Quantity and Quality of Economic Growth*

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Most cross-country studies of economic growth, including my earlier research, have focused on the determinants of economic variables. The variables most often studied are the growth rate of per capita GDP and the ratio of investment to GDP. In this study, I focus more on the determination of quality dimensions of economic development. By quality, I mean factors such as life expectancy, fertility, income inequality, and aspects of political institutions. The political dimensions that I consider are democracy in the sense of electoral rights, maintenance of the rule of law, and the extent of official corruption. I also look at the determinants of crime rates, measured by murder rates.

I. Economic Growth

Previous cross-country research has revealed a number of empirical regularities concerning the determination of economic growth. For given policies and institutions and for given starting levels of human capital, a country tends to grow faster per capita if it starts with a lower per capita GDP. This pattern is known as conditional convergence, that is, the poor tend to converge toward the rich if policies and institutions are held constant. However, the strong tendency for rich countries to have better policies and institutions (which explains their being rich) eliminates the convergence tendency in an absolute or non-conditional sense.

Empirical research has also isolated some specific measures of policies, institutions, and initial human capital that are systematically related to subsequent growth. For a given initial per capita GDP, growth tends to be fostered by higher starting levels of education and health, lower fertility, better maintenance of the rule of law,

smaller government consumption, greater openness to international trade, lower inflation, and a higher propensity to invest. Growth is also stimulated by improvements in the terms of trade.

Table 1 illustrates these kinds of results for 84 countries with available data. The dependent variable is the growth rate of per capita GDP observed over the periods 1965-75, 1975-85, and 1985-95.[1] In system (1), the estimated coefficient on the log of per capita GDP at the beginning of the period equals -0.030 and is highly significant. This coefficient means that the estimated rate of conditional convergence is around 3 percent per year.

One result related to initial human capital is a marginally significant positive coefficient for the average years of school attainment of adult males. Also significantly positive is the log of life expectancy at birth; hence, improved health is a component of human capital that predicts subsequent growth. A significantly negative growth effect appears for the log of the total fertility rate. Hence, there seems to be a tradeoff between a higher rate of population growth (determined in the long run particularly by the fertility rate) and the growth rate of per capita output.

A significantly positive effect on growth shows up for a subjective indicator of the maintenance of the rule of law. This variable (measured on a [0,1] scale, with a

[1] The GDP data are the purchasing-power-parity adjusted values reported by Summers and Heston in their Penn World Table version 5.6, which is available at www.nber.org. Most of the other data have been discussed in previous research; see, for example, Barro (2000). The results are similar in most respects for systems with seven five-year periods, 1965-1970, …, 1995-2000. The fits of the equations, measured by R-squared values, are much poorer in the five-year systems. The likely explanation is that much of economic growth over short intervals is dominated by forces—*business cycles*—that are unrelated to the mostly longer-term determinants of growth that are considered in Table 1. However, the estimated standard errors of the coefficients tend to be slightly smaller in the five-year systems, thereby suggesting that a little more information about long-term growth effects is generated by observing the data at a somewhat higher frequency. The largest change occurs for the inflation rate, which has an estimated

higher value being more favorable) is the one provided by Political Risk Services in its publication *International Country Risk Guide*.[2] The indicator is intended to gauge the nature of the legal and judicial systems, particularly as they govern the maintenance of law and order.

Also significantly positive for growth is a measure of international openness.[3] The government consumption ratio[4] is significantly negative, and the inflation rate is negative but only marginally significant (see n. 1, above). The investment ratio and the growth rate of the terms of trade (export prices relative to import prices) also have significantly positive effects.

The other columns of Table 1 show the effects from introduction of additional explanatory variables as determinants of economic growth. System (2) adds the average years of school attainment of adult females at the start of the period. The estimated coefficient is negative and marginally significant. If years of primary schooling are also added, then the point estimates are negative for male primary and positive for female primary, but neither coefficient is statistically significant. A discussion of these kinds of effects from initial levels of schooling appears in Barro (2001).

Some previous research has considered growth effects of democracy, measured by Freedom House's subjective indicators of electoral rights and civil liberties (which are themselves highly correlated). These variables have been considered instead of or in

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coefficient that is statistically significant and about three times as large in magnitude in the five-year systems as compared with the ten-year systems shown in Table 1.

[2] Since this indicator is available starting only in 1982, later values of the variable are allowed to influence earlier values of economic growth. The rationale is that rule of law tends to persist substantially over time, so that later values may be satisfactory proxies for earlier ones.

[3] This variable is the ratio of exports plus imports to GDP filtered for the usual relation of this ratio to country size (measured by the logs of population and area).

[4] This variable is based on the standard measure of government consumption less outlays on defense and education.

addition to the indicator for maintenance of the rule of law as determinants of growth. If the electoral rights indicator is added to the system for growth, then its estimated coefficient (0.0083, s.e. = 0.0072) is positive but statistically insignificantly different from zero. However, the inclusion of a quadratic in the electoral rights measure, as in system (3) of Table 1, reveals that growth is first increasing and subsequently decreasing in the extent of democracy. This kind of relation has been discussed in Barro (1996).

Other research has focused on the growth effects from official corruption. System (4) of Table 1 adds a subjective indicator of corruption, also constructed by Political Risk Services. (The variable is defined on a [0,1] scale, with a higher number signifying a more favorable environment, that is, *less* corruption.) The estimated coefficient on the corruption variable is indistinguishable from zero. A possible interpretation for a non-positive effect is that some aspects of corruption are productive because they inhibit the enforcement of poor laws and regulations.

