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IS GOD IN THE DETAILS? A REEXAMINATION OF THE ROLE OF RELIGION IN ECONOMIC GROWTH

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Abstract

Barro and McCleary (2003) is a key research contribution in the new literature exploring the macroeconomic effects of religious beliefs. This paper represents an effort to evaluate the strength of their claims. We evaluate their results in terms of replicability and robustness. Overall, their analysis generally meets the standard of statistical replicability, though not perfectly. On the other hand, we do not find that their results are robust to changes in their baseline statistical specification. When model averaging methods are employed to integrate information across alternative statistical specifications, little evidence survives that religious variables help to predict cross-country income differences.

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1. Introduction

One of the notable recent developments in economics has been the rise of interest in the study of how religion affects aggregate economic outcomes. A key paper stimulating this new literature is Barro and McCleary (2003).[1] Barro and McCleary distinguish between two distinct dimensions of religion – religious beliefs and participation in religious activities (as measured by monthly church attendance). They find that some aspects of religious beliefs (notably belief in hell) correlate positively with economic growth while church attendance correlates negatively with growth, once one has controlled for a set of alternative growth determinants. They interpret their results to mean that "higher levels of church attendance depress economic growth because greater attendance signifies a larger use of resources by the religion sector, and the main output of this sector (the religious beliefs) has already been held constant [Barro and McCleary, 2003, p. 779]". That is, religious sectors that require less church attendance input to generate a given level of religious beliefs output will tend to grow faster.

The current work by Barro and McCleary has significantly upped the ante in the discussion over the importance of religion to economic growth. Previous studies have identified a relationship between religious affiliations and growth in the context of a general search for growth determinants. One striking example is Fernandez, Ley and Steel (2001) who find Confucianism to be one of the most robust growth determinants. However, it is difficult to interpret these past findings on religion affiliations in any meaningful way since these affiliations correspond closely to dummy variables for geographic regions; for instance, East Asian countries. Any historical or cultural explanations for heterogeneity in growth experiences, and not necessarily ones related to religion, will therefore be consistent with the results. The power of Barro and McCleary's paper is that their focus on religious beliefs becomes potentially not so amenable to such criticism.

[1] Other work in this area includes, among others, Guiso, Sapienza and Zingales (2003), Noland (2003), Cavalcanti, Parente, and Zhao (2004), Doepke and Zilibotti (2008), and Fernandez and Fogli (2009).

The finding by Barro and McCleary that religion matters for growth is an important one as it represents a new direction in the effort to identify sources of inequality across nations that lie outside the domain of the canonical neoclassical model. Explanations of this type, including geography (Sachs (2003)), institutions (Acemoglu, Johnson, and Robinson (2001, 2002), Acemoglu and Johnson (2005)) and ethnic heterogeneity (Easterly and Levine (1997) and Alesina et al (2003)), have proven very valuable in understanding cross-country differences. To the extent that religion proves similarly useful, it may well represent the beginning of a major new research direction.

This paper is designed to assess the strength of the evidence for a religion/growth nexus in the context of Barro and McCleary's seminal work. Our reevaluation of their work includes both strict replication questions, i.e. can one find the results they report using their data and models, as well as an assessment of the robustness of their analysis to alternate statistical models. We find that while their analysis is statistically replicable, it is not statistically robust. In particular, we find no evidence that religious beliefs play a significant role in enhancing growth outcomes. There is little evidence of a religion/growth nexus. At best, our findings suggest that there may be weak evidence for a negative effect of religious participation on growth. As a result, we conclude that God is not in the details, at least not in so far as their claims that religion is good for growth. While our analysis focuses on a specific paper, we believe that the range of questions we ask and methods we employ will also be useful in describing how evidentiary support for a given growth theory should be subjected to evaluation. A problem with much of the empirical literature on growth is the tendency for the literature to focus on large claims without a commensurate degree of interest in exhaustive analysis of the strength of the claims. We hope that our admittedly unglamorous analysis shows the importance of the latter.

Section 2 of this paper describes the growth regression. Section 3 demonstrates the basic statistical replicability of Barro and McCleary's baseline model. Section 4 evaluates the robustness of the religion/growth relationship to a richer set of growth models and discusses our main findings. Finally, Section 5 concludes.

2. Basic growth regression framework

Our reanalysis of Barro and McCleary treats their specification as one example of a linear cross country growth regression. Our analysis will consider a set of growth regression models, all of which follow a common structure. For each country j, per capita income growth over the time interval $t-1$ to t, $g_{j,t}$, is assumed to obey

$$g_{j,t} = X'_{1,j,t}\beta_1 + Z'_{2,j,t}\beta_2 + \varepsilon_{j,t} = X'_{j,t}\beta + \varepsilon_{j,t}, \tag{1}$$

where $j = 1,2,\ldots,N_t$, $t = 1,2,...,T$, $X_{1,j,t}$ is a $k_1 \times 1$ vector of right hand side endogenous growth determinants that include among others the set of religious beliefs and church attendance variables (which we will collectively refer to as Religiosity variables) as well as the set of Religion Shares. $Z_{2,j,t}$ is a $l_2 \times 1$ vector of included exogenous/predetermined variables and time effects and $\varepsilon_{j,t}$ is the error term. In order to account for the endogeneity of $X_{1,j,t}$, equation (1) is augmented with

$$X_{j,t} = \Pi'_1 Z_{1,j,t} + \Pi'_2 Z_{2,j,t} + V_{j,t} = \Pi' Z_{j,t} + V_{j,t}, \tag{2}$$

where $Z_{1,j,t}$ is a $l_1 \times 1$ vector of exogenous/predetermined (instrumental) variables excluded from the growth equation (1) such that $l_1 \geq k_1$ and $V_{j,t}$ is the vector of errors. We follow Barro and McCleary and deal with an exactly identified system, that is, $l_1 = k_1$. Finally, we assume that $(\varepsilon_{j,t}, V_{j,t})'$ is *i.i.d* and that $E(Z'_{j,t}V_{j,t}) = 0$ and $E(Z'_{j,t}\varepsilon_{j,t}) = 0$ so that the instruments are contemporaneously exogenous but not necessarily strictly exogenous other time periods. Then, the literature typically estimates growth equation (1) using 2SLS.

3. Data and replication

3.1. Barro-McCleary data

Following Barro and McCleary, we employ an unbalanced panel data set of 41 countries over three periods, $T = 3$, 1965-74 ($N_1 = 38$), 1975-84 ($N_2 = 41$), and 1985-94 ($N_1 = 39$).[2] The dependent variable is the average growth rate of real per capita GDP corresponding to the three periods. We first describe how we replicate the Barro and McCleary model and then discuss how we consider how to evaluate their model against a larger model space.

