 indicate that, once the other development indicators are held constant, the relation between church attendance and per capita GDP is not statistically significantly different from zero. The relation of the religious beliefs to

per capita GDP is negative and marginally significant. Figures 9 and 10 show the partial associations of monthly church attendance and belief in heaven with per capita GDP.

For age structure, one result in Table 2 is that a greater presence of children (higher population share under age 16) goes along with greater church attendance. This pattern accords with theoretical presumptions. However, there is no clear relation empirically between the presence of children and religious beliefs. The theory also does not suggest clear patterns for these relationships.

The old-age fraction is not significantly related to church attendance. This finding accords with the ambiguity in the theory, whereby the elderly would wish to attend church more often because of their impending deaths but would be deterred by the likely high costs of going to church. The empirical results indicate a negative association between the old-age fraction and religious beliefs, although the theory is silent on these relations.

We can also use the empirical framework to investigate whether there is any secular trend in religiosity for given values of the economic variables (and for given values of the other explanatory variables shown in Table 2). In the systems shown in Table 2, the same constant applies for the various survey years, 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 were estimated for the surveys from different dates (*WVS* for 1981, 1990, and 1995, and *ISSP* for 1991 and 1998). Thus, we can test for a secular trend in the religiosity variables by allowing these constant terms to vary over these dates.

The conclusion is that, at the 5% critical level, the only statistical evidence for a trend is for belief in hell—in this case, beliefs appear to be rising over time. At the 10% critical level, there is indication of a declining trend in monthly church attendance. For the other variables, the hypothesis of equal constant terms for the different years would be accepted at a 10% or higher critical level.

C. Effects of State Religion, State Regulation, and Communism

Table 2 shows that the estimated coefficients on the state-religion dummy variable are significantly positive for church attendance. The estimated value of 0.85 (s.e.=0.14) in column 2 implies that the imposition of a state religion would raise the monthly church attendance rate by 19 percentage points (starting again from the mean attendance rate of 36%).[27] This pattern conflicts with the one predicted in the religion-market model of Stark and Bainbridge (1987), Iannaccone (1991), Finke and Stark (1992), and Finke and Iannaccone (1993). In that view, state religion promotes monopoly and, therefore, poor service and low rates of church attendance. However, since state religion also typically goes along with substantial state subsidy, it is not

[27] These results apply when we use the status of state religion as of 1970. Our sample does not contain enough instances of change after 1970 to assess the responses of church attendance and religious beliefs. The main example of a shift since 1970 is Ireland's abandoning Roman Catholicism as its state religion in 1972, although Barrett, Kurian, and Johnson (2001) continue to classify Ireland as officially religious, but no longer officially Roman Catholic. Legislative changes also occurred after 1970 in Italy, Portugal, and Spain, but Barrett, et al, continue to label these countries as maintaining a Roman Catholic state religion even in 2000. More recently, some Scandinavian countries have abandoned the Lutheran church as the state religion. If we compare 1970 with 1900, then we find many examples of countries having relinquished state religions. Using Barrett, Kurian, and Johnson's (2001) data, examples for countries in our sample are Brazil, Chile, China, Japan, South Korea, Turkey, Latvia, Lithuania, Romania, and Russia. Some countries that were not independent in 1900 (Bangladesh, Israel, and Pakistan in our sample) introduced state religions when they became independent. We also have information from Barrett, Kurian, and Johnson (2001) for a classification of governments as 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

surprising that the overall relation between state religion and church attendance would be positive.

We should note that our results for state religion apply while holding constant a measure 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 a low degree of religious pluralism. Hence, the pluralism variable could be getting credit for some of the influence on church attendance that stems ultimately from the presence of an established religion. If we delete the pluralism index from the system for monthly church attendance, then the estimated coefficient on the state religion dummy becomes 0.56 (s.e.=0.13), which is smaller than before but still significantly positive. 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 could be getting credit for some of the effect that stems ultimately from state religion. If we delete the regulatory variable, as well as the pluralism index, from the system for monthly church attendance, then the estimated coefficient on the state religion dummy falls further to 0.30 (s.e.=0.13).

In the literature, the Scandinavian countries are often cited as examples of places in which state churches co-exist with low rates of church attendance. That pattern does characterize the data in our study. However, it turns out that the low rates of attendance in these countries are explained well by the model estimated in Table 2, despite the positive coefficient on the state-religion dummy. For example, Table 4 shows that the

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systems of Table 2 to capture this officially religious category, the estimated coefficients on this new variable are close to zero.

residual for Sweden in 1990 is actually positive.[28] That is, although church attendance is low—10% at the monthly frequency—it is greater than the value predicted by the model. The reason is that the other variables contained in the system—notably the overall influence of the economic variables and the composition of religious denominations (discussed in the next section)—tend to generate low rates of church attendance. This pattern turns out to apply also to the other Scandinavian countries—Denmark, Finland, Iceland, and Norway—all of which had state religions in 1970.

Table 2 shows that the estimated coefficients for the state-religion dummy are also significantly positive for religious beliefs, notably for those in heaven and hell. For example, the estimated coefficient for belief in heaven in column 3 is 1.11 (s.e.=0.18). These results suggest that the state sponsorship that encourages church attendance is also somewhat successful in engendering high levels of beliefs.

Again, the effects from state religion may interact with the influences of religious pluralism and government regulation. If we delete the pluralism variable from the system for belief in heaven, then the estimated coefficient on the state religion dummy falls to 0.77 (s.e.=0.16). If we also delete the dummy variable for state regulation of religion, then the estimated value falls further to 0.62 (s.e.=0.15). Although this estimated coefficient is about half that found in column 3 of Table 2, it is still significantly positive.

The results in Table 2 indicate that government regulation of religion tends to depress church attendance and some of the religious beliefs. That is, the argument from the religion-market model about the ill effects of government involvement seems to hold

[28] The Lutheran church was the state religion of Sweden during our sample. However, Sweden formally dropped its state religion in 2000.

with respect to public regulation. It may be that better measurement of the indicator for regulation would further sharpen these results.

Quantitatively, the estimated coefficient of -0.59 (s.e.=0.11) on the state regulation dummy variable in column 2 of Table 2 means that the introduction of a government regulatory system for religion would lower monthly attendance by about 14 percentage points. 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, then the estimated net effect on monthly church attendance is positive but by only about 5 percentage points.

Not surprisingly, the presence of a Communist regime has a substantial negative relation with the measures of church attendance and religious beliefs. Specifically, the estimated coefficient of -0.74 (s.e.=0.21) in column 2 of Table 2 implies that the imposition of a Communist regime would lower monthly church attendance by 17 percentage points.

By comparing the three later surveys—*WVS* around 1995, *ISSP* around 1998, and Gallup in 1999—with the three earlier ones, we can estimate how the downfall of the Communist systems in Eastern Europe affected religiosity. The results are that church attendance and religious beliefs tended to recover in the former Communist countries during the 1990s.[29] For example, in the 1999 equation for monthly church attendance,

[29] Poland is an exception to this pattern, 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. As shown in Table 4, the empirical model explains virtually none of Poland's high rate of church attendance in 1990. Some observers explain the high religiosity in Poland 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

the net remaining effect from the presence of Communism before 1990 is given by the coefficient on the Communism dummy, -0.74, plus the coefficient for ex-Communism (in 1999), 0.59. Hence, the net remaining effect estimated for 1999 is a coefficient of -0.15, implying a net reduction of monthly attendance by only about 3 percentage points.

D. Religious Pluralism and Religious Denominations

Table 2 shows that the religious pluralism indicator (shown in Table 1) has significantly positive coefficients in the systems for church attendance.[30] The partial relation with monthly church attendance is shown graphically in Figure 11. This pattern accords with the argument from the religion-market model that greater pluralism will encourage competition among religion providers and lead, thereby, to better service and higher rates of attendance. The estimated coefficient in column 2 of 1.20 (s.e.=0.30) means that an increase in pluralism by 0.23 (its sample standard deviation) raises monthly church attendance by about 6 percentage points. Greater pluralism also has a significantly positive relation with some of the beliefs—those in heaven and hell—but not with others. The partial relation with belief in heaven appears in Figure 12.

With respect to the composition of religious adherence, recall that each coefficient should be interpreted as the effect relative to that for Catholic (which is omitted from the systems). Recall also that the variables are the fractions of the population adhering to the indicated religion among persons who express adherence to some religion.

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religion occupy a different place in Poland than, say, in Hungary or Czechoslovakia (which were also historically predominantly Roman Catholic)? More generally, it is not a satisfactory empirical strategy to come up with a special argument for each observation that does not fit the model.