System (5) of Table 1 adds the country's murder rate (number of homicides per year per 100,000 inhabitants)—the data are the ones used by Loayza, et al. As these authors point out, the murder data have more consistency across countries and over time than do alternative measures of violent or total crime. However, the murder rate is statistically insignificant for growth. The rule-of-law variable—which is related to the crime rate through the consideration of "law and order"—becomes *more* significant when the murder rate is added. (Note, however, that the inclusion of the murder variable also has a substantial negative effect on the sample size, so the systems of columns [1] and [5] are not directly comparable.)

System (6) shows that economic growth is not closely related to the extent of income inequality, as gauged by a standard measure, the Gini coefficient. (Note that, as with the murder rate, the inclusion of the Gini variable substantially lowers the sample size.) Further analysis of the interplay between growth and inequality is contained in Barro (2000).

When considering social or cultural developments it is natural to think about religion, which is a central element of a nation's culture. In previous work, I considered the growth implications of different religious denominations. I use here an eight-way breakdown of adherence among persons professing some religion: Catholic, Muslim, Protestant, Hindu, Eastern religions (including Buddhist), Orthodox, Jewish, and other religions. (The data are from Barrett, *World Christian Encyclopedia*, 1st and 2nd editions.) I arbitrarily omitted the Catholic fraction as a normalization and then considered the effects on growth from the fractions affiliated with the other seven denominations. With the other explanatory variables shown in Table 1 held constant, this religious breakdown is insignificantly related to growth. (The p-value for the hypothesis that the seven coefficients all equal zero is 0.42.)

System (7) of Table 1 shows the results when only the Muslim denomination fraction is added to the system. (This result may be of especial interest because the Muslim variable turns out to be systematically related to some other variables considered later.) The result in system (7) is that the estimated coefficient on the Muslim variable is insignificantly different from zero. Hence, at least when initial income, schooling, fertility, rule of law, and so on, are held constant, the extent of Muslim adherence does not matter significantly for growth.

I have also examined the growth implications of a country's former colonial status. Four variables—dummies for whether a country is a former colony of Britain, France, Spain or Portugal, and another ruler—are jointly insignificant for growth. The p-value here is 0.55. Hence, at least when per capita GDP and the other explanatory variables are held constant, a country's colonial history is not systematically related to its growth performance.

Finally, system (8) of Table 1 adds the log of population as a country scale variable. (With the log of per capita GDP already included, the results would be the same if the log of GDP were entered.) The result is that country size is insignificantly related to growth.

II. Political and Social Variables

The empirical findings in the preceding section indicate that a number of social, political, and institutional variables are important for the determination of economic growth. Many of these variables tend themselves to evolve during the process of economic development. Some of these changes—such as rises in health indicators, reductions in fertility rates, and expansions of democracy—have been described as improvements in the quality of economic growth.

Interestingly, the associations of some of the social and political variables with economic development have been given familiar names in various research literatures. As an example, the Aristotle-Lipset hypothesis states that the propensity for maintaining strong democracy and the rule of law tend to be enhanced by economic growth, particularly by expansions of income and education. It is sometimes also argued that greater income inequality decreases the prospects for sustaining democracy and the rule of law.

The association of income inequality—measured, for example, by the Gini coefficient—with economic development is usually expressed in terms of the Kuznets curve. In this case, the hypothesis is that inequality will first rise and later fall as per capita income rises. In a previous study (Barro [2000]), I discussed the cross-country evidence on this topic, and I argued that the Kuznets curve was present in the data but did not explain a great deal of the cross-sectional or time-series variation in inequality.

In the sociology of religion, a famous idea—called either the secularization hypothesis or the modernization hypothesis—is that people become less religious as they

become richer and better educated. Sometimes this hypothesis is based on the idea that religion is primarily superstition—hence, more educated and, therefore, more scientific, people will be less likely to follow religious practices. A substantial recent literature has argued that the secularization hypothesis conflicts with the cross-country data on church attendance and religious beliefs. In a later section, I present some preliminary results on the relation of religiosity measures to economic development.

Some of the other explanatory variables used in Table 1—notably life expectancy and fertility rates—are particularly closely related to per capita GDP and education. Therefore, it is surprising that the relationships of these variables with economic development do not seem to have famous names.

Table 2, carried out in the spirit of Bill Easterly's analysis in *Life During Growth*, looks at the relation to economic development of some of the social, political, and institutional factors that were viewed as independent variables in Table 1. In each case, the independent variables in Table 2 include three basic measures of economic development—the log of per capita GDP, a measure of years of education, and the rate of urbanization. Also included is the Muslim denomination fraction—as mentioned before, this measure of religious adherence has interesting interactions with some of the political and social variables. The second specification in each case adds the Gini coefficient as a measure of income inequality. (As noted before, the inclusion of this variable substantially reduces the sample size.)

The three development indicators have highly significant positive coefficients for explaining life expectancy in column (1) of Table 2. In this case, schooling is represented by primary education. The addition of years of schooling at the secondary

and higher levels does not add to the explanatory power for life expectancy. The main inference from these results is that, not surprisingly, improved life expectancy typically accompanies economic development. The Muslim denomination variable is insignificant in this system.

In column (2), the Gini coefficient has a significantly negative coefficient. That is, for given per capita GDP, etc., average life expectancy tends to be lower when income is more unevenly distributed. In comparison with column (1), the urbanization variable is much less important, and the Muslim fraction becomes significantly negative.