The set of Religiosity measures consists of countrywide averages of individual responses to survey questions on monthly church attendance, belief in hell, and belief in heaven reported in the three waves (1981-84, 1990-93, and 1995-97) of the World Values Survey (WVS) as well as data from the International Social Survey Programme (ISSP). To minimize the loss of information Barro and McCleary construct single cross-sectional measures as follows. A measure of attendance or belief for a country is defined as the value from WVS 1990 if available. If not, then the value from WVS 1981 is used. If neither of these values were available, then the values for ISSP 1991, WVS 1995, and ISSP 1998 were used in an analogous way. Finally, the value is adjusted for the average discrepancy between the two values among countries that had information for both years.

Based on Barrett (1982), the data on Religion Shares include adherent shares for Catholic, Eastern, Hindu, Jewish, Muslim, Orthodox, Protestant, and Other religions for the years 1970 and 1980. Each religion share is defined as the fraction adhering to the specified religion among persons who expressed adherence to some religion. The Catholic fraction is omitted from the regressions and thus each coefficient should be interpreted relative to the Catholic share. We note that Barro and McCleary generously provided us with the Religiosity and Religion Shares data.

Consistent with Barro and McCleary, we also employ a set of additional covariates consisting of time dummies for each of the three time periods and the set of variables that Barro and Sala-i-Martin (2003) had found to be robust determinants of growth. These variables, measured respectively for each period, are: the log of (initial) per capita GDP in 1965, 1975, and 1985; years of male secondary and higher school attainment in 1965, 1975, and 1985; reciprocal of life expectancy at age 1 in 1960, 1970,

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[2] The list of countries is provided in the Supplement. Our list of countries reflects that for Barro and McCleary (2003) closely.

and 1980; average ratio over each period of investment to GDP; the log of the total fertility rate in 1960, 1970, and 1980; average ratios for each period of exports plus imports to GDP, filtered for the usual relation of this ratio to the logs of population and area; average ratios for each period of government consumption (net of outlays on defense and education) to GDP; the growth rate of the terms of trade over each period, interacted with the average ratio of exports plus imports to GDP; the average of the Political Risk Services indicator of the rule of law;[3] the average for each period of the Freedom House measure of political rights and its square;[4] and the consumer price inflation rate for each period. We obtained the data for these additional control variables from various publicly available sources.[5]

The lack of correspondence between the time when the data was recorded for some of the variables, such as the set of Religiosity variables and the institutions variables, and the time periods for our exercises is unfortunate. However, we follow Barro and McCleary, who faced the same problem but argued that the use of such variables might still be satisfactory since these variables are typically slow-moving and therefore exhibit high persistence.

To address the possible endogeneity of the direct growth determinants, we follow Barro and McCleary and instrument the Religiosity variables with a dummy variable that indicates the presence of a State Religion in 1970, a dummy variable that indicates the presence of State Regulation of religion in 1970, and a measure of Religious Plurality. This last variable is defined as one minus the Herfindahl index constructed from the Religion (adherence) Shares in 1970 for the first two periods and 1980 (1990 for Poland) for the last period. For the calculation of this index, the share of Buddhism was distinguished from the share of other Eastern religions. To deal with the endogeneity of Religion Shares, they use as instruments the lagged shares; 1970 for the first two periods and 1980 for the third.

[3] Due to data availability the value for Rule of Law for 1982 or 1985 appears in the first two equations while the average value is taken for the third period.
[4] The Freedom House data for the first period corresponds to the average of 1972-74 due to data availability.
[5] Barro and McCleary did not share the data for these additional control variables.

Table 1 provides summary descriptive statistics for the data. We refer the reader to the Data Appendix found in the online Supplement for a complete description of the variables and data.

3.2. Replication results

The key findings of Barro and McCleary are reported in Table 3 of that paper. Table 2 of this paper contains our replication results. We were able to replicate most of Barro and McCleary's results using their original specification. In particular, our replication results affirm Barro and Cleary's results for belief in hell and monthly church attendance. As shown in Table 2, the coefficient to monthly church attendance is negative while that for belief in hell or belief in heaven is positive. As in Barro and McCleary, these coefficients are individually and jointly statistical significant. There are only a few small differences in the degree of significance. Our replication shows stronger evidence in favor of belief in heaven but weaker evidence in belief in hell. More precisely, while Barro and McCleary find that belief in heaven is not significant in system (4) we find that it is significant at 1%. Conversely, while Barro and McCleary find that belief in hell is significant in systems in (5) and (6) at 1% and 5%, respectively, we find that they are significant at 5% and 10%, respectively. We were also able to affirm the marginal significance for Muslim, Orthodox, and Protestant Shares. On the other hand, we were not able to confirm the statistical significance of the Hindu share we were able to verify the joint statistical significance of Religion Shares. We cannot determine whether our inability to replicate the Hindu share is due to differences in data or due to some other factor.

4. Methodology

4.1. Robustness of the religion/growth relationship

While Barro and McCleary's claims appear to be statistically replicable, a separate question is whether they are statistically robust. As Brock and Durlauf (2001) and others have argued, the inherent *open-endedness* of new growth theories presents unique challenges to researchers in exploring their quantitative consequences on growth. The statement that a particular theory of growth is empirically relevant does not logically preclude other theories of growth from also being relevant. Dealing with theory uncertainty is therefore of first-order importance if we are concerned with understanding the strength of evidential support for the link between religiosity variables and growth.

Barro and McCleary avoid this issue by choosing to include additional control variables on the basis of an assessment of what Barro and Sala-i-Martin (2003) identify as empirically important growth determinants. But this assessment relies on a subjective reading of a body of papers that itself suffers from a lack of attention to the question of model uncertainty. Thus, they in essence engage in model selection without the formal specification of a common body of data, a set of models to consider, and a well-defined metric for evaluation. It is also far from clear that their choices on growth controls well reflect the current state of empirical thinking on growth. An important substantive problem in their analysis is the lack of evaluation of religion against alternative fundamental growth determinants, in particular institutions, geography, and ethnic heterogeneity, each of which has been found by other authors to be empirically important. None of these alternate channels was a part of the model selection exercise employed to identify additional controls in the Barro and McCleary analysis.

For these reasons, we regard it as important to evaluate the robustness of their findings. To evaluate robustness, we employ model averaging methods to account for the broad theoretical background against which a religion/growth relationship must be assessed. [6]

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[6] Model averaging methods have proven useful in a number of growth studies, see Brock and Durlauf (2001), Fernandez, Ley and Steel (2001), Doppelhofer, Miller, and Sala-i-Martin (2004), Masanjala and Papageorgiou (2007), and Durlauf, Kourtellos, and Tan (2008) for examples in the growth literature; the methodology has also proven useful in both macroeconomics (Brock, Durlauf, and West (2003) and Cogley and Sargent (2005)) and in economic forecasting (Garratt et al (2003)). Our current application is somewhat different from those in that we focus on a specific theory rather than engage in a horserace across all theories. This strategy is chosen since our goal is to assess the religion/growth relationship against the current body of growth theories, not assess all theories simultaneously.