[30] One possible difficulty here is that an exogenous increase in the demand for religion could lead, in the long run, to a greater variety of religious denominations. That is, there might be reverse causation from church attendance and religious beliefs to the pluralism indicator.

For church attendance, the main finding is that most of the denominations exhibit lower rates of participation than the Catholic one.[31] The exceptions are Muslim (which is weakly positive) and other religions (which has a coefficient close to zero). For the religious beliefs, most of the denominations are again lower than Catholic. However, Muslim is again positive, the other religion variable is now positive, and the Orthodox religion has coefficients close to zero in some cases. Particularly striking are the high positive coefficients for the Muslim denomination in the system for belief in heaven and, even more so, in the system for belief in hell.

E. Superstition

As discussed before, one dimension of the secularization hypothesis is that increased education would generate lower levels of church attendance and religious beliefs. One argument for this pattern (which we did not observe in the data) was that religion amounts to superstition and ignorance and, hence, that religious activities would decline as people became more knowledgeable.

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

[31] These results can reflect differences across religions in the role of attending church or analogous houses of worship. For example, religions vary by the weight that they attach to organized services versus personal prayer.

be scientifically testable. Although we have not done the analysis, we take it as plausible that none of the three actually has predictive content.

Data on the three superstition variables are available only for 17 Christian countries, which are listed in Table 6. The table shows the fraction of persons holding each of the three types of belief. We were surprised by the high levels—they range from 19% of the Irish population believing in horoscopes to 80% of the Latvian population believing in fortune tellers.

Table 7 shows that there is a strong positive correlation among the three measures of superstition. Therefore, we focus on the average of the three, as shown in the first column of Table 6. These values range from 25% in Ireland to 73% in Latvia.

Table 8 shows, for the 17 countries included in Table 6, the correlations among the six religion variables that we considered before. These correlations are strongly positive whether we look at church attendance or the various religious beliefs. However, the most interesting finding, shown in the first column of Table 8, is that the correlation between the average superstition indicator and each of the religion variables is negative. These values range from -0.36 for belief in hell to -0.63 for belief in heaven.

One clear 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.[32] 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. This idea accords with the observation that the superstition variables,

[32] We do not have sufficient data on the superstition variables to carry out the sort of cross-country statistical analysis done in Table 2.

shown in Table 6, are the highest in the formerly Communist countries of eastern Europe. Another point is that organized religions, notably the Roman 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.[33] 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 6, Ireland and the Philippines.

V. Determinants of economic growth

Table 9 contains cross-country panel regressions for the growth rate of per capita GDP. The dependent variable is measured over the periods 1965-75, 1975-85, and 1985-95. The framework, based on Barro (1997, 2000), includes an array of explanatory variables: the log of per capita GDP at the start of each period, average years of secondary and higher school attainment at the start of each period, a measure of international openness (the period average of the ratio of exports plus imports to GDP), the period average of the ratio of government consumption to GDP, the log of life expectancy at birth at the start of each period (an indicator of health), the growth rate over each period of the terms of trade (export prices relative to import prices), a subjective indicator of the maintenance of the rule of law, the log of the total fertility rate at the start of each period, the retail price inflation rate for each period, and the period average of the ratio of total investment to GDP. For further discussion of the framework and these variables, see Barro (2000) and the notes to Table 9.

[33] 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 identified with the body and blood of

The regressions include all countries for which data on all of the variables are available. In systems that exclude measures of church attendance and beliefs, we are able to include 84 countries. However, in the systems that incorporate these religion variables, the sample size falls to between 39 and 46 countries (observed over three time periods). The 39-country sample includes 2 countries in sub-Saharan Africa, 8 in Latin America, 9 in Asia, and 20 industrialized countries (not including those in Asia).

The system in column 1 of Table 9 includes as explanatory variables the fractions of the adhering population in 1970 or 1980 attached to seven major religious denominations. (The Catholic denomination is again omitted as a normalization). This specification excludes measures of religious attendance and beliefs. In this system, the estimated coefficient of initial per capita GDP is negative and highly significant. This result reflects a conditional convergence force—for given values of the other explanatory variables, growth is higher if a country starts out poorer. The other estimated influences are positive effects from initial schooling and life expectancy; positive effects from international openness, the rule of law, and the investment ratio; negative effects from fertility, government consumption, and inflation; and a positive effect from the growth of the terms of trade. The general pattern of these results is similar in the other systems shown in Table 9.

The main finding about religion in column 1 of Table 9 is that differences in the composition of the population among the major religious denominations have little consequence for economic growth, once one holds constant the explanatory variables mentioned above. Note that these variables include the initial level of economic development, as measured by per capita GDP, schooling, life expectancy, and so on.

Christ. Luther denounced these practices as untenable.

None of the estimated coefficients on the religious denomination variables in column 1 are individually statistically significant. The hypothesis that all of these coefficients are equal to zero is accepted at a critical level (p-value) of 0.10. Thus, probably not as a surprise to Weber (1930), the composition of religious denominations does not matter much for modern economic growth.

Each of the other systems in Table 9 excludes the denominational composition but includes one measure of church attendance and one measure of religious beliefs. As already mentioned, the sample sizes for these systems are much smaller than that in column 1. In order not to lose even more observations, we entered into the regressions a single measure of church attendance or religious belief for each period for countries that had data on these concepts at any point in time. Specifically, we defined a measure of attendance or belief for a country to be the value from *WVS* 1990 if available, then we filled in with the value from *WVS* 1981 if the 1990 value was unavailable. (We adjusted for the average discrepancy between the two values among countries that had information for both years.) If neither of these values were available, then we used in an analogous way the value for *ISSP* 1991, then *WVS* 1995, then *ISSP* 1998, and finally Gallup 1999. This procedure means that the systems for economic growth incorporate on the right-hand side measures of religious attendance and beliefs that post-date the growth rates.

One reason that the use of later observations on the right-hand side of the equations might be satisfactory is that religious attendance and beliefs exhibit a lot of persistence over time. Hence, the later values might proxy satisfactorily for the earlier ones, which can be viewed as the true causes of differences in growth rates. However, the previous analysis already documented responses of religiosity to economic and

political variables. Thus, there is a good chance that the religion measures pick up reverse causation from economic development to religiosity, rather than the reverse.

To deal with this reverse-causation issue, we used instrumental variables suggested by the regressions shown in Table 2, in which the religion measures were the dependent variables. Specifically, we use as instruments the dummy variable for the presence of a state religion (in 1970), the dummy variable for the existence of state regulation of religion (in the 1970s), and the pluralism index constructed from the composition of religious denominations in 1970 or 1980.[34] It is, of course, possible that the proposed instruments—although prior in time to most of the growth observations—are themselves endogenous. For example, over long periods, economic development could induce countries to drop their official state religions or their regulatory systems for religion. No instruments are ever perfect!

We found that monthly church attendance provided a slightly better fit than weekly attendance to the growth data. Since the results were basically similar, we report only the estimates that use monthly attendance. The religious beliefs, already discussed, refer to heaven, hell, God, and an after-life.

Column 2 of Table 9 reveals the typical pattern of results. The estimated coefficient on church attendance is significantly negative, whereas that on beliefs—in this case in heaven—is significantly positive.[35] The estimated coefficient on monthly attendance (-0.0078 [s.e.=0.0023]) means that an increase in this variable by one standard deviation (1.20) would reduce the growth rate on impact by 0.9 percent per year. The

[34] We also estimated systems in which the instrument list was expanded to include the fractions of the adhering population for the major religious denominations in 1970 or 1980. In this case, the results were close to those obtained when the religious attendance and belief variables were themselves included in the instrument lists.

estimated coefficient (0.0072 [s.e.=0.0024]) on belief in heaven means that a rise in this variable by one standard deviation (1.16) would raise the growth rate on impact by 0.8 percent per year.

Since monthly church attendance and belief in heaven are highly correlated (and also have similar sample standard deviations), the results suggest that being more or less religious overall—in the sense of attendance and belief moving together in the typical manner—would not have a strong relationship to economic growth. To check this idea, we estimated systems in which church attendance or beliefs, but not both, were included in the regressions. If we include monthly church attendance by itself, then the estimated coefficient is about half the magnitude found before: -0.0042 (s.e.=0.0018). If we include belief in heaven by itself, then the estimated coefficient is less than one-third that found before and is no longer statistically significant: 0.0022 (s.e. =0.0020). Therefore, our inference is that the main growth effect is a positive response to an increase in believing *relative* to belonging (that is, attending).