Columns (3) and (4) take the log of the total fertility rate as the dependent variable. In this case, the adult educational attainment variables that have the most explanatory power are primary schooling distinguished by males and females. The development indicators are, in this case, strongly negatively related to fertility. Moreover, in column (3), female primary schooling is substantially more important than male schooling.

In column (4), the Gini coefficient is significantly positive—that is, greater inequality goes along with a higher economy-wide fertility rate. With the Gini coefficient held constant, the negative effects of male and female primary education are now of similar magnitude. The Muslim religion fraction is significantly positive in systems (3) and (4). That is, even with per capita GDP and the other variables held constant, a higher Muslim affiliation goes along with higher fertility.

Systems (5) and (6) look at electoral rights as a measure of democracy. The estimated coefficients of the log of per capita GDP are significantly positive, thereby supporting the Aristotle-Lipset hypothesis. The urbanization variable is not important

here. Years of primary schooling have the main explanatory power related to education, and this variable is significantly positive in column (5). However, the variable is insignificant in column (6) when the Gini coefficient is held constant (and where the sample size is altered to reflect the availability of data on inequality). The Gini coefficient is itself insignificant in column (6)—that is, the results fail to support Aristotle's idea that greater equality of income reinforces the tendency toward democracy. The Muslim variable is significantly negative in columns (5) and (6). Hence, even with per capita GDP and the other explanatory variables held constant, a higher Muslim affiliation is associated with less democracy.

The results for the rule of law in columns (7) and (8) are similar with respect to the effects of the log of per capita GDP. However, primary schooling now plays no special role, and the total years of schooling is the education variable with the most explanatory power. Thus, the indication is that basic education is important for maintaining electoral rights (in system [5]), whereas broader education plays more of a role in sustaining a functioning legal system (in system [7]).

The urbanization rate is significantly negative for the rule of law in column (7)—this finding may reflect an adverse influence of urbanization on law and order. Also, in contrast with the results for democracy in columns (5) and (6), the Muslim fraction is insignificant for explaining the rule of law in columns (7) and (8). This finding is noteworthy because rule of law tended to have a positive effect on economic growth (in Table 1), whereas the level of democracy lacked a clear relationship with growth. Thus, on this count, a larger Muslim fraction might diminish the incidence of democracy without impeding the growth process.

The Gini coefficient has a significantly negative coefficient for explaining the rule of law in column (8). Thus, although greater inequality did not seem to impair the sustainability of electoral rights, it does seem to hinder the maintenance of the rule of law (perhaps by making it more difficult to sustain law and order).

Columns (9) and (10) deal with the indicator for official corruption (where, again, a higher value signifies less corruption). These results are broadly similar to those for the rule of law in columns (7) and (8), although the positive effects for the log of per capita GDP are weaker in the case of the corruption variable. Another difference is that the estimated coefficient on the urbanization rate is essentially zero in column (9)—that is, in contrast with the tendency for urbanization to go along with weaker rule of law, there is no relationship with the extent of official corruption. Moreover, in column (10), where the Gini coefficient is held constant, the estimated coefficient of the urbanization rate is positive. The estimated negative coefficient on the Gini variable in column (10) is weaker than it was in column (8).

For the murder rate in columns (11) and (12), one immediate observation is that the fit is very poor. That is, economic development overall explains little of the observed variations in murder rates (and, presumably, in crime rates more broadly). Surprisingly, the estimated effect of per capita GDP is positive and even marginally statistically significant in column (11). The greatest explanatory power comes in column (12) from the Gini coefficient. That is, as stressed by Loayza, et al, murder rates are much more related to the degree of income inequality (positively) than to the level of per capita GDP. The Muslim coefficient is significantly negative in column (11) but becomes statistically insignificant in column (12) when the Gini variable is included.

Table 3 shows results with the Gini coefficient treated as the dependent variable. A Kuznets curve shows up in that the estimated coefficient on the log of per capita GDP is significantly positive, whereas that on the square of the log of per capita GDP is significantly negative. The estimated coefficients imply that the marginal effect of per capita GDP on the Gini coefficient turns from positive to negative when the level of per capita GDP reaches $2800 (in PPP-adjusted 1985 U.S. dollars).

The results in Table 3 also show a significantly negative coefficient for primary schooling, a marginally significant negative coefficient for secondary schooling, and an insignificant positive coefficient for higher schooling. The urbanization rate is insignificant. Overall, these results do not generate a close correspondence between the level of economic development and the extent of income inequality. The table also shows that the coefficient on the Muslim fraction is significantly negative. That is, a higher Muslim fraction goes along with greater *equality* of income.

To summarize, economic development tends overall to be accompanied by higher life expectancy (and, presumably, better health generally), lower fertility rates, and higher propensities for democracy, maintenance of the rule of law, and low official corruption. However, the relationship with the murder rate (and, presumably, crime more broadly) is weak. The overall relation with income inequality is also not strong.

III. Religiosity

In recent research, I have been studying the impact of economic development on a key cultural variable, the extent of religiosity. Specifically, I am testing the secularization hypothesis, which argues that various dimensions of economic development, notably enhanced education, would reduce religiosity. In carrying out this research, I am exploiting some useful panel data that have been generated in recent years from the *World Values Survey* and the *International Social Survey Programme.* Recently obtained data from Gallup International will allow an extension of this analysis.