4.2. Model averaging

As we have suggested above, there do not exist good reasons for assuming that a particular growth model is the true one. How can one move beyond the dependence of statistical inferences on parameters of interest on the choice of a given model? We proceed by constructing estimates conditional not on a single model, but on a model space whose elements span an appropriate range of growth determinants, as explained below.

Operationally, we employ a "hybrid" approach to model averaging in the sense that we mix frequentist probability statements about observables given unobservables and Bayesian probability statement about unobservables given observables. In particular, our "hybrid" approach to model averaging "integrates out" the uncertainty over models by taking the average of model-specific frequentist 2SLS estimates, weighted by model weights, objects that depend on the data and the model, and which are constructed to be analogous to posterior model probabilities. Sala-i-Martin, Doppelhofer, and Miller (2004) pioneered this approach in economics. In that paper, Sala-i-Martin et. al. argue that the weighting scheme for their "hybrid" model average estimator can be derived as a limiting case of a standard Bayesian analysis as the prior information becomes "dominated" by the data. Our approach is closer to Raftery (1995) and, especially, Eicher, Lenkoski, and Raftery (2009) who approximate the posterior probability of each model by the exponential of the Bayesian Information Criterion (BIC). This approximation is justified when a unit information prior for parameters is assumed; also see Kass and Wasserman (1995). We also follow Eicher et. al. who replace the posterior means with the 2SLS estimator and show that this instrumental variable model averaging estimator is consistent.

To more precisely understand our model averaging (MA) approach consider the standard cross-country growth regression analysis of the type performed by Barro and McCleary who construct estimates of the parameters that are conditional on the available data, D, and the specification of the growth model, M_m^S. A growth model, M_m^S, is defined by a particular combination of second stage regressors from a given universe of growth determinants; hence the superscript S in M_m^S. The set of all possible combinations of regressors from this set form the model space M^S.

For a given model, M_m^S, define $k_m = k_{1,m} + l_{2,m}$ and $l_m = l_{1,m} + l_{2,m}$ such that under exact-identification $k_m = l_m$. Note that in this application we are only concerned with the case of exact-identification. Then, for any given, M_m^S, we obtain an associated first stage model given by a model specific version of equation (2). For each country define $g_j = (g_{j,1}, g_{j,2}, ..., g_{j,T})'$ as the $T \times 1$ vector of growth rates, $X_{m,j} = (X_{m,j,1}, X_{m,j,2}, ..., X_{m,j,T})'$ as the $T \times k_m$ matrix of regressors, and the matrix of instruments as the $l_m T \times l_m T$ block diagonal matrix $Z_{m,j} = diag\{Z_{m,j,1}, Z_{m,j,2}, ..., Z_{m,j,T}\}$. Define the stacked versions of g_j, $X_{m,j}$, $Z_{m,j}$ by g, X_m, Z_m, respectively, as well as the projection matrix $P_m = Z_m (Z_m{}' Z_m)^{-1} Z_m{}'$.

Then, the 2SLS model averaging (2SLS-MA) estimator is given by the posterior mean

$$\hat{\beta}_{D,M}^{\text{2SLS-MA}} = \sum_{m \in M^S} \hat{\mu}_{m,D} (X_m{}' P_m X_m{}')^{-1} X_m{}' P_m g, \tag{3}$$

where $\hat{\mu}_{m,D}$ is the posterior weight for model M_m^S. Note that $\hat{\beta}_{D,M}^{\text{2SLS-MA}}$ depends on data D and model space M^S rather than a single element of $M_m^S \in M^S$. Model averaging "integrates out" the uncertainty over models by taking the weighted average of model-specific 2SLS estimates, $\hat{\beta}_{D,m}^{\text{2SLS-MA}} = (X_m{}' P_m X_m{}')^{-1} X_m{}' P_m g$, using model specific (second stage) weights, $\hat{\mu}_{m,D}^S$, which are constructed to be analogous to posterior model probabilities in the sense of Sala-i-Martin, Doppelhofer, and Miller (2004) and depend on the fitted values $P_m X_m$ rather than data X_m. The latter is an important difference between (3) and the standard LS model averaging estimator; see for example Raftery et al (1997).

Similarly, we can also obtain the posterior variance of the parameter vector, $\hat{V}_{D,M}^{\beta}$,

$$\hat{V}^{\beta}_{D,M} = \sum_{m\in M} \hat{V}^{\beta}_{D,m}\hat{\mu}_{m,D} + \sum_{m\in M} \left(\hat{\beta}^{2SLS}_{D,m} - \hat{\beta}^{2SLS-MA}_{D,M}\right)^2 \hat{\mu}_{m,D}\,, \tag{4}$$

where the model-specific posterior variance of the 2SLS estimator, under homoskedasticity, is given by $\hat{V}^{\beta}_{D,m} = (X'_m P_m X_m)^{-1}\hat{\sigma}^2_{\varepsilon|D,m}$ and $\hat{\sigma}^2_{\varepsilon|D,m}$ is the variance estimate of the error for model M^S_m, $\hat{\sigma}^2_{\varepsilon|D,m} = \frac{1}{N}\sum_{j=1}^{N}(g_j - X'_{m,j}\hat{\beta}^{\text{2SLS}}_{D,m})^2$, where $N = \sum_{t=1}^{T} N_t$. The first term in equation (4) is the average of the posterior variances within models and the second term is the variance of the posterior means across models (weighted average of the squared deviations of the model-specific estimates, $\hat{\beta}^{\text{2SLS}}_{D,m}$, from the model averaged estimates, $\hat{\beta}^{\text{2SLS-MA}}_{D,M}$). We use the posterior variance, $\hat{V}^{\beta}_{D,m}$, to compute standard errors for the model averaged estimates.

The 2SLS model averaging (2SLS-MA) estimator in (3) is a special case of the IVBMA estimator independently proposed by Eicher, Lenkoski, and Raftery (2008). Their analysis allows for overidentification, $k_m \le l_m$, and deals both with uncertainty in the instrumental variables (model uncertainty in the first stage) and growth determinants (model uncertainty in the second stage). This, in effect, changes the model space into the product space of $M^S \times M^F$, where M^F is the set of all possible combinations of instruments from the first stage. Based on this product model space, Eicher, Lenkoski, and Raftery (2008) propose the following model averaging estimator,

$$\hat{\beta}^{\text{IVBMA}}_{D,M} = \sum_{m\in M^S} \sum_{\tilde{m}\in M^F} \hat{\mu}^S_{m,D}\hat{\mu}^F_{\tilde{m},D}(X_m{'}P_{\tilde{m}}X_m{'})^{-1}X_m{'}P_{\tilde{m}}g, \tag{5}$$

Equation (5) shows that IVBMA is the weighted average of each 2SLS estimator that results from using the combination of model $M^F_{\tilde{m}}$ in the first stage and model M^S_m in the second stage using as weights the first and second stage probabilities ,$\hat{\mu}^F_{\tilde{m},D}$, $\hat{\mu}^S_{m,D}$, respectively. Under exact identification of all the second stage models, IVBMA becomes 2SLS-MA given by equation (3).