This pattern makes sense if we think of believing as the fundamental output of the religion sector. Growth is then positively related to the productivity of the religion sector in the sense of the level of belief expressed relative to sectoral inputs, which include the level of church attendance.

Column 3 of the table repeats the estimation with the three instrumental variables mentioned before substituted for the monthly church attendance and belief-in-heaven variables in the instrument lists. The pattern of results remains the same as in column 2, but the magnitude of both estimated coefficients (as well as their standard errors) increase. The estimated coefficients are now -0.0129 (0.0041) for monthly attendance

[35] As before, each religion variable, x, is entered in the form log[x/(1-x)].

and 0.0140 (0.0043) for belief in heaven. Hence, both variables continue to be statistically significant.

We again find that the patterns are much weaker for religiosity overall. For example, if monthly church attendance is included by itself, the estimated coefficient when the three instrumental variables are used is -0.0078 (0.0036). The corresponding estimate for belief in heaven, when entered by itself, is 0.0022 (0.0020). Thus, growth is again found to respond mainly when believing increases relative to belonging.

Our overall conclusion, based on the arguable exogeneity of the three instrumental variables that we employed, is there is reason to believe that the estimates reflect effects of religion on economic growth, rather than the reverse. Hence, we have some evidence that an increase in religious beliefs (at least belief in heaven) or a decrease in church attendance tends to stimulate economic growth.

Figures 13 and 14 depict the partial relations between the rate of economic growth and the variables that measure monthly church attendance and belief in heaven. (These figures are constructed from the estimates shown in column 3 of Table 9.) These diagrams are constructed in a manner analogous to those based on Table 2. In particular, the diagrams hold constant the influence on economic growth from all of the explanatory variables other than the one shown on the horizontal axis. Note especially that, in Figure 13, the value for belief in heaven is held constant, whereas in Figure 14, the value for monthly church attendance is held fixed. Thus, the figures represent the effect on economic growth not from an overall change in religiosity but, rather, from a shift in belonging with believing held fixed or vice versa.

In columns 4 and 5 of Table 9, the belief measure refers to hell. The results are similar to those for belief in heaven, although the belief-in-hell variable becomes only marginally significant in the case where the three instrumental variables are used.

The results in columns 6-9 of the table measure beliefs in relation to God and an after-life. The results are weaker in these cases than for those in columns 1-4, but the general pattern of the estimates is the same.

VI. Major Results and Concluding Observations

Our empirical work used a cross-country panel that includes country level information on church attendance and religious beliefs. These data derive from individual survey data.

Although religiosity tends to decline overall with economic development, the patterns of response depend on the specific dimensions of development. For example, the measures of religiosity are positively related to education and negatively related to urbanization. Enhanced life expectancy and reduced fertility are inversely related to church attendance but have weak associations with religious beliefs.

The presence of a state religion is positively related to the religion measures, probably because of the subsidies that typically flow to the established religions. However, religiosity is negatively associated with government regulation of the religion market and with the presence of a Communist government. The elimination of the Communist regimes in Eastern Europe led to a recovery of religiosity in most countries during the 1990s.

Greater religious pluralism, measured by the diversity of adherence among major denominations, is associated with higher church attendance and beliefs. Across the denominations, religiosity tends to be highest for Muslim, then Catholic, then the other religions, which include Hindu, Buddhist, Orthodox, Protestant, and Jewish.

The analysis of the determinants of economic growth reveals little connection to the patterns of adherence across the major religions. However, growth responds positively to enhanced religious beliefs—notably belief in heaven—and negatively to increased church attendance. These patterns remain intact when we use instrumental variables to control for possible reverse causation. The instruments that we use are the existence of a state religion, the presence of government regulation of religion, and the extent of religious pluralism. Thus, our inference is that economic performance is stimulated by believing but retarded by belonging. We interpret this pattern as reflecting a positive connection between economic performance and the level of "productivity" in the religion sector.

In subsequent research, we plan to investigate the effects of religiosity on political and social variables, including democracy, the rule of law, fertility, and health. We plan also to study how the process of economic development influences the role of organized religion in a country's political and legal structure, including the propensity to have state religions. We will also assess the influence of organized religion on legislation, such as that related to economic regulation, marriage, divorce, birth control, abortion, and euthanasia. We plan also to extend our present analysis of religiosity at a country-wide level to behavior at the individual level.

References

Ashton, T.S. (1924). *Iron and Steel in the Industrial Revolution*, Manchester, Manchester University Press.

Azzi, C. and R. Ehrenberg (1975). "Household Allocation of Time and Church Attendance," *Journal of Political Economy*, February, 27-56.

Barrett, D.B. (1982). *World Christian Encyclopedia*, 1st ed., Oxford, Oxford University Press.

Barrett, D.B., G.T. Kurian, and T.M. Johnson (2001). *World Christian Encyclopedia*, 2nd ed., Oxford, Oxford University Press.

Barro, R.J. (1991). "Economic Growth in a Cross Section of Countries," *Quarterly Journal of Economics*, May, 407-443.

Barro, R.J. (1997). *Determinants of Economic Growth: A Cross-Country Empirical Study*, Cambridge MA, MIT Press.

Barro, R.J. (2000). "Inequality and Growth in a Panel of Countries," *Journal of Economic Growth*, March, 5-32.

Barro, R.J. and J.W. Lee (2001). "International Data on Educational Attainment: Updates and Implications," *Oxford Economic Papers*, 541-563.

Bell, Daniel (1973). *The Coming of Post-Industrial Society: A Venture in Social Forecasting*, New York Basic Books.

Berger, P.L. (1967). *The Sacred Canopy: Elements of a Sociological Theory of Religion*, Garden City NY, Doubleday.

Chaves, M. (1994). "Secularization as Declining Religious Authority," *Social Forces*,

March, 749-774.

Chaves, M. and D.E. Cann (1992). "Regulation, Pluralism, and Religious Market Structure," *Rationality and Society*, July, 272-290.

Chaves, M. and P.S. Gorski (2001). "Religious Pluralism and Religious Participation," *Annual Review of Sociology*, 261-281.

Ekelund, R.B., R.F. Hebert, and R.D. Tollison (2001). "An Economic Analysis of the Protestant Reformation," unpublished, University of Mississippi.

Finke, R. and L.R. Iannaccone (1993). "Supply-Side Explanations for Religious Change," *The Annals of the American Academy of Political and Social Sciences*, May, 27-39.

Finke, R. and R. Stark (1992). *The Churching of America 1776-1990*, New Brunswick NJ, Rutgers University Press.

Fischoff, E., "The Protestant Ethic and the Spirit of Capitalism, The History of a Controversy," *Social Research*, 53-77.

Glaeser, E. and S. Glendon (1998). "Incentives, Predestination and Free Will," *Economic Inquiry*, July, 429-443.

Glaeser, E. and J. Scheinkman (1998). "Neither a Borrower Nor a Lender Be: An Economic Analysis of Interest Restrictions and Usury Laws," *Journal of Law and Economics*, 1-36.

Hagen, E.E. (1962). *On the Theory of Social Changes: How Economic Growth Begins*, Homewood IL, Dorsey Press.

Hume, D. (1757). *The Natural History of Religion*, edited by J.C.A. Gaskin, Oxford, Oxford University Press, 1993.

Huntington, S.P. (1996). *The Clash of Civilizations and the Remaking of World Order*, New York, Simon & Schuster.

Iannaccone, L.R. (1991). "The Consequences of Religious Market Structures: Adam Smith and the Economics of Religion," *Rationality and Society*, April, 156-177.

Iannaccone, L.R. and R. Stark (1994). "A Supply-Side Reinterpretation of the 'Secularization' of Europe," *Journal for the Scientific Study of Religion*, March, 76-88.

Iannaccone, L.R., R. Stark, and R. Finke (1998). "Rationality and the 'Religious Mind'," *Economic Inquiry*, July, 373-389.

Inglehart, R. and W.E. Baker (2000). "Modernization, Cultural Change, and the Persistence of Traditional Values," *American Sociological Review*, February, 19-51.

Jeremy, D.J., ed. (1988). *Business and Religion in Britain*, Aldershot UK, Gower Publishing.

Jeremy, D.J. (1990). *Capitalists and Christians*, Oxford, Clarendon Press.

Jeremy, D.J., ed. (1998). *Religion, Business and Wealth in Modern Britain*, London, Routledge.

Kuran, T. (1993). "The Economic Impact of Islamic Fundamentalism," in M.E. Marty and R.S. Appleby, eds., *Fundamentalisms and the State*, Chicago, University of Chicago Press.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R.W. Vishny (1998). "Law and Finance," *Journal of Political Economy*, December, 1113-1155.