Table 4, taken from Barro and McCleary (2001), shows some preliminary regression results with measures of religiosity used as the dependent variables. There are five systems corresponding to the different measures of religiosity—the fraction of the population attending church at least weekly in column 1, the fraction attending at least monthly in column 2, the fraction of the population who believe in heaven in column 3, the fraction believing in hell in column 4, and the fraction believing in an after-life in column 5. (The actual form of each dependent variable is a transformation of the original data—see the notes to Table 4.) Each system consists of five equations corresponding to the religiosity survey data: the first is for 1981 data from the *World Values Survey* (*WVS*), the second is for 1990 data from *WVS*, the third is for 1991 data from the *International Social Survey Programme* (*ISSP*), the fourth is for 1995 data from *WVS*, and the fifth is for 1998 data from *ISSP*.

The explanatory variables include five measures of economic development: per capita GDP, average years of school attainment of the adult population, the urbanization

rate, the log of life expectancy at birth, and the fraction of the population aged 65 and over.

The statistical findings 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 (viewed as the basic indicator of development). As examples, negative associations appear for weekly church attendance in Figure 1 and for belief in heaven in Figure 2.

The statistical results shown in Table 4 reveal very different patterns for the individual dimensions of economic development. Two results that show up clearly for all five measures of religiosity are *positive* effects from education and negative effects from urbanization. These results reveal partial relationships. For example, the regression framework isolates the relation between education and church attendance, while holding constant the other (highly correlated) development indicators, such as per capita GDP and urbanization. The partial relation with education is shown graphically for weekly church attendance in Figure 3 and for belief in heaven in Figure 4.

With the other explanatory variables held constant, per capita GDP has essentially a zero relation with church attendance and relatively weak negative relationships with the belief measures. Thus, it appears that more income, *per se*, does not have a close relationship with religiosity.

We have more difficulty in interpreting the relationships with the two health related measures, life expectancy at birth and the fraction of the population that is elderly. Church attendance is significantly negatively related to life expectancy. This result

seems reasonable from an economic perspective if church attendance is related to securing a favorable life-after-death. However, it is less clear why the belief measures are significantly negatively related to the elderly population share. (A negative effect on church attendance would be predicted from the higher costs for elderly persons to attend services.)

Suppose that we think of economic development as reflecting fundamentally growth in per capita GDP. Empirically, this growth is typically accompanied by higher values of the other development indicators included in Table 4: education, urbanization, life expectancy, and the elderly population share. Then one can think of the overall effect of economic development on religiosity as reflecting the direct impact of GDP—for example, the coefficient 0.08 shown for weekly church attendance in Table 4—and four indirect effects that involve the other four dimensions of development. For example, the indirect effect from education on weekly church attendance is given by the coefficient 0.265 shown in Table 4 multiplied by the typical response of education to GDP (which turns out to involve a coefficient of 2.3). Proceeding in this way, one can compute an overall effect of economic development on weekly church attendance as follows: 0.08 from per capita GDP, 0.61 from education, -0.32 from urbanization, -0.82 from life expectancy, and –0.11 from the elderly population share. The total effect (coefficient of –0.56) is consistent with the simple relation between weekly church attendance and GDP that is shown in Figure 1.[5]

[5] If one proceeds in the same way for the other measures of religiosity, one gets overall coefficients for GDP of -0.61 for monthly church attendance, -0.52 for belief in heaven, -0.59 for belief in hell, and –0.10 for belief in an after-life. Thus, belief in an after-life is the one religiosity indicator considered here that seems not to be strongly related to economic development overall.

So, what does all this say about the secularization hypothesis? The positive partial relation between education and the religiosity measures makes implausible the idea that religiosity is non-scientific and, therefore, tends to decline as societies become more modern and sophisticated. On the other hand, other features of economic development—including urbanization and some aspects of improved health—seem to be strong enough to generate an overall negative association between economic development and religiosity. Sorting out the nature of these associations will be an important part of future research.

The results in Table 4 also have implications for the market or supply-side theory of religiosity developed by Rodney Stark, Laurence Iannaccone, and others. One of their arguments is that greater competition among religion providers promotes more efficient service and, thereby, leads to a rise in church attendance. Empirically, they argue that religious competition can be measured by a pluralism indicator based on the composition of religious affiliations in a country. For example, a larger Herfindahl index for denomination shares suggests less inter-denominational competition and, hence, lower church attendance. Chaves and Cann have focused, instead, on direct measures of government regulation, including the existence of an official state church and the government's participation in the appointment and approval of church leaders.

Table 4 shows, consistent with the Stark-Iannaccone argument, that an index of religious pluralism is positively related to church attendance. This pluralism index is also positively related to beliefs in heaven and hell but not with belief in an after-life. Thus, there is some suggestion that more competition among religion providers tends to generate more religiosity, measured by attendance or some of the beliefs. However, one

concern with these results is that greater religiosity (caused by some unmeasured factor) may be leading to greater religious diversity, rather than the reverse. That is, if the population of a country were more religious (for reasons not being explained) it would not be surprising that a more diverse group of denominations would be created in the country, at least in the long run, to meet the demand.

Table 4 shows, contrary to Stark-Iannaccone and Chaves-Cann, that a dummy variable for the existence of an official state religion (as designated in Barrett's *World Christian Encyclopedia*) is *positively* related to church attendance. The state religion variable is also positively related to beliefs in heaven and hell though not to belief in an after-life. These results seem reasonable if, as is usually the case, the existence of a state church goes along with subsidies to church-going activities.

The results on state religion shown in Table 4 apply when the system includes the status that applied in 1970 (which is prior to any of the observed religiosity measures used as dependent variables). Some countries had changes in the status of state religion subsequent to 1970, for example, Ireland dropped the official monopoly position of the Catholic church in the early 1970s. However, if a later value of the state religion dummy is added to the systems, then this variable lacks explanatory power.[6] This finding may indicate that people take a long time to adjust to a change in church-state relations or that some of the changes may be less substantive than they appear formally. For example, Barrett still classifies Ireland in 1990 as a religious state, although not exclusively a Catholic one.