Next, we describe the model weights in detail.

4.2.1. model weights and integrated likelihood

We construct the model weights, $\hat{\mu}^S_{m,D}$, by analogy to posterior probabilities. This means that the weights follow, using Bayes' rule,

$$\hat{\mu}^S_{m,D} \propto \hat{\mu}^S_{D,m}\mu^S_m \tag{6}$$

so that each weight is the product of the integrated likelihood of the data given a model, $\hat{\mu}^S_{D,m}$, and the prior probability for a model, μ^S_m.

The integrated likelihood of the data given a model reflects the relative goodness of fit of different models. Following Raftery (1995) and Eicher, Lenkoski, and Raftery (2008), we approximate the integrated likelihood using the Bayesian Information Criterion (BIC), so that

$$\log \hat{\mu}_{D,m} = -\frac{N}{2}\log \hat{\sigma}^2_{\varepsilon|D,m} - \frac{1}{2} l_m \log(N) + O(N^{-1}), \tag{7}$$

Finally, we evaluate the finite sample performance of the BIC approximation for the case of exact identification using a Monte Carlo experiment. Our results are consistent with those obtained by Eicher, Lenkoski, and Raftery (2008). 2SLS-MA performs well both in terms of estimating the coefficients of the DGP, as well as providing credible posterior inclusion probabilities for regressors in the DGP. Due to space considerations the detailed findings are reported in a Supplement.

4.2.2. model priors

Along with the integrated likelihood, model averaging also requires one to specify priors over the models in the model space M^S. This is a nontrivial task. The standard practice in much of the growth literature is to assign a uniform prior over the model space. This approach is equivalent to assuming that the prior probability that a given variable is present in the "true" model is 0.5 independent of the presence or absence of any of the other *p* regressors in the model. And in fact this prior is the most commonly used one in the model averaging literature.

This uniform prior across models, however, ignores interrelations between different variables. As argued in Brock and Durlauf (2001) and Brock, Durlauf and West (2003), the probability that one variable affects growth may be logically dependent on whether others do. They describe this phenomenon as being analogous to the irrelevance of independent alternatives (IIA) in the discrete choice literature. Why is the IIA problem of particular importance in the growth context? An important consideration in the growth literature has been to evaluate the relative importance of various fundamental growth *theories*. Our primary concern, in this paper, for instance, is to evaluate claims that religion is important to growth. Therefore, in principle, what a researcher would want to do is to start by being agnostic about the a priori validity of fundamental growth theories, and then examine the posterior evidence in favor of or against each of these theories after viewing the data. However, if the uniform prior is employed, a researcher could arbitrarily increase or reduce the prior weights across *theories* simply by judiciously introducing "redundant" proxy variables for some of these theories.

To handle these interdependencies across theories created by the introduction of redundant variables, we set the prior probability that a particular *theory* – that is, the set of proxy variables classified under that theory – is included in the "true" model to 0.5 to reflect non-information across theories. This prior specification also assumes that theories are independent in the sense that the inclusion of one theory in a model does not affect the probability that some other theory is also included.

Growth empirics also suffer from another problem that we refer to as *specification uncertainty*. In our context, this problem translates into concerns over what variables out of a potentially large set adequately proxies for each theory. New growth theories often do not naturally translate into specific regressors for a model such as (1). Rather, the theories are qualitative in the sense that multiple empirical proxies exist for each theory. Specification uncertainty results in dependencies between potentially irrelevant proxy variables *within* theories. If we ignore these dependencies by assigning uniform weights across all possible combinations of variables classified under each theory, then analogous to the discussion above, we would end up putting excess prior weights on many similar, but not very informative combinations while taking weight away from more unique and informative alternatives.

To deal with the specification uncertainty problem, we introduce a version of George's (1999) *dilution priors*. Given that a theory τ is a priori relevant, we assign to each possible combination of variables classified under this theory γ_τ the following conditional prior probability,

$$\mu^S(\gamma_\tau) = \left|R_{\gamma_\tau}\right| \prod_{j=1}^{p_\tau} \pi_j^{\gamma_j} \left(1-\pi_j\right)^{1-\gamma_j}, \tag{8}$$

where p_τ is the number of proxy variables for theory τ, $\pi_j = 0.5$ for $j = 1,..., p_\tau$, and R_{γ_τ} is the correlation matrix for the set of variables included in γ_τ. Since $|R_{\gamma_\tau}|$ equals 1 when the set of variables are orthogonal and 0 when the variables are collinear, these priors are designed to penalize models with many "redundant" variables while preserving weights on unique and informative combinations[7].

4.3. Implementation

4.3.1. additional data

Our aim is to nest Barro and McCleary's model within a larger model space. While retaining all the variables used by Barro and McCleary in Section 3.1, we further expand the model space by augmenting their set of variables with the canonical *Neoclassical Growth* variables and new growth determinants suggested by the broader

[7] Other proposals to deviate from "flat" model priors have been advanced in the literature. For instance, Sala-i-Martin, Doppelhofer, and Miller (2004) alter the probability of variable inclusion in order to give greater weight to models with a small number of regressors. Brown, Vannucci, and Fearn (1998, 2002) assume that the probability a given variable is included is itself a random variable drawn from some distribution. However, the IIA assumption remains common to these approaches.

growth literature. The set of canonical *Neoclassical Growth* variables comprises the log of initial per capita GDP, the average years of male secondary and higher school attainment, the average investment to GDP ratio, and the log of the average population growth rate plus 0.05.

The new growth literature suggests that a set of fundamental determinants – geography, institutions, and fractionalization – have important roles to play in explaining cross-country growth divergence. In keeping with this recent literature, we include a climate variable as well as a variable that measures geographic isolation. The climate variable we use is the percentage of a country's land area classified as tropical and subtropical via the Koeppen-Geiger system (KGATSTR) while the geographic isolation proxy is the percentage of a country's land area within 100km of an ice-free coast (LCR100KM). Following Acemoglu and Johnson (2005), we include two measures of economic institutions. The first measures property rights protections, or as Acemoglu et. al. explain, the relationship between the state and its citizens. These property rights institutions are proxied by the average value of Expropriation Risk for private investments. The second form of institutions measures the enforcement of contracts between economic agents. These contracting institutions are proxied by an index of legal formalism (CHECK) measuring the number of procedures for collecting on a bounced check.[8] Finally, to proxy for ethnic fractionalization, we include a measure of linguistic fractionalization due to Alesina et al (2003) which measures the probability that two randomly selected individuals from a population would have different mother tongues.[9]

The instrument list for the additional controls includes beginning of period or lagged values of all the covariates with the exception of inflation, language, Rule of Law, Expropriation Risk and CHECK. Inflation is instrumented with the Spain and Portuguese colonial dummy. CHECK was instrumented with the British legal origin dummy (as

[8] For Expropriation Risk, due to data availability, we use average values for 1982-84 for the first two periods, and the average value for 1985-94 for the third period. For CHECK, the available data was constructed as a cross-section for 1999. We repeat this data across all time periods.