Landes, D.S. (1999). *The Wealth and Poverty of Nations: Why Some Are so Rich and*

Some So Poor, Norton, New York.

Lipset, S.M. and G.S. Lenz (2000). "Corruption, Culture, and Markets," in L.E. Harrison and S.P. Huntington, eds., *Culture Matters: How Values Shape Human Progress*, New York, Basic Books.

Martin, D. (1978). *A General Theory of Secularization*, Oxford, Basil Blackwell.

Marx, K. (1913). *A Contribution to the Critique of Political Economy*, translated by N.I. Stone, Chicago, Kerr & Company.

McClelland, D.C. (1961). *The Achieving Society*, Princeton NJ, van Nostrand.

McCleary, R.M. (2002). "Salvation and Economic Incentives," unpublished, Harvard University, May.

Sacerdote, B. and E.L. Glaeser (2001). "Education and Religion, NBER working paper no. 8080, January.

Smith, A. (1791). *An Inquiry into the Nature and Causes of the Wealth of Nations*, 6th ed., London, A. Strahan.

Sprinzak, E. (1972). "Weber's Thesis as an Historical Explanation," *History and Theory*, 294-320.

Stark, R. and W.S. Bainbridge (1987). *A Theory of Religion*, New York, P. Lang.

Stulz, R.M. and R. Williamson (2001). "Culture, Openness and Finance," NBER working paper no. 8222, April.

Tawney, R.H. (1926). *Religion and the Rise of Capitalism*, London, John Murray.

Troeltsch, E. (1931). *The Social Teaching of the Christian Churches*, v.I, translated by O. Wyon, London, Allen & Unwin.

Weber, M. (1930). *The Protestant Ethic and the Spirit of Capitalism*, translated by

Talcott Parsons, London, Allen & Unwin.

Weber, M. (1963). *The Sociology of Religion*, 4th ed., translated by E. Fischoff, Boston, Beacon Press.

Wilson, B. (1966). *Religion in Secular Society: A Sociological Comment*, London, Watts.

Worsley, I. (1816). *Observations on the State and Changes in the Presbyterian Societies of England During the Last Half Century*, London, Manchester Central Reference Library.

Table 1							
State Religion, State Regulation of Religion, and Religious Pluralism							
Country	**State relig.**	**State regulation**	**Plural index**	**Country**	**State relig.**	**State regulation**	**Plural index**
Cameroon	0	0	0.73	Cyprus	0	0	0.36
Ghana	0	0	0.72	Denmark	1	0	0.02
S. Africa	0	0	0.63	Finland	1	1	0.03
Canada	0	0	0.56	France	0	1	0.17
Dom. Rep.	1	0	0.05	W. Germany	0	0	0.54
Mexico	0	0	0.05	Greece	1	1	0.04
U.S.	0	0	0.64	Hungary	0	1	0.47
Argentina	1	1	0.13	Iceland	1	0	0.03
Brazil	0	0	0.20	Ireland	1	0	0.08
Chile	0	0	0.22	Italy	1	1	0.01
Colombia	1	0	0.05	Netherlands	0	0	0.53
Peru	1	1	0.09	Norway	1	1	0.01
Uruguay	0	0	0.14	Poland	0	0	0.19
Venezuela	1	1	0.08	Portugal	1	0	0.02
Bangladesh	1	1	0.24	Spain	1	0	0.00
China	0	1	0.46	Sweden	1	1	0.08
Hong Kong	0	0	0.60	Switzerland	0	0	0.51
India	0	0	0.31	Turkey	0	1	0.01
Israel	1	0	0.19	U.K.	1	1	0.33
Japan	0	0	0.46	Australia	0	0	0.51
S. Korea	0	0	0.33	New Zealand	0	0	0.37
Malaysia	1	0	0.68	Bulgaria	0	0	0.28
Pakistan	1	0	0.06	Czech Rep.	0	1	0.43
Philippines	0	0	0.28	Estonia	0	1	0.48
Singapore	0	0	0.63	Latvia	0	1	0.68
Taiwan	0	0	0.58	Lithuania	0	1	0.13
Thailand	1	1	0.14	Romania	0	0	0.40
Austria	0	0	0.15	Russia	0	1	0.51
Belgium	0	0	0.05	Slovak Rep.	0	1	0.34
				Slovenia	0	0	0.12

Notes to Table 1

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, pp. 834-35). We assigned the value one only if Barrett, et al, 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 church leaders. This designation comes from discussions in Barrett (1982) and Barrett, Kurian, and Johnson (2001) and elsewhere and typically applies during the late 1970s. The pluralism index is one minus the Herfindahl index based on the fractions of adherents in 1980 in nine major religious denominations among persons expressing adherence to some religion. The denominations are Catholic, Muslim, Protestant, Hindu, Buddhist, other eastern religions, Jewish, Orthodox, and other. These data are from Barrett (1982). For the Eastern European countries shown at the end of the table, the data are from Barrett, Kurian, and Johnson (2001) and apply in 1990. The countries shown are the ones included in the subsequent statistical analysis (as dictated by data availability).

Table 2			
Determinants of Church Attendance and Religious Beliefs			
	(1)	**(2)**	**(3)**
explanatory variable	**weekly church attendance**	**monthly church attendance**	**belief in heaven**
log(per capita GDP)	0.26 (0.16)	0.24 (0.15)	-0.40 (0.20)
years of education	0.221 (.039)	0.191 (.035)	0.239 (.042)
urbanization rate	-1.72 (0.36)	-1.41 (0.32)	-1.48 (0.42)
log(life expectancy)	-5.2 (1.8)	-4.9 (1.7)	5.2 (2.3)
population share = 65	-0.8 (3.2)	-1.9 (3.0)	-9.6 (4.3)
population share = 15	4.3 (2.1)	4.5 (2.0)	4.8 (2.9)
religious pluralism	1.50 (0.34)	1.20 (0.30)	1.32 (0.37)
state religion	0.82 (0.16)	0.85 (0.14)	1.11 (0.18)
regulation of religion	-0.63 (0.12)	-0.59 (0.11)	-0.35 (0.13)
Communist regime	-0.69 (0.22)	-0.74 (0.21)	-0.83 (0.25)
ex-Communist (in 1995)	0.23 (0.18)	0.32 (0.18)	0.59 (0.23)
ex-Communist (in 1998)	0.38 (0.18)	0.51 (0.14)	0.32 (0.16)
ex-Communist (in 1999)	0.45 (0.24)	0.59 (0.22)	--
ISSP data	-0.30 (0.08)	-0.18 (0.07)	0.10 (0.08)
Gallup data	-0.02 (0.11)	-0.12 (0.10)	--
Muslim fraction	0.84 (0.31)	0.11 (0.28)	2.05 (0.42)
Protestant fraction	-2.86 (0.21)	-2.34 (0.19)	-1.41 (0.24)
Hindu fraction	-0.94 (0.49)	-0.93 (0.46)	-1.88 (0.58)
eastern religion fraction	-2.86 (0.26)	-2.48 (0.24)	-1.38 (0.30)
Jewish fraction	-2.49 (0.59)	-2.98 (0.50)	-3.17 (0.44)
Orthodox fraction	-2.64 (0.26)	-1.65 (0.23)	-1.50 (0.29)
other religion fraction	-0.29 (0.88)	-0.49 (0.83)	3.28 (1.09)
number of countries & total observations	59, 183	59, 181	50, 129
number of observations for each equation	23, 37, 22, 32, 28, 41	22, 36, 22, 32, 28, 41	21, 33, 16, 30, 29
R-squared for each equation	.86, .80, .71, .92, .75, .75	.88, .76, .78, .89, .83, .77	.65, .79, .90, .84, .85