[6] This finding is based on very limited information because, according to Barrett, the only changes in official state religion between 1970 and 1990 for countries in the sample were Ireland and South Korea dropping an official state church and Slovenia adding one. Perhaps controversially, Barrett does not admit

Table 4 shows, consistent with Stark-Iannaccone and Chaves-Cann, that greater state regulation of religion significantly reduces church attendance. Interestingly, this regulation variable is not significantly related to the measures of religious belief. Thus, there is the suggestion that government regulation makes less efficient the provision of organized religion and, thereby, depresses church attendance. However, this regulatory involvement seems not to reduce religiosity as measured by beliefs—which apparently are sustained in this case despite the fall in church attendance. The results on religious pluralism and state religion differed in that significant effects were found not only for church attendance but also for some of the beliefs.

Table 4 shows a substantial negative effect on all of the religiosity measures from the presence of a Communist regime. (The Communist countries in the sample are mainly in eastern Europe but include also China.) This pattern makes sense because the Communist governments typically attempted to suppress organized religion, which was presumably regarded as competitive with the Communist religion itself.

The presence in the sample of the eastern European countries allows an investigation of the effects of removal of Communism in the 1990s. Table 4 shows evidence for significant recovery of church attendance (more so for monthly than weekly data) and beliefs in the post-Communist period. However, the 1998 results indicate that the recovery has been only by around one-third of the initial depressing influence. Thus, as with the existence of an official state church, the impact on religiosity seems to persist well beyond the change in the regime.

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changes for Portugal and Spain, each of which is described as officially Catholic even in 1990. Changes in state religion also would have occurred during the 1990s in some of the former Communist countries.

The empirical estimation also allows for differences in religious practices among religious denominations. The variables correspond to the eight-way breakdown of denominations used before in the analysis of economic growth. The Catholic share is again omitted, so that the coefficients shown in the table represent the effect of the indicated denomination relative to that for Catholic.

For church attendance, the results reveal that all religions other than Muslim have significantly lower participation than Catholic. For the belief measures, Muslim is significantly higher than Catholic. Significantly negative effects on beliefs (relative to those for Catholic) appear for Protestant, Hindu, eastern religions, Jewish, and Orthodox.

IV. Relation of religiosity to economic growth

I have some highly preliminary results on the effects of religiosity on economic growth, which is the relationship emphasized by Max Weber. Holding fixed the kinds of explanatory variables shown in Table 1, growth appears to be negatively related to church attendance and positively related to measures of religious beliefs.[7] The three belief measures considered thus far—in heaven, hell, and an after-life—are hard to distinguish in terms of the relationship with economic growth. However, belief in life-after-death has the strongest relationship with growth. I am also studying the relation of religiosity to economic growth while also holding constant the composition of the population by religious denominations.

Table 1, Part I				
Regressions for Economic Growth				
Explanatory variable				
	(1)	**(2)**	**(3)**	**(4)**
Log(per capita GDP)	-0.0297 (0.0032)	-0.0279 (0.0032)	-0.0263 (0.0032)	-0.0297 (0.0032)
Years of male upper schooling	0.0035 (0.0019)	0.0088 (0.0035)	0.0039 (0.0017)	0.0034 (0.0019)
Log(life expectancy)	0.0588 (0.0141)	0.0578 (0.0140)	0.0563 (0.0139)	0.0569 (0.0143)
Log(fertility rate)	-0.0159 (0.0058)	-0.0158 (0.0057)	-0.0116 (0.0055)	-0.0159 (0.0058)
Rule of law	0.0133 (0.0059)	0.0138 (0.0058)	0.0178 (0.0061)	0.0114 (0.0075)
Government consumption ratio	-0.109 (0.025)	-0.102 (0.025)	-0.101 (0.027)	-0.111 (0.025)
International openness	0.0149 (0.0044)	0.0137 (0.0043)	0.0108 (0.0044)	0.0149 (0.0044)
Inflation rate	-0.0142 (0.0105)	-0.0120 (0.0104)	-0.0199 (0.0097)	-0.0132 (0.0101)
Investment ratio	0.057 (0.026)	0.054 (0.026)	0.069 (0.024)	0.059 (0.026)
Growth of Terms of trade	0.079 (0.032)	0.085 (0.032)	0.093 (0.032)	0.081 (0.032)
Years of female upper schooling	--	-0.0072 (0.0041)	--	--
Democracy	--	--	0.100 (0.031)	--
Democracy squared	--	--	-0.087 (0.026)	--
Corruption	--	--	--	0.0030 (0.0076)
Numbers of countries and observations	84, 244	84, 244	84, 239	84, 244
R-squared values	.59, .46, .42	.59, .49, .43	.66, .40, .44	.59, .46, .42

[7] However, since the religiosity data begin only in 1981, later values have been allowed to influence earlier values of economic growth. The (imperfect) rationale for this specification is that religiosity is highly persistent over time, so that later values may proxy satisfactorily for earlier ones.