[9] This data was obtained from Encyclopedia Britannica in 2001 and reports the shares of languages spoke as "mother tongues" based on national census data. We repeat this data across all three time periods.

suggested by Acemoglu and Johnson (2005)). The reported results below leave Expropriation Risk, language, and Rule of Law un-instrumented.[10]

4.3.2. organizing variables into theories

We organize the Barro-McCleary data and the additional growth determinants into the following theories. In addition to the *Neoclassical Growth* theory, we focus on seven other *fundamental* growth theories: *Religiosity* (belief in hell, belief in heaven, and monthly church attendance), *Religion Shares* (the seven religion shares (excluding the Catholic share) described in Section 3.1), *Geography* (tropical climate (KGATSTR) and geographic accessibility (LCR100KM)), *Ethnic Fractionalization* (linguistic fractionalization (Language)), *Political Institutions* (Political Rights and its square), *Property Rights Institutions* (Rule of Law and Expropriation Risk), and *Contracting Institutions* (Legal Formalism (CHECK)). From the perspective of growth factors that evolve at a low frequency, therefore, we treat religion similarly with geography, institutions, and ethnic heterogeneity as a potential fundamental growth determinant.

Next, we organize the additional covariates employed by Barro and McCleary (2003) into two *proximate* growth theories: *Demography* (the reciprocal of life expectancy at age 1 and the log of the total fertility rate), and *Macroeconomic Policy* (the ratio of exports plus imports to GDP, the ratio of government consumption to GDP, the growth rate of the terms of trade interacted with the ratio of exports plus imports to GDP, and the inflation rate). Finally, we include as a theory, *Regional Heterogeneity* which consists of a dummy variable for East Asian countries and one for Sub-Saharan African countries.

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[10] The usual instrument for Expropriation Risk, the log of European settler mortality (Acemoglu et. al. (2001)), leads to no qualitative changes in our findings for religion, but dramatically reduces the sample size making the new sample not comparable with Barro and McCleary's. Language is typically not instrumented in the literature while Rule of Law was not instrumented in Barro and McCleary. We experimented with using initial values for Rule of Law as an instrument. We also experimented with using French legal origin dummy as an instrument for Expropriation Risk. In both cases, we found no qualitative differences in findings compared with those reported in this paper.

4.4. Findings

In terms of our MA results, we report both structural (2SLS-MA) and reduced form (LS-MA) estimates. While the reduced form results ignore the structural framework of Barro and McCleary, they can give us some sense of whether the findings are qualitatively robust to the exclusion of the instruments. The 2SLS-MA results follow the discussion in Sections 4.2. The LS-MA results are based on Raftery's (1995) least squares MA methodology where the model averaging estimator is given by the average of model-specific LS estimates, weighted by model weights given by the exponential of the BIC criterion. In line with the 2SLS-MA results, the model priors for LS-MA follow the hierarchical dilution structure discussed in Section 4.2.2. Finally we assess the robustness of our findings to alternative specifications of model priors by considering uniform priors (as opposed to hierarchical priors) as well as exercises that allow certain variables (e.g. religiosity) to be present in all models in the model space.

We present our main findings in Tables 3A and 3B. Columns (1)-(2) and columns (3)-(4) present the results for 2SLS-MA and LS-MA, respectively. Columns (1) and (3) report the posterior inclusion probabilities for variables as well as "collectively" for theories. The posterior probability of inclusion of theory τ is defined as the sum of those model posterior probabilities that include at least one proxy variable of theory τ. Columns (2) and (4) report posterior means and posterior standard errors. Finally, columns (5) and (6) present the classical 2SLS and LS estimates of the "kitchen sink" model; i.e., the largest model in our model space (all variables included). The "kitchen sink" approach has been used in growth empirics when a "horserace" between fundamental determinants of growth is desired (see, for instance, Rodrik, Subramanian, and Trebbi (2004) and Sachs (2003)). In all the MA exercises reported in the table we assumed hierarchical priors (as discussed in Section 4.2) and retained time period dummies in all specifications to capture the fixed time effects. With the exception of time dummies all variables of the model space were allowed be present or absent from a model.

We now turn to a detailed discussion of our findings.

4.4.1. religiosity and religion shares

Our key finding (shown in Table 3A) is that there is no evidence that religious beliefs matter for growth once we control for model uncertainty. In both 2SLS-MA and LS-MA exercises, we find that the posterior probabilities of inclusion for both belief in heaven and belief in hell in the "true" model are negligible (less than 1.5%) and the corresponding coefficients are insignificant.

There is stronger evidence for the inclusion of monthly church attendance in the "true" model; the posterior probability of inclusion is larger than the prior of 50% at about 57% when the MA is based on 2SLS and 62% when the MA is based on LS. However, in both cases, the marginal effect of monthly church attendance of growth was found to be negative (as in Barro and McCleary) but not statistically significant.

Finally, in terms of the overall posterior probability of theory inclusion for Religiosity as a growth theory, we find unsurprisingly that this probability is driven in both cases by that for monthly church attendance since the posterior probability of inclusion for the belief in heaven and hell variables are close to zero.

All these MA results are in sharp contrast with the results of Barro and McCleary (Table 3) and the classical "kitchen-sink" results presented in columns (5)-(6). While both Barro and McCleary and the classical "kitchen sink" results provide evidence for the significance of the effects of Religiosity variables on growth, the MA results do not.

Suppose that instead of MA, we decided to select a single model. A natural approach (e.g. Chipman, George, and McCulloch (2001)) would be to compare the posterior mode models for our MA exercises and the Barro and McCleary specification. We include results for the posterior mode models based on 2SLS and LS in the online Supplement. The coefficient for monthly church attendance is negative and only marginally significant for the 2SLS case at the 10% level, but it is negative and strongly significant at the 1% level for the LS case. However, in both posterior mode models, neither belief in hell nor belief in heaven is included as a covariate. It turns out that the posterior weights assigned to the respective posterior mode models are 0.467 for the 2SLS case and 0.500 for the LS case.[11]

This finding suggests that if one wants to engage in model selection based on the evidentiary weight of the data, the model proposed by Barro and McCleary would not be chosen. Hence, even though the posterior mode model for the LS case finds a significant role for religiosity (in terms of monthly church attendance), the interpretation of these results necessarily differ from the one provided by Barro and McCleary. Religiosity has a negative impact on growth. Overall, we conclude that there is simply insufficient evidence to support Barro and McCleary's contention that countries with more efficient religious sectors will tend to grow faster. In fact, there is little evidence to suggest that Religiosity matters to growth at all.