Table 2, continued			
	(4)	**(5)**	**(6)**
explanatory variable	**belief in hell**	**belief in after-life**	**belief in God in some form**
log(per capita GDP)	-0.36 (0.18)	-0.36 (0.17)	-0.54 (0.22)
years of education	0.218 (.040)	0.110 (.036)	0.148 (.046)
urbanization rate	-2.05 (0.41)	-1.34 (0.34)	-0.67 (0.40)
log(life expectancy)	4.2 (2.0)	6.5 (1.9)	2.2 (2.3)
population share = 65	-11.4 (3.8)	-6.9 (3.7)	-10.9 (4.0)
population share = 15	1.9 (2.5)	2.6 (2.5)	1.3 (2.8)
religious pluralism	1.23 (0.37)	0.45 (0.32)	-0.11 (0.37)
state religion	0.80 (0.17)	0.32 (0.16)	0.43 (0.18)
regulation of religion	-0.11 (0.13)	-0.07 (0.12)	-0.21 (0.13)
Communist regime	-0.91 (0.24)	-0.96 (0.23)	-1.32 (0.27)
ex-Communist (in 1995)	0.94 (0.22)	0.44 (0.22)	0.20 (0.32)
ex-Communist (in 1998)	0.57 (0.17)	0.48 (0.13)	0.41 (0.19)
ex-Communist (in 1999)	--	--	0.82 (0.25)
ISSP data	0.35 (0.08)	0.15 (0.08)	0.06 (0.10)
Gallup data	--	--	-0.57 (0.13)
Muslim fraction	2.70 (0.38)	0.62 (0.36)	0.26 (0.52)
Protestant fraction	-1.53 (0.23)	-0.52 (0.22)	-1.27 (0.26)
Hindu fraction	-1.07 (0.53)	-1.19 (0.50)	-0.97 (0.73)
eastern religion fraction	-0.75 (0.28)	-0.72 (0.23)	-1.92 (0.28)
Jewish fraction	-1.80 (0.48)	-1.97 (0.44)	-2.26 (0.55)
Orthodox fraction	-0.88 (0.30)	-0.58 (0.24)	-0.35 (0.28)
other religion fraction	1.70 (0.99)	2.10 (0.92)	2.75 (1.20)
number of countries & total observations	50, 129	52, 134	57, 169
number of observations for each equation	21, 33, 16, 30, 29	26, 33, 16, 30, 29	22, 32, 16, 30, 29, 40
R-squared for each equation	.75, .74, .71, 85, .72	.59, .63, .74, .67, .77	.67, .65, .83, .80, .80, .70

Notes to Table 2

Each system, numbered (1)-(6), consists of five or six equations, corresponding to observations for countries on the dependent variables at five or six points in time: 1981-84, subsequently called 1981 (*World Values Survey* data mostly for 1981, supplemented by information from Gallup surveys for a few countries); 1990-93, subsequently called 1990 (*WVS* data mostly for 1990, plus observations on some variables for Greece in 1987 from *Eurodim*); 1990-93, subsequently called 1991 (*International Social Survey Programme* data mostly for 1991); 1995-97, 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 weekly and monthly church attendance and belief in god. The dependent variables are population averages of weekly church attendance (1), monthly church attendance (2), belief in heaven (3), belief in hell (4), belief in an after-life (5), and belief in God in some form (6). The measured value is either the fraction of people attending or the fraction who hold the belief. For example, in system 2, monthly church attendance is observed for 23 countries with 1981 data, 37 countries with 1990 data, 22 countries with 1991 data, 32 countries with 1995 data, 28 countries with 1998 data, and 41 countries with 1999 data. The form of each dependent variable used in the regressions is log[x/(1-x)], where x is the fraction of persons attending or believing. This form confines fitted values of x to the interval [0,1].

Explanatory variables: The log of real per capita GDP, average years of schooling of adults aged 25 and older, the urbanization rate, the log of life expectancy at birth, and the shares of the population aged 65 and over and 15 and under are observed just prior to the dependent variable. For example, 1980 per capita GDP is matched with the dependent variables for 1981, 1990 per capita GDP with the dependent variables for 1990 and 1991, and 1995 per capita GDP with the dependent variables for 1995, 1998, and 1999. The data on these explanatory variables are from a previously assembled cross-country data set, which includes information in most cases at five-year intervals. Religious pluralism (1 minus the Herfindahl index of religious denomination shares for nine categories of religions among those professing some religion) is for 1980 (1990 for some Eastern European countries) using data from Barrett (1982) and Barrett, Kurian, and Johnson (2001). The dummy variable for the presence of a state religion (from Barrett, Kurian, and Johnson [2001]) applies in 1970. The dummy variable for state regulation of religion (based on whether the state appoints or approves church leaders, from Barrett [1982] and Barrett, Kurian, and Johnson [2001]) is for the 1970s. The dummy for the presence of a Communist regime applies to the pre-1990 period. The 1995 and later equations also include a dummy for whether the country had been Communist but is no longer Communist. For example, in the 1995 equations, the total effect for a former Communist country equals the coefficient on the Communist dummy plus the coefficient on the ex-Communist (in 1995) dummy. The dummy for the use of *ISSP* data applies to the 1991 and 1998 equations and that for Gallup applies to the 1999 equation. (These variables allow for the possibility of systematic differences among the *WVS*, *ISSP*, and Gallup sources.) The religious denomination variables are the fractions professing each religion in 1980 (1990 for some Eastern European countries), according to Barrett (1982) and Barrett, Kurian, and Johnson (2001). The Catholic fraction is

omitted as a normalization in each case; hence, the coefficient on each denomination represents the differential effect between that denomination and the Catholic one.

Estimation of each system is by the seemingly-unrelated (*SUR*) method, which allows the error terms to be correlated over the time periods for each country. For example, in system 2, the error term for a country's 1981 monthly church attendance is allowed to be correlated with those for 1990, 1991, 1995, 1998, and 1999. This procedure does not weight countries differentially for size or other characteristics. Estimated standard errors of the coefficient estimates are shown in parentheses. Constant terms, not shown, are included for each system. (These vary by system but not across the equations within a system.) The table also shows the number of countries included in each equation of a system, the total number of observations, and the number of observations and R-squared values for each of the five or six equations of a system.

Table 3		
Means and Standard Deviations of Variables		
Variable	**Mean**	**Standard deviation**
Weekly church attendance	0.24	0.20
Monthly church attendance	0.36	0.23
Belief in heaven	0.55	0.22
Belief in hell	0.38	0.21
Belief in after-life	0.58	0.17
Belief in God in some form	0.80	0.14
Log[x/(1-x)] for:		
weekly attendance	-1.53	1.36
monthly attendance	-0.74	1.20
belief in heaven	0.33	1.16
belief in hell	-0.56	1.06
belief in after-life	0.35	0.77
belief in God	1.75	1.25
Average "superstition"	0.43	0.14
Log(per capita GDP)	8.95	0.71
Years of education	8.29	2.12
Urbanization rate	0.70	0.15
Log(life expectancy)	4.290	0.069
Population share = 65	0.113	0.040
Population share = 15	0.236	0.071
Religious pluralism	0.29	0.23
State religion	0.33	0.47
Regulation of religion	0.38	0.49
Communist regime	0.23	0.42
Catholic fraction	0.47	0.40
Muslim fraction	0.043	0.148
Protestant fraction	0.29	0.34
Hindu fraction	0.012	0.087
Eastern religion fraction	0.074	0.242
Jewish fraction	0.010	0.067
Orthodox fraction	0.073	0.205
Other religion fraction	0.021	0.062

Note: The columns show the means and standard deviations of the variables used in the statistical analysis of Table 2. The sample for most variables is the set of observations for which data are available for church attendance and the explanatory variables used in Table 2. For the religious belief variables, the set of observations is smaller. For superstition, the values refer to the average of the three indicators shown in Table 6 (available for 17 countries).

Table 4 Fitted Values of Monthly Church Attendance for Selected Countries						
	U.S. 1990	**Sweden 1990**	**Mexico 1990**	**Bangladesh 1995**	**S. Korea 1981**	**Brazil 1990**
Monthly attendance	0.58	0.10	0.63	0.91	0.28	0.50
Log[x/(1-x)]	1.09	-1.42	1.27	3.04	-0.21	0.75
Residual	0.35	0.23	0.10	0.33	-0.46	-0.15
Effects of:						
GDP	0.21	0.16	-0.07	-0.39	-0.22	-0.16
Schooling	0.71	0.24	-0.46	-1.14	-0.28	-0.84
Urban	-0.07	-0.20	-0.04	0.73	0.19	-0.10
Life expectancy	-0.15	-0.30	0.17	1.24	0.43	0.53
Pop. = 65	-0.02	-0.12	0.14	0.15	0.14	0.13
Pop. = 15	-0.08	-0.25	0.67	0.88	0.46	0.50
Pluralism	0.41	-0.26	-0.29	-0.06	0.45	-0.12
Communist	0.16	0.16	0.16	0.09	0.16	0.16
State religion	-0.28	0.57	-0.28	0.57	-0.28	-0.28
Church regulation	0.22	-0.37	0.22	-0.37	0.22	0.22
Denominations	-0.33	-1.24	0.99	0.99	-0.97	0.89