Table 1, Part II				
Regressions for Economic Growth				
Explanatory variable				
	(5)	**(6)**	**(7)**	**(8)**
Log(per capita GDP)	-0.0347 (0.0038)	-0.0316 (0.0037)	-0.0299 (0.0032)	-0.0294 (0.0032)
Years of male upper schooling	0.0016 (0.0017)	0.0034 (0.0020)	0.0036 (0.0019)	0.0036 (0.0019)
Log(life expectancy)	0.0610 (0.0219)	0.0574 (0.0168)	0.0615 (0.0148)	0.0576 (0.0141)
Log(fertility rate)	-0.0125 (0.0064)	-0.0270 (0.0076)	-0.0164 (0.0058)	-0.0153 (0.0057)
Rule of law	0.0248 (0.0073)	0.0033 (0.0071)	0.0129 (0.0059)	0.0132 (0.0059)
Government consumption ratio	-0.184 (0.030)	-0.134 (0.035)	-0.104 (0.026)	-0.106 (0.026)
International openness	0.0080 (0.0038)	0.00105 (0.0044)	0.0140 (0.0044)	0.0151 (0.0044)
Inflation rate	-0.0138 (0.0087)	-0.0166 (0.0098)	-0.0159 (0.0106)	-0.0107 (0.0105)
Investment ratio	0.039 (0.030)	0.051 (0.028)	0.062 (0.026)	0.061 ((0.026)
Growth of Terms of trade	0.086 (0.041)	0.045 (0.038)	0.082 (0.032)	0.081 (0.032)
Murder rate	-0.00011 (0.00017)	--	--	--
Gini coefficient	--	0.021 (0.022)	--	--
Muslim fraction	--	--	0.0042 (0.0049)	--
Log(population)	--	--	--	-0.0003 (0.0009)
Numbers of countries and observations	62, 143	67, 141	84, 244	84, 244
R-squared values	.63, .51, .26	.62, .60, .54	.59, .47, .42	.60, .46, .41

Notes: Estimation is by three-stage least squares using mostly lagged explanatory variables as instruments. Standard errors are in parentheses. The growth rate of per capita GDP is observed for 1965-75, 1975-85, and 1985-95. Constant terms, not shown, are included for each time period in each system.

Table 2, Part I				
Regressions for Political and Social Variables				
	Dependent variable			
	(1)	**(2)**	**(3)**	**(4)**
Explanatory variable	**log (life expectancy)**	**log (life expectancy)**	**log (fertility rate)**	**log (fertility rate)**
Log(per capita GDP)	0.0518 (0.0049)	0.0638 (0.0072)	-0.082 (0.014)	-0.184 (0.019)
Years of primary schooling	0.0278 (0.0025)	0.0169 (0.0033)	--	--
Years of male primary schooling	--	--	-0.0339 (0.0113)	-0.0359 (0.0154)
Years of female primary schooling	--	--	-0.0870 (0.0120)	-0.0401 (0.0157)
Urbanization rate	0.234 (0.024)	0.091 (0.026)	-0.223 (0.063)	-0.263 (0.067)
Muslim fraction	-0.020 (0.016)	-0.095 (0.017)	0.223 (0.041)	0.203 (0.044)
Gini coefficient	--	-0.181 (0.064)	--	1.39 (0.17)
Numbers of countries and observations	108, 709	85, 439	106, 704	85, 439
Average R-squared	0.72	0.67	0.69	0.78

Notes: Systems (1)-(12) are estimated by the seemingly-unrelated (SUR) method. Standard errors are in parentheses. Constant terms, not shown, are included for each time period for each system. The logs of life expectancy at birth and the total fertility rate are observed in 1970, 1975, …, 1995, 1998. The measure of democracy (electoral rights from Freedom House) is observed in 1972, 1975, …, 2000. The rule-of-law and official corruption variables (from Political Risk Services) are observed in 1982, 1985, …, 2000. The murder rate (from Loayza, et al) is observed in 1970, 1975, …, 1995.

Table 2, Part II				
Regressions for Political and Social Variables				
	Dependent variable			
	(5)	**(6)**	**(7)**	**(8)**
Explanatory variable	**democracy**	**democracy**	**rule of law**	**rule of law**
Log(per capita GDP)	0.155 (0.025)	0.197 (0.030)	0.123 (0.021)	0.129 (0.024)
Total years of schooling	--	--	0.0341 (0.0077)	0.0145 (0.0086)
Years of primary schooling	0.0308 (0.0135)	-0.0012 (0.0153)	--	--
Urbanization rate	-0.039 (0.099)	-0.060 (0.108)	-0.206 (0.074)	-0.088 (0.083)
Muslim fraction	-0.262 (0.055)	-0.220 (0.061)	0.012 (0.040)	-0.077 (0.045)
Gini coefficient	--	-0.073 (0.199)	--	-0.508 (0.148)
Numbers of countries and observations	108, 708	85, 438	97, 456	73, 300
Average R-squared	0.48	0.44	0.54	0.62

Table 2, Part III				
Regressions for Political and Social Variables				
	Dependent variable			
	(9)	**(10)**	**(11)**	**(12)**
Explanatory variable	**corruption**	**corruption**	**murder rate**	**murder rate**
Log(per capita GDP)	0.084 (0.021)	0.042 (0.025)	2.01 (1.10)	1.62 (1.06)
Total years of schooling	0.0232 (0.0079)	0.0241 (0.0091)	-0.84 (0.33)	-0.40 (0.30)
Urbanization rate	-0.003 (0.081)	0.171 (0.090)	-4.43 (3.61)	-2.49 (3.39)
Muslim fraction	-0.044 (0.041)	-0.022 (0.049)	-5.50 (1.94)	-1.35 (2.02)
Gini coefficient	--	-0.258 (0.165)	--	17.3 (6.1)
Numbers of countries and observations	97, 456	73, 300	78, 330	63, 244
Average R-squared	0.48	0.50	0.06	0.11