Moreover, our MA results suggest that Religion Shares are unlikely to have important growth effects. The posterior probability of theory inclusion for Religion Shares is 35% and 28% for 2SLS and LS, respectively. In contrast, the classical estimates for both the "kitchen sink" (columns (5)-(6) of Table 3A) and the Barro and McCleary model (Table 2) suggest that some religious affiliations have growth consequences. In particular, the classical "kitchen sink" results show that Muslim, Orthodox, Protestant, and Other Religion shares have significant marginal effects on growth. Hence, the "kitchen sink" findings are at least broadly compatible with those of Barro and McCleary. However, our MA results suggest that these findings are not robust once we account for model uncertainty.

4.4.2. other fundamental determinants

Table 3B presents the results for the other fundamental growth theories. We present in that table only results for theories (and corresponding proxy variables) with

[11] The findings for the posterior mode models are especially relevant if one is interested in model selection since the other models have negligible posterior weight. For example, the five best models (in terms of posterior probability) for 2SLS-MA have posterior weights of 0.467 (posterior mode), 0.069 (2nd best), 0.051 (3rd best), 0.039 (4th best), and 0.032 (5th best), while those for LS-MA have posterior weights of 0.500 (posterior mode), 0.075 (2nd best), 0.052 (3rd best), 0.040 (4th best), and 0.029 (5th best).

posterior probability of inclusion above 0.5. We refer the reader to the online Supplement for the complete set of findings. We find some robust evidence for the Neoclassical growth theory in the form of "conditional convergence"; the coefficient to the logarithm of initial income per capita is negative and highly significant (at the 1% level) across both MA specifications. The posterior inclusion probability across MA methods is also close to 1. A negative coefficient on log initial income per capita is typically taken as evidence in the literature that poorer countries are catching up with richer countries after controlling for heterogeneity. Our findings are therefore consistent with those in the existing "conditional convergence" literature. Nevertheless, we do not find any significant role for either human or physical capital accumulation, or population growth. While the probability of inclusion for Schooling is larger than 0.5, in both 2SLS-MA and LS-MA exercises, its effect on growth is positive but insignificant.

Beyond the Neoclassical growth theory we find robust evidentiary support for Macroeconomic Policy (as proxied by trade openness, government consumption, and inflation), Demography (as proxied by the reciprocal of Life Expectancy at age 1), Geography (as proxied by the accessibility variable, LCR100KM), Fractionalization (as proxied by linguistic diversity), and Property Rights Institutions (as proxied by expropriation risk). These results hold for both MA methods and the corresponding posterior inclusion probabilities for theory are all large and close to 1.

Our results are consistent with those of the broader growth literature. For instance, our findings for the negative significant impact of ethnic fractionalization on growth are similar to the ones found by Easterly and Levine (1997), Alesina et. al. (2003), and Brock and Durlauf (2001). Similarly, our results for the importance of expropriation risk are consistent with those of Acemoglu and Johnson (2005). Our results therefore support Acemoglu-Johnson's thesis that it is the rules governing the interactions between the population and political elites rather than the rules that govern the interactions between individuals that appear to be more salient to growth.[12]

[12] In response to a request from a referee we also considered hierarchical priors with dilution but grouping all institutional variables into one theory. The results are qualitatively unchanged.

4.4.3. robustness

In Table 4, we report results assessing the robustness of our MA results to alternative model prior specifications as well as approximations to the integrated likelihood. Column 1 of Table 4 reproduces our baseline MA results (Column 2 of Table 3). Columns 2 to 5 contain results for cases where particular subsets of variables are assumed a priori to be always included in the "true" model. For instance, the MA exercises for which results are reported in column 2 assume that the variables employed in Barro and McCleary's baseline model are included in all models in the model space. Similarly, column 3 reports results for MA exercises where the canonical Neoclassical Growth variables are always included in all models. Columns 4 and 5 report results for exercises where, respectively, all Religiosity variables and all Religiosity and Religion Shares variables are retained in all models in the model space. We also experiment with replacing our hierarchical model priors with uniform priors. That is, we disregard any theoretical distinctions between variables so that instead of having each of the 10 growth theories be assigned a 0.5 prior probability of being included in the "true" model, we allow each individual variable instead to have a 0.5 prior probability of being included in the "true" model. Uniform priors are an alternative means of specifying non-information about which model in our model space is the "true" model (or, is closest to it in some well-defined sense). As we discuss in Section 4.2.2 above, however, the use of uniform priors, while standard practice in the literature, may nevertheless, be inappropriate in the growth context. In any case, these results are reported in column 6. Finally, column 7 reports results for exercises where instead of using the BIC approximation for the integrated likelihood, we use the AIC instead. The effect of using the AIC instead of the BIC is to allow for a smaller penalty on larger models.

We find that our baseline results are largely robust to these perturbations. When we account for model uncertainty, our results do not support the finding of Barro and McCleary; i.e., a positive and significant coefficient for belief in hell along with a negative and significant coefficient for monthly church attendance. The only cases where we find Religiosity variables to be significant are for the exercises where the Barro-McCleary variables are always kept in the generated models and the case where both

Religiosity and Religion Shares variables are kept. In both these cases, monthly church attendance is found to have a negative and significant (at the 1% and 5% levels, respectively) effect on growth. This finding suggests yet again that Barro and McCleary's results on the importance of religiosity to growth, as well as the interpretation they attach to their results, are heavily contingent on their particular model specification.

A final point is that although the hierarchical dilution prior does not matter for Religiosity, it does play a role for Religion Shares. More precisely, when we change our default hierarchical dilution priors to uniform priors in column (6) of Table 4, we find that the posterior inclusion probability for Religion Shares increases from 0.35 to 0.92. Furthermore, the effect of Jewish Share on growth becomes positive and significant. This result reflects the fact that, under uniform priors, each individual Religion Share now has a 0.5 prior probability of being in the "true" model whereas, under hierarchical dilution priors, the whole set of Religion Shares has 0.5 prior probability of being in the "true" model. Since the set of Religion Shares is large, uniform priors result in (collectively) a large prior weight being placed on the set of Religion Shares appearing in the "true" model, and this accounts for the large change in the posterior inclusion probability for Religion Shares when we go from hierarchical dilution priors to uniform priors.

5. Conclusion

In this paper, we evaluate the robustness of the link between religion and economic performance using Bayesian model averaging methods to account for model uncertainty. In sharp contrast to the primary existing work in the literature, most notably Barro and McCleary (2003), we fail to find anything close to compelling evidence that the religiosity is quantitatively important to growth. There is no evidence that religious beliefs (such as beliefs in the existence of hell or heaven) have a direct robust relationship with economic growth. At best, we find limited evidence that monthly church attendance may have an adverse impact on growth. The existing results that have appeared in the literature are, in our judgment, an artifice of ad hoc modeling choices.