Table 4, continued							
	Ireland 1990	**Poland 1990**	**Russia 1990**	**Greece 1990**	**China 1990**	**India 1990**	**Pakistan 1999**
Monthly attendance	0.88	0.85	0.06	0.29	0.008	0.71	0.85
Log[x/(1-x)]	2.71	2.46	-2.03	-0.15	-4.08	1.62	2.48
Residual	0.79	2.05	-1.06	0.97	-1.53	0.40	-0.03
Effects of:							
GDP	0.04	-0.17	-0.08	-0.03	-0.43	-0.44	-0.39
Schooling	0.04	0.24	0.42	-0.12	-0.58	-0.88	-1.13
Urban	0.18	0.11	-0.06	0.10	0.20	0.59	0.50
Life expectancy	-0.11	0.14	0.27	-0.26	0.27	0.97	0.89
Pop. = 65	0.00	0.02	0.02	-0.04	0.11	0.13	0.15
Pop. = 15	0.17	0.07	-0.03	-0.20	0.18	0.57	0.88
Pluralism	-0.25	-0.13	0.26	-0.30	0.20	0.02	-0.28
Communist	0.16	-0.59	-0.59	0.16	-0.59	0.16	0.04
State religion	0.57	-0.28	-0.28	0.57	-0.28	-0.28	0.57
Church regulation	0.22	0.22	-0.37	-0.37	-0.37	0.22	0.22
Denominations	0.94	0.81	-0.50	-0.58	-1.22	0.20	1.10

Table 5 Fitted Values of Belief in Heaven for Selected Countries						
	U.S. 1990	**Sweden 1990**	**Mexico 1990**	**Bangladesh 1995**	**S. Korea 1981**	**Brazil 1990**
Belief in heaven	0.87	0.31	0.70	0.98	0.53	0.76
Log[x/(1-x)]	1.54	-1.13	0.53	3.52	-0.19	0.81
Residual	0.73	0.10	-0.31	0.53	-0.93	0.67
Effects of:						
GDP	-0.33	-0.25	0.12	0.65	0.38	0.27
Schooling	0.90	0.32	-0.57	-1.42	-0.34	-1.05
Urban	-0.07	-0.20	-0.03	0.77	0.20	-0.10
Life expectancy	0.16	0.32	-0.18	-1.32	-0.45	-0.56
Pop. = 65	-0.09	-0.60	0.72	0.78	0.73	0.68
Pop. = 15	-0.08	-0.28	0.71	0.94	0.49	0.53
Pluralism	0.46	-0.27	-0.31	-0.05	0.51	-0.12
Communist	0.14	0.14	0.14	0.05	0.14	0.14
State religion	-0.36	0.75	-0.36	0.75	-0.36	-0.36
Church regulation	0.12	-0.23	0.12	-0.23	0.12	0.12
Denominations	0.02	-0.87	0.53	2.03	-0.62	0.64

Table 5, continued				
	Ireland 1990	**Poland 1990**	**Russia 1990**	**India 1990**
Belief in heaven	0.90	0.80	0.18	0.43
Log[x/(1-x)]	1.87	1.07	-1.81	-0.59
Residual	0.23	1.02	-0.74	-0.23
Effects of:				
GDP	-0.06	0.29	0.15	0.74
Schooling	0.06	0.32	0.54	-1.09
Urban	0.20	0.12	-0.06	0.63
Life expectancy	0.12	-0.14	-0.29	-1.03
Pop. = 65	0.01	0.13	0.14	0.68
Pop. = 15	0.18	0.07	-0.03	0.61
Pluralism	-0.27	-0.13	0.29	0.04
Communist	0.19	-0.68	-0.68	0.14
State religion	0.75	-0.36	-0.36	-0.36
Church regulation	0.12	0.12	-0.23	0.12
Denominations	0.45	0.37	-0.49	-0.77

Notes to Tables 4 and 5

The value for log[x/(1-x)] in the tables measures x by either the fraction of persons attending church at least monthly or the fraction who express belief in heaven. The value is expressed relative to the sample mean (where the sample consists of observations for which data are available for the variable x and for the explanatory variables in the system). The impact of each of the explanatory variables represents the estimated effect on log[x/(1-x)] of the indicated variable, relative to the sample mean effect. For denominations, the value indicates the overall influence, relative to the sample mean, from all of the denomination shares.

Table 6 "Superstition" Variables				
Country	**Average of 3 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
W. 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
U.K.	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 Rep.	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 Rep.	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 the *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.

Table 7 Correlations among Superstition Variables				
	Average of 3 variables	**Fortune Tellers**	**Horoscopes**	**Good-luck charms**
Average of 3 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 6.

Table 8 Correlations for Religion Variables							
	Avg. super.	**Weekly attend.**	**Monthly attend.**	**Belief in heaven**	**Belief in hell**	**Belief in God**	**Belief in after-life**
Average super.	1.0	-0.56	-0.53	-0.63	-0.36	-0.47	-0.56
Weekly attendance	-0.56	1.0	0.98	0.88	0.80	0.77	0.75
Monthly attendance	-0.53	0.98	1.0	0.90	0.86	0.85	0.78
Belief in heaven	-0.63	0.88	0.90	1.0	0.91	0.87	0.92
Belief in hell	-0.36	0.80	0.86	0.91	1.0	0.82	0.79
Belief in God	-0.47	0.77	0.85	0.87	0.82	1.0	0.81
Belief in after-life	-0.56	0.75	0.78	0.92	0.79	0.81	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 6. The religion variables, also coming from the *ISSP* waves, are for the same set of countries.

Table 9 Regressions for Economic Growth					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Instruments (religion variables)	**denoms.**	**attendance & beliefs**	**state relig., relig. reg., pluralism**	**attendance & beliefs**	**state relig., relig. reg., pluralism**
Explanatory variable:					
Initial log per capita GDP and an array of other explanatory variables are included					
Muslim fraction	0.001 (0.005)	--	--	--	--
Protestant fraction	-0.007 (0.005)	--	--	--	--
Hindu fraction	-0.013 (0.012)	--	--	--	--
Eastern religion fraction (incl. Buddhist)	0.009 (0.006)	--	--	--	--
Jewish fraction	0.018 (0.012)	--	--	--	--
Orthodox religion fraction	-0.004 (0.009)	--	--	--	--
Other religion fraction	-0.015 (0.011)	--	--	--	--
Monthly church attendance	--	-0.0078 (0.0023)	-0.0129 (0.0041)	-0.0070 (0.0019)	-0.0088 (0.0032)
Belief in heaven	--	0.0072 (0.0024)	0.0140 (0.0043)	--	--
Belief in hell	--	--	--	0.0077 (0.0020)	0.0051 (0.0036)
p-value for denominations	0.10	--	--	--	--
Number of countries and total observations	84, 240	39, 117	39, 117	39, 117	39, 117
Number of observations for each period	78, 84, 78	39, 39, 39	39, 39, 39	39, 39, 39	39, 39, 39
R-squared values for each period	.61, .48, .54	.52, .61, .52	.41, .58, .47	.49, .71, .59	.51, .67, .56

Table 9, continued				
	(6)	**(7)**	**(8)**	**(9)**
Instruments (religion variables)	**attendance & beliefs**	**state relig., relig. reg., pluralism**	**attendance & beliefs**	**state relig., relig. reg., pluralism**
Explanatory variable:				
Initial log per capita GDP and an array of other explanatory variables are included				
Monthly church attendance	-0.0053 (0.0026)	-0.0119 (0.0054)	-0.0034 (0.0021)	-0.0087 (0.0036)
Belief in God	0.0018 (0.0023)	0.0064 (0.0050)	--	--
Belief in after-life	--	--	0.0020 (0.0027)	0.0058 (0.0050)
Number of countries and total observations	46, 138	46, 138	41, 123	41, 123
Number of observations for each period	46, 46, 46	46, 46, 46	41, 41, 41	41, 41, 41
R-squared values for each period	.65, .57, .43	.55, .53, .38	.63, .57, .48	.56, .58, .43

Notes to Table 9

The dependent variables are the growth rates of per capita real GDP over 1965-75, 1975-85, and 1985-95. The explanatory variables that are not shown are the log of per capita GDP at the beginning of each period, years of male secondary and higher school attainment at the start of each period, the average ratio for each period of exports plus imports to GDP (filtered for the usual relation of this ratio to country population and area), the average ratio for each period of government consumption (net of outlays on defense and education) to GDP, the log of life expectancy at birth at the start of each period, the growth rate of the terms of trade over each period, the average of an indicator of maintenance of the rule of law (the value for 1982 or 1985 appears in the first two equations), the log of the total fertility rate at the start of each period, the consumer price inflation rate over each period, and the average ratio over each period of total investment to GDP. For discussion of the data, see Barro (2000). Estimation is by three-stage least squares, using beginning-of-period or lagged values as instruments (except that measures of colonial status appear instead of the inflation rate). Separate constants are estimated for each period. Standard errors are in parentheses. The monthly church attendance and belief variables are entered as log[x/(1-x)], where x is the fraction attending or believing—see the notes to Table 2. Column 1 includes in the instrument list the denomination fractions (for 1970 in the first two equations and for 1980 or 1990 in the third equation). Columns 2, 4, 6, and 8 include the attendance and belief variables in the list of instruments. Columns 3, 5, 7, and 9 use, instead, three variables used as regressors in Table 2: the dummy for the presence of a state religion, the dummy for the existence of state regulation of religion, and the pluralism indicator for religious diversity (in 1970 for the first two equations and in 1980 or 1990 for the third equation).