Table 3	
Regression for Gini Coefficient	
Explanatory variable	
Log (per capita GDP)	0.484 (0.091)
Log (per capita GDP) squared	-0.0305 (0.0058)
Years of primary schooling	-0.0257 (0.0051)
Years of secondary schooling	-0.0169 (0.0086)
Years of higher schooling	0.030 (0.037)
Urbanization rate	0.029 (0.036)
Muslim fraction	-0.052 (0.020)
Dummy for net income or expenditure data	-0.073 (0.011)
Dummy for individual data	-0.021 (0.010)
Numbers of countries and observations	89, 226
Average R-squared	0.52

Note: The system is estimated by the seemingly-unrelated (SUR) method. Standard errors are in parentheses. The Gini coefficient, from Deininger and Squire, is observed around 1960, 1970, 1980, and 1990. Constant terms, not shown, are included for each time period. Two dummy variables are included as explanatory variables. One is for whether the inequality data are based on income net of tax or on expenditures, rather than income gross of tax. The other is for whether the data are based on income for individuals, rather than households.

Table 4 Regressions for Church Attendance and Religious Beliefs					
	Dependent variable				
	(1)	(2)	(3)	(4)	(5)
Explanatory variable	**weekly church attendance**	**monthly church attendance**	**belief in heaven**	**belief in hell**	**belief in after-life**
Log(per capita GDP)	0.08 (0.17)	0.09 (0.17)	-0.48 (0.21)	-0.45 (0.19)	-0.55 (0.17)
Total years of education	0.265 (0.044)	0.238 (0.040)	0.231 (0.045)	0.204 (0.043)	0.128 (0.038)
Urbanization rate	-2.00 (0.43)	-1.82 (0.40)	-1.74 (0.45)	-2.28 (0.44)	-1.21 (0.37)
Log (life expectancy)	-9.7 (2.0)	-9.4 (1.9)	1.7 (2.5)	1.8 (2.1)	7.2 (2.0)
Population share > 65	-3.6 (2.3)	-5.7 (2.1)	-14.9 (2.5)	-13.0 (2.3)	-9.0 (2.1)
Religious pluralism	1.40 (0.40)	1.10 (0.36)	0.95 (0.39)	0.97 (0.39)	-0.27 (0.33)
State religion (dummy)	0.61 (0.16)	0.64 (0.15)	0.84 (0.19)	0.49 (0.17)	0.11 (0.16)
State regulation of religion (dummy)	-0.81 (0.15)	-0.72 (0.13)	-0.27 (0.14)	-0.05 (0.14)	-0.04 (0.12)
Communist regime (dummy)	-0.89 (0.22)	-1.17 (0.21)	-1.35 (0.23)	-1.30 (0.22)	-1.10 (0.20)
ex-Communist regime (in 1995, dummy)	0.08 (0.20)	0.29 (0.19)	0.54 (0.24)	0.90 (0.22)	0.35 (0.21)
ex-Communist regime (in 1998, dummy)	0.26 (0.17)	0.43 (0.14)	0.37 (0.17)	0.57 (0.18)	0.44 (0.15)
ISSP data (dummy)	-0.29 (0.08)	-0.16 (0.08)	0.11 (0.09)	0.38 (0.09)	0.12 (0.08)
Muslim fraction	0.51 (0.37)	-0.31 (0.36)	1.46 (0.43)	2.18 (0.38)	0.75 (0.36)
Protestant fraction	-2.76 (0.22)	-2.28 (0.21)	-1.17 (0.26)	-1.23 (0.24)	-0.49 (0.23)
Hindu fraction	-2.04 (0.54)	-2.07 (0.51)	-2.75 (0.57)	-1.87 (0.52)	-1.49 (0.50)
Eastern religion fraction	-3.53 (0.31)	-3.01 (0.28)	-1.34 (0.33)	-0.70 (0.32)	-1.01 (0.26)
Jewish fraction	-1.99 (0.57)	-2.50 (0.50)	-2.00 (0.42)	-0.76 (0.45)	-1.03 (0.38)
Orthodox fraction	-3.31 (0.32)	-2.08 (0.29)	-1.28 (0.31)	-0.73 (0.31)	-0.69 (0.26)
Other religion fraction	-3.48 (0.89)	-3.95 (0.84)	0.91 (1.09)	-0.99 (0.96)	1.56 (0.90)
Numbers of countries and observations	51, 140	51, 139	50, 130	50, 130	50, 130
Average R-squared	0.79	0.81	0.81	0.70	0.62

Notes to Table 4

Each system consists of five equations corresponding to observations on the dependent variables at five points in time: 1981 (*World Values Survey* data), 1990 (*WVS*), 1991 (*International Social Survey Programme* data), 1995 (*WVS*), and 1998 (*ISSP*). The dependent variables are population averages of weekly church attendance (1), monthly church attendance (2), and beliefs in heaven (3), hell (4), and an after-life (5). The measured value is either the fraction of people attending or the fraction who hold the belief. For example, in system (1), weekly church attendance is observed for 22 countries with 1981 data, 36 countries with 1990 data, 22 countries with 1991 data, 32 countries with 1995 data, and 28 countries with 1998 data. The form of each dependent variable 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 share of the population aged 65 and over 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 and 1998. Religious pluralism (1 minus the Herfindahl index of religious denomination shares for nine categories of religions among those professing some religion) is for 1980 using data from Barrett. The dummy variable for the presence of a state religion (from Barrett) applies in 1970. The dummy variable for state regulation of religion (based on whether the state appoints or approves church leaders, from Barrett) is for the 1970s. The dummy for the presence of a Communist regime applies to the pre-1990 period. The 1995 and 1998 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. (This variable allows for the possibility of systematic differences between the *WVS* and *ISSP* sources.) The religious denomination variables are the fractions professing each religion in 1980, according to Barrett. The Catholic fraction is omitted 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. Constant terms, not shown, are included for each system (but do not vary over the time periods within a system). Standard errors are in parentheses.