We hasten to add that our findings should not be read as simply negative ones. While it is true that our main results negate those of Barro and McCleary, that alone does not fully characterize the entirety of our results. Some evidence does exist that religious participation (measured by monthly church attendance) potentially leads to worse economic outcomes. Hence, we do provide a positive finding, but simply one that is in the opposite direction to Barro-McCleary.

We therefore conclude that at this stage of empirical research, there is simply no compelling case that religion is good for growth.

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Table 1: Descriptive Statistics

Variable	Mean	Median	St. Dev.	Min.	Max.
East Asia	0.11110	0.00000	0.31573	0.00000	1.00000
Sub-Saharan Africa	0.04630	0.00000	0.21110	0.00000	1.00000
Average Growth Rates	0.02184	0.01916	0.01974	-0.02098	0.07864
Investments	0.22504	0.22290	0.06444	0.044800	0.37450
Schooling	2.11580	1.77100	1.30422	0.19400	5.9780
Initial Income	8.56522	8.71568	0.77955	6.62140	9.71534
1/ Life Expectancy at age 1	1.44483	1.38533	0.14140	1.30657	1.96941
Log of Fertility Rate	1.15628	1.05082	0.45017	0.43825	1.99470
Population growth Rates	-2.78022	-2.80616	0.14570	-3.06539	-2.48092
Openness (filtered)	-0.04213	-0.06195	0.17654	-0.47032	0.64087
Government Consumption (net)	0.07227	0.06495	0.04134	0.01000	0.23362
Change in Terms of Trade times Openness	-0.00290	-0.00264	0.01341	-0.05236	0.04734
Inflation	0.19376	0.08564	0.30464	0.01305	2.09233
Church Attendance	-0.36207	-0.40963	1.09993	-2.16432	2.09675
Belief in Hell	-0.57192	-0.45898	0.92632	-2.48382	1.75832
Belief in Heaven	0.50843	0.28033	0.99943	-1.43706	2.36583
Eastern Religion	0.06524	0.00000	0.22542	0.00000	0.96979
Hindu	0.02378	0.00000	0.13561	0.00000	0.827135
Jews	0.02920	0.00103	0.14670	0.00000	0.895643
Muslim	0.04163	0.00140	0.16485	0.00000	0.99299
Orthodox	0.00565	0.00201	0.00863	0.00000	0.03525
Other Religion	0.03564	0.00117	0.09363	0.00000	0.46940
Protestant	0.26133	0.03472	0.34640	0.00102	0.99595
LCR100km	0.60813	0.58210	0.31955	0.06325	1.00000
KGATRSTR	0.20300	0.00000	0.33765	0.00000	1.00000
Language	0.26552	0.15220	0.25130	0.00280	0.86520
Political Rights	0.77302	0.89420	0.27187	0.11666	1.00000
Political Rights Square	0.67079	0.79961	0.35652	0.01361	1.00000
Expropriation Risk	0.78119	0.85150	0.18187	0.31666	1.00000
Rule of Law	0.75470	0.83333	0.26923	0.16666	1.00000
Legal Formalism: Check	0.40274	0.35635	0.18219	0.09649	0.83479

Table 2: Replication of Table 4 in Barro and McCleary (2003)

Explanatory Variable	System 1	System 2	System 3	System 4	System 5	System 6
Religiosity	0.00003$^{\Upsilon}$	0.00002$^{\Upsilon}$	0.00009$^{\Upsilon}$	0.00045$^{\Upsilon}$	0.00013$^{\Upsilon}$	0.00023$^{\Upsilon}$
Monthly Church Attendance	-0.00828***	-0.01585***	-0.00883***	-0.01702***	-0.00813***	-0.01905***
	(0.00183)	(0.00341)	(0.00209)	(0.00442)	(0.00207)	(0.00453)
Belief in Hell	0.00659**	0.01527***	-	-	0.00696**	0.00918*
	(0.00263)	(0.00444)			(0.00352)	(0.00550)
Belief in Heaven	-	-	0.00534**	0.01460***	-0.00053	0.00942
			(0.00270)	(0.00514)	(0.00359)	(0.00631)
Religion Shares	-	0.00694$^{\Upsilon}$	-	0.00212$^{\Upsilon}$	-	0.00965$^{\Upsilon}$
Eastern Religion Share	-	-0.00711	-	0.00345	-	-0.00552
		(0.00839)		(0.00803)		(0.00896)
Hindu Share	-	-0.01092	-	0.00612	-	0.00241
		(0.01174)		(0.01525)		(0.01547)
Jewish Share	-	-0.00264	-	0.00892	-	0.00198
		(0.00907)		(0.00875)		(0.00926)
Muslim Share	-	-0.03098**	-	-0.01400	-	-0.02909**
		(0.01223)		(0.00979)		(0.01254)
Orthodox Share	-	-0.02966	-	-0.02169	-	-0.03289
		(0.02044)		(0.01993)		(0.02091)
Protestant Share	-	-0.01661**	-	-0.02114**	-	-0.02144**
		(0.00698)		(0.00836)		(0.00868)
Other Religion Share	-	-0.01271	-	-0.02160	-	-0.02110
		(0.02087)		(0.02317)		(0.02240)
Number of observations for each time period	38,41,39	38,41,39	38,41,39	38,41,39	38,41,39	38,41,39

Table 2 replicates the growth regressions in Barro and McCleary (2003; Table 4, page 773). The time periods are 1965– 1975, 1975–1985, and 1985–1995. Time dummies are included each period. The dependent variable is the growth rate of real per capita GDP over 1965–1975, 1975–1985, and 1985–1995. Other growth determinants were included but coefficients are not shown. The description of the variables is discussed in Section 3. Robust (White) standard errors are in parentheses. "***" denotes significance at 1%, "**" at 5%, and "*" at 10%. "ϒ" denotes joint p-value.