Notes to Figures

In Figures 3-12, which are labeled as “partial relation,” the dependent variable is filtered for the estimated effect of each explanatory variable other than the one shown on the horizontal axis. The filtered value is then normalized to have zero mean and is shown in relation to the selected explanatory variable. The same procedure applies to the growth diagrams in Figures 13 and 14.

Figure 1
Monthly Church Attendance versus GDP
(simple relation)

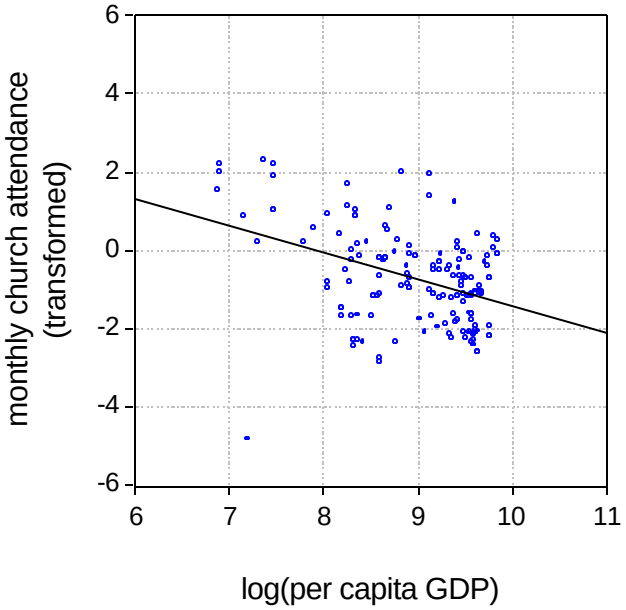

Figure 2
Belief in Heaven versus GDP
(simple relation)

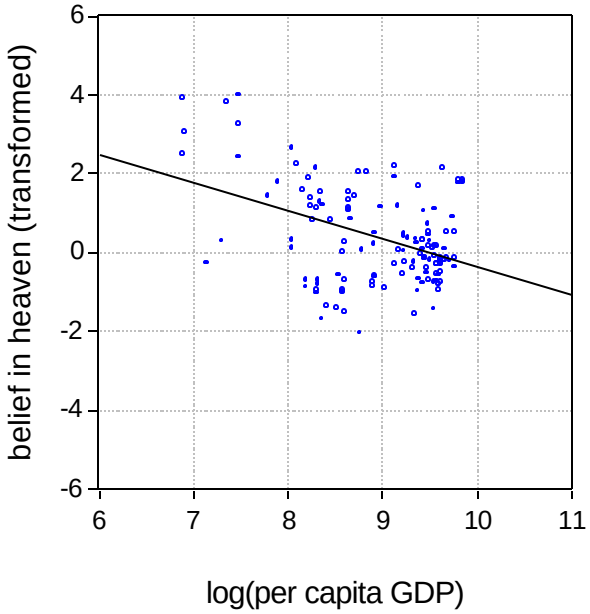

Figure 3
Monthly Church Attendance versus Schooling
(partial relation)

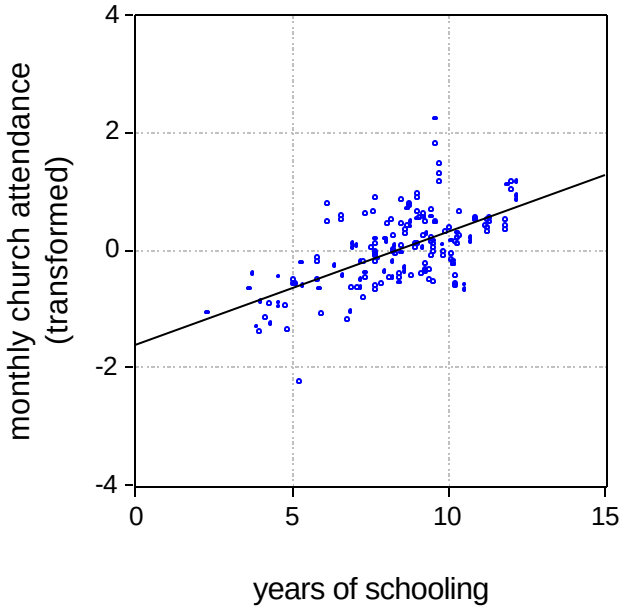

Figure 4
Belief in Heaven versus Schooling
(partial relation)

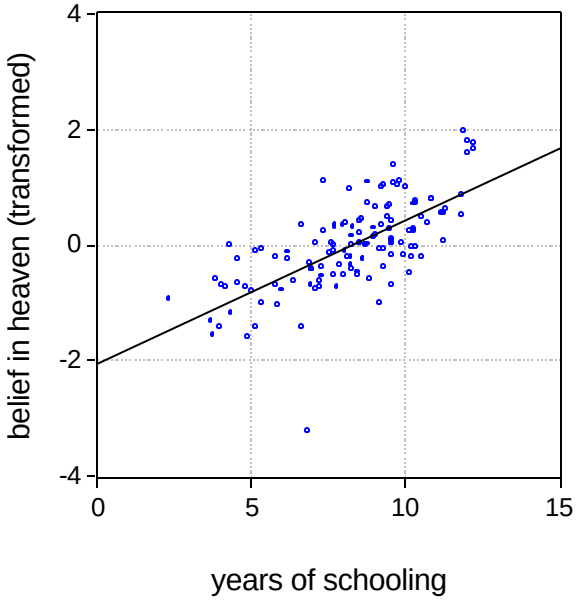

Figure 5
Monthly Church Attendance versus Urbanization
(partial relation)

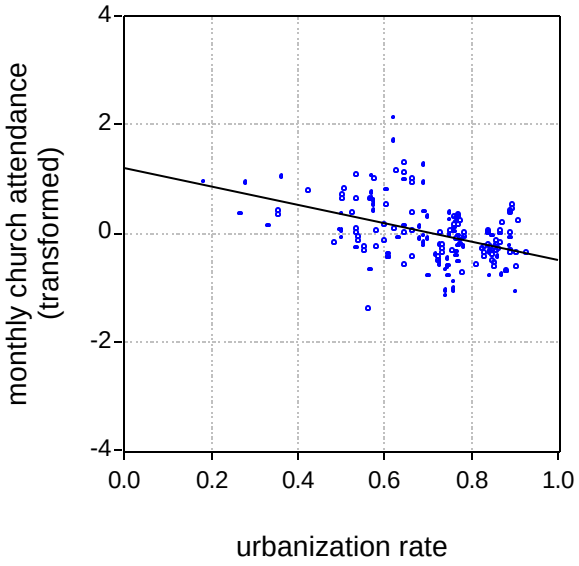

Figure 6
Belief in Heaven versus Urbanization
(partial relation)

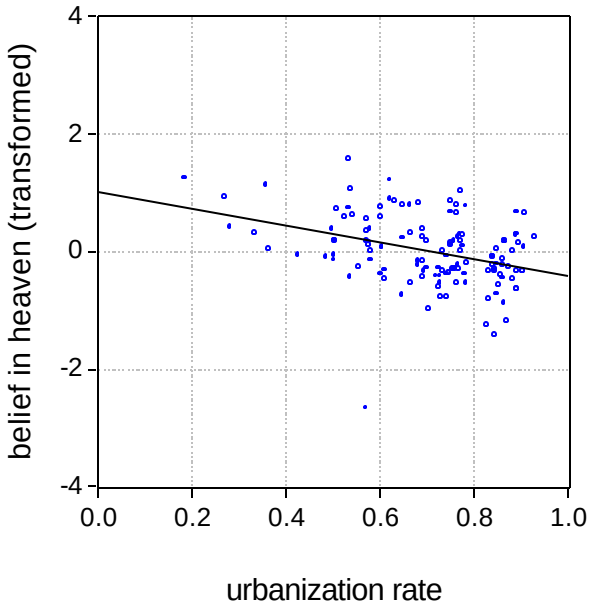

Figure 7
Monthly Church Attendance versus Life Expectancy
(partial relation)