Figure 1
Weekly Church Attendance and GDP
simple relation

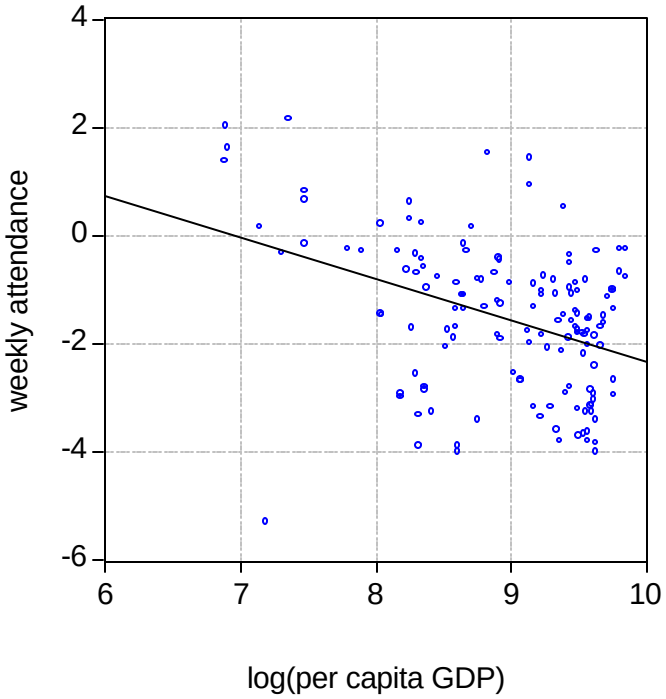

Figure 2
Belief in Heaven and GDP
simple relation

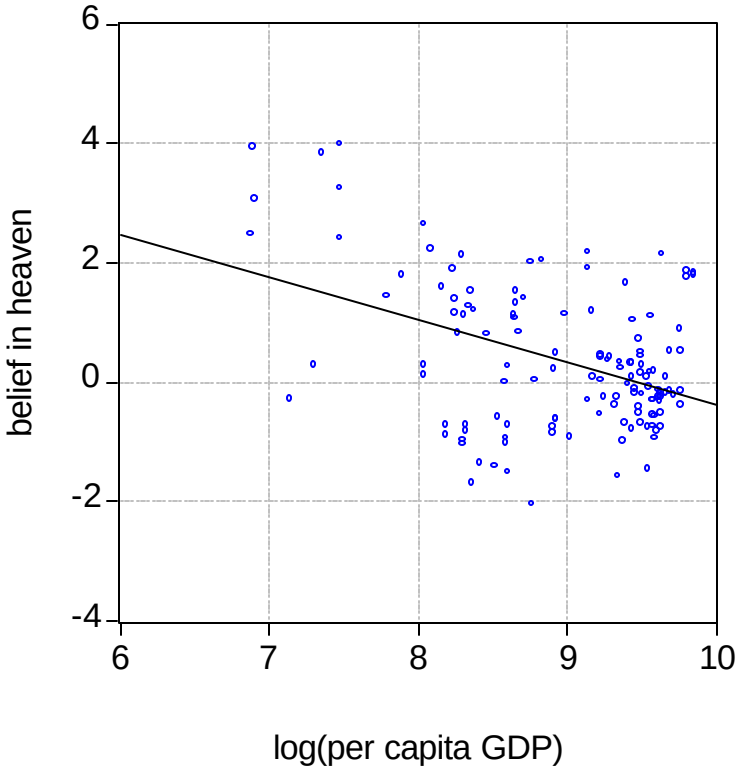

Figure 3
Weekly Church Attendance and Education
partial relation

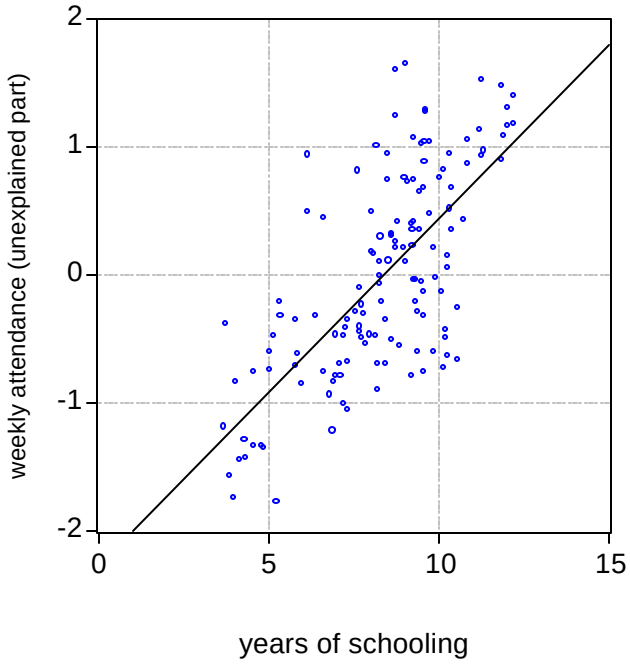

Figure 4
Belief in Heaven and Education
partial relation