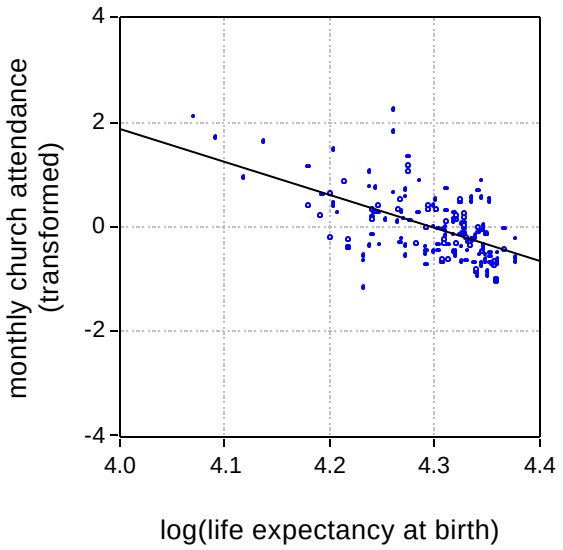

Figure 8
Belief in Heaven versus Life Expectancy
(partial relation)

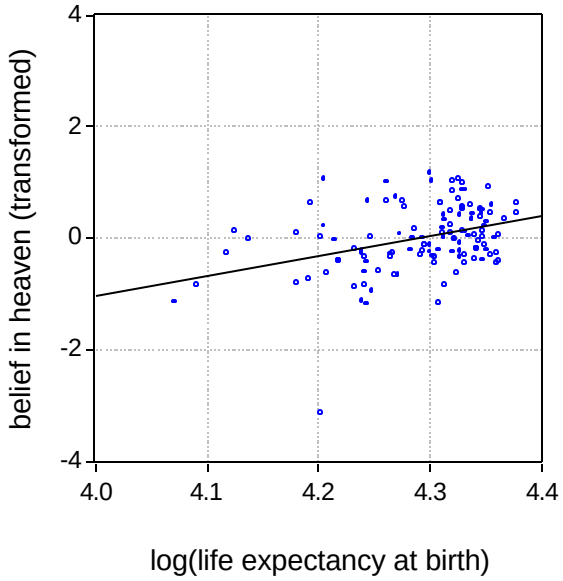

Figure 9
Monthly Church Attendance versus GDP
(partial relation)

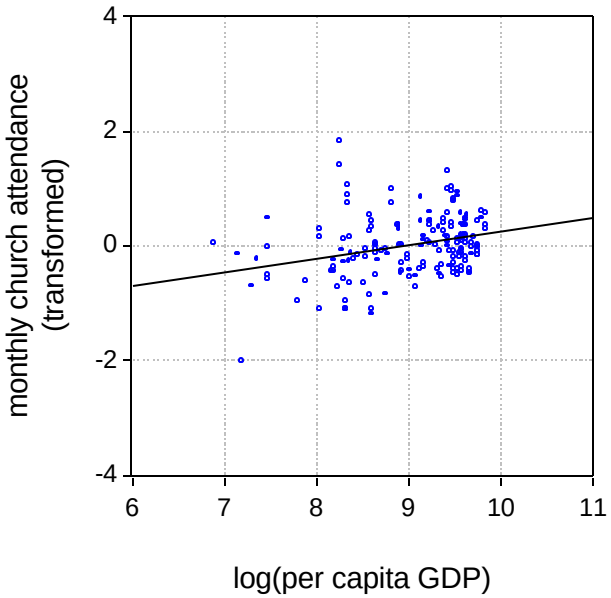

Figure 10
Belief in Heaven versus GDP
(partial relation)

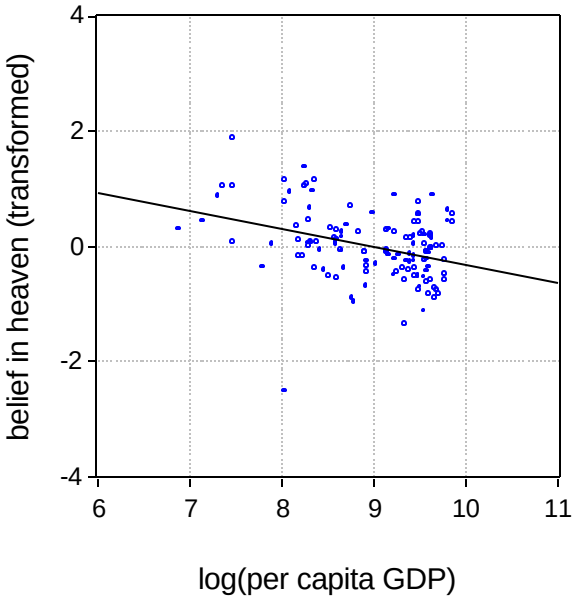

Figure 11
Monthly Church Attendance versus Pluralism
(partial relation)

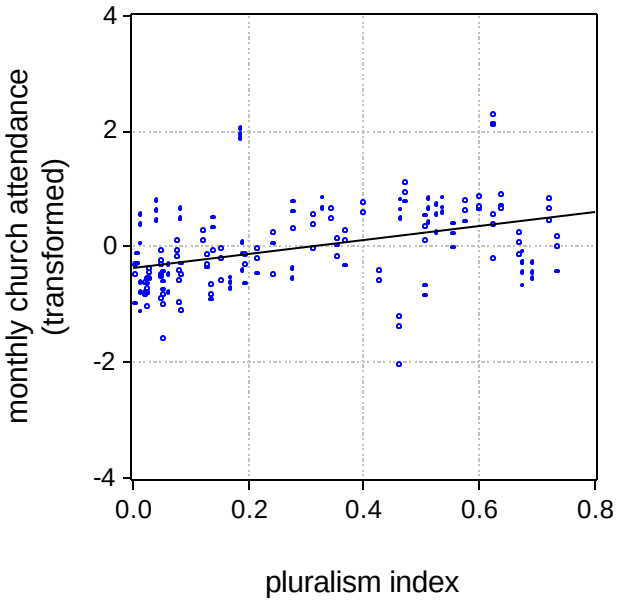

Figure 12
Belief in Heaven versus Pluralism
(partial relation)

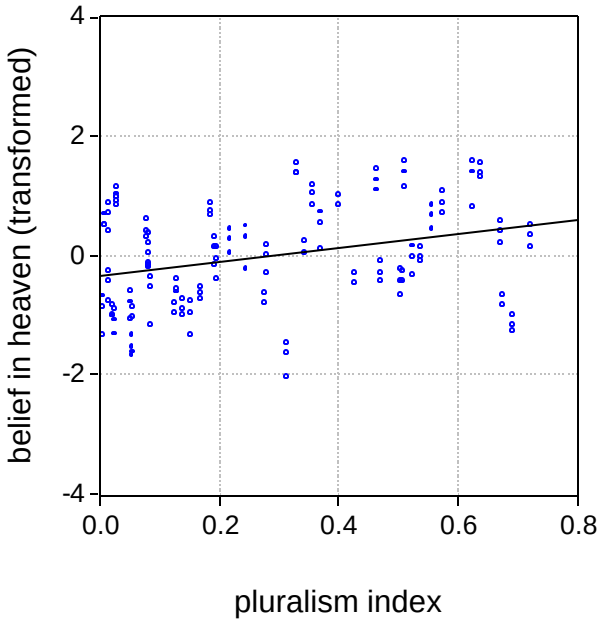

Figure 13
Growth Rate versus Monthly Church Attendance
(partial relation)

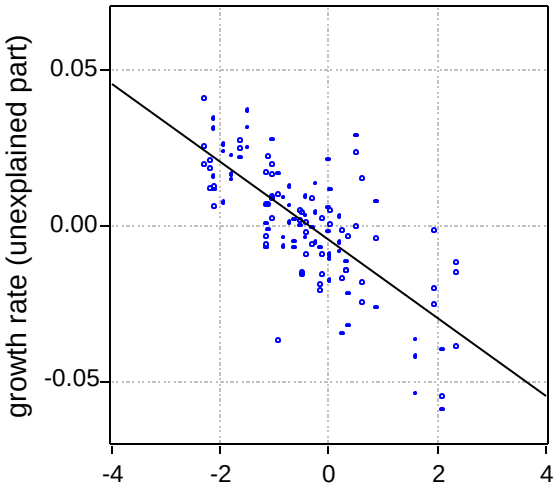

Figure 14
Growth Rate versus Belief in Heaven
(partial relation)