Table 3A: MA and Classical Estimation Results for Growth Regression

	Model Averaging Estimation				Classical Estimation	
Estimation Method	2SLS-MA		LS-MA		2SLS	LS
	Posterior Inclusion Probability	Posterior Mean and Std. Error	Posterior Inclusion Probability	Posterior Mean and Std. Error	Coefficient Estimate and Std. Error	Coefficient Estimate and Std. Error
	(1)	(2)	(3)	(4)	(5)	(6)
Religiosity	0.57130$^{\#}$		0.63565$^{\#}$		0.00034$^{\gamma}$	0.00678$^{\gamma}$
Belief in Heaven	0.00000	0.00000 (0.00005)	0.01136	-0.00003 (0.00033)	0.00383 (0.00515)	-0.00011 (0.00496)
Belief in Hell	0.00305	0.00000 (0.00044)	0.01022	0.00004 (0.00061)	0.01051** (0.00515)	0.00633 (0.00412)
Monthly Church Attendance	0.56935	-0.00285 (0.00347)	0.62208	-0.00272 (0.00242)	-0.01564*** (0.00365)	-0.00848** (0.00345)
Religion Shares	0.35433$^{\#}$		0.28416$^{\#}$		0.00066$^{\gamma}$	0.00183$^{\gamma}$
Eastern Religion Share	0.34861	0.00621 (0.01092)	0.26515	0.00381 (0.00899)	-0.02183* (0.01292)	-0.01162 (0.01132)
Hindu Share	0.01014	-0.00006 (0.00123)	0.00759	0.00000 (0.00095)	-0.00394 (0.01746)	-0.01054 (0.01741)
Jewish Share	0.34621	0.01028 (0.01473)	0.26397	0.00737 (0.01271)	-0.00344 (0.01048)	0.00828 (0.00992)
Muslim Share	0.01221	-0.00002 (0.00108)	0.01753	-0.00016 (0.002)	-0.05305*** (0.01145)	-0.03145*** (0.0094)
Orthodox Share	0.01619	-0.00172 (0.03132)	0.02088	-0.00306 (0.03103)	-0.69527*** (0.18570)	-0.39675*** (0.12336)
Protestant Share	0.01666	-0.00004 (0.00109)	0.02582	-0.00021 (0.00177)	-0.02162*** (0.00654)	-0.01426** (0.00573)
Other Religion Share	0.00952	-0.0001 (0.00174)	0.00922	-0.00008 (0.00171)	-0.04114* (0.02246)	-0.02984 (0.01879)

Table 3B: MA and Classical Estimation Results for Growth Regression

	Model Averaging Estimation				Classical Estimation	
Estimation Method	2SLS-MA		LS-MA		2SLS	LS
	Posterior Inclusion Probability	Posterior Mean and Std. Error	Posterior Inclusion Probability	Posterior Mean and Std. Error	Coefficient Estimate and Std. Error	Coefficient Estimate and Std. Error
	(1)	(2)	(3)	(4)	(5)	(6)
Neoclassical Growth	1.00000#		1.00000#		0.00000ϒ	0.00000ϒ
Initial Income	1.00000	-0.03080***	1.00000	-0.02824***	-0.03488***	-0.02908***
		(0.00589)		(0.00475)	(0.00494)	(0.00427)
Schooling	0.61134	0.00172	0.66345	0.00166	0.00457***	0.00316**
		(0.00167)		(0.00153)	(0.00147)	(0.00138)
Regional Heterogeneity	0.78667#		0.86751#		0.35794ϒ	0.07052ϒ
East Asia	0.78238	0.01075	0.86551	0.01263*	0.01177	0.01605*
		(0.00772)		(0.00717)	(0.00979)	(0.00885)
Demography	0.92688#		0.96494#		0.01843ϒ	0.09669ϒ
1/ Life Expectancy at age 1	0.91981	-0.07076**	0.95938	-0.0563***	-0.06979***	-0.05172**
		(0.03)		(0.0218)	(0.02296)	(0.02199)
Macroeconomic Policy	1.00000#		1.00000#		0.00000ϒ	0.00000ϒ
Openness (filtered)	1.00000	0.03083***	1.00000	0.02815***	0.03381***	0.03107***
		(0.00956)		(0.00783)	(0.00851)	(0.00745)
Government Consumption (net)	0.95799	-0.08457*	0.94515	-0.10157**	-0.06872	-0.06534
		(0.04634)		(0.04442)	(0.05444)	(0.04768)
Inflation	0.98963	-0.01869**	0.99584	-0.01434***	-0.02212***	-0.01803***
		(0.00810)		(0.00417)	(0.00562)	(0.0043)
Geography	0.94742#		0.97425#		0.00023ϒ	0.00000ϒ
LCR100km	0.94594	-0.01584**	0.97363	-0.01357**	-0.02544***	-0.02406***
		(0.00622)		(0.00508)	(0.00556)	(0.00449)
Fractionalization	1.00000#		0.99998#		0.0531ϒ	0.00513ϒ
Language	1.00000	-0.02409***	0.99998	-0.02267***	-0.01533**	-0.02098***
		(0.00737)		(0.00667)	(0.00722)	(0.00679)
Property Rights Institutions	0.99968#		0.99866#		0.19264ϒ	0.04917ϒ
Expropriation Risk	0.99968	0.04092***	0.99863	0.04506***	0.03878**	0.04611***
		(0.01435)		(0.01158)	(0.01966)	(0.01735)

Tables 3A and 3B show the results for the growth regression in equations (1)-(2) in the text. Table 3A presents the results for Religiosity and Religion Shares while Table 3B presents the results for the other fundamental theories (and corresponding proxy variables) that attain posterior probability of inclusion above 0.5. Columns (1)-(4) present the results using Model Averaging (discussed in Section 4) while columns (5)-(6) present the results using Classical estimation. The time periods are 1965–75, 1975–85, and 1985–95. Time dummies are included for each period. The dependent variable is the growth rate of real per capita GDP for each period. Other growth determinants were included but coefficients are not shown. The complete set of results is available on the online Supplement. The description of the variables is discussed in Section 3. Posterior robust (White) standard errors are in parentheses. "***" denotes significance at 1%, "**" at 5%, and "*" at 10%. "ϒ" denotes joint p-value while "#" denotes posterior probability of theory inclusion.

Table 4: Robustness

Priors	Hierarchical	Hierarchical	Hierarchical	Hierarchical	Hierarchical	Uniform	Hierarchical
Information Criterion	BIC	BIC	BIC	BIC	BIC	BIC	AIC
Always Kept	None	Barro and McCleary	Neoclassical Growth	Religiosity	Religiosity and Shares	None	None
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Religiosity	0.57130#	-	0.11883#	-	-	0.5881#	0.93961#
Belief in Heaven	0.00000	0.00580	-0.00002	-0.00247	-0.00199	0.00000	0.00013
	(0.00005)	(0.00569)	(0.00042)	(0.00962)	(0.00921)	(0.00013)	(0.00120)
Belief in Hell	0.00000	0.00791	0.00003	0.00852	0.00813	0.00005	0.00317
	(0.00044)	(0.006)	(0.00081)	(0.00997)	(0.01052)	(0.00136)	(0.00493)
Monthly Church Attendance	-0.00285	-0.01515***	-0.00055	-0.00901	-0.00836*	-0.00218	-0.00685
	(0.00347)	(0.00386)	(0.00204)	(0.00556)	(0.00503)	(0.0034)	(0.00436)
Religion Shares	0.35433#	-	0.89906#	0.94568#	-	0.92451#	0.89716#
Eastern Religion Share	0.00621	-0.01176	0.02047**	0.00104	-0.0123	0.00744	-0.00214
	(0.01092)	(0.0111)	(0.00952)	(0.00451)	(0.01632)	(0.01191)	(0.01066)
Hindu Share	-0.00006	-0.00032	-0.00011	-0.00008	-0.01385	-0.0001	-0.00298
	(0.00123)	(0.01718)	(0.00198)	(0.00204)	(0.01816)	(0.00175)	(0.00903)
Jewish Share	0.01028	-0.00392	0.02623**	0.00014	0.01594	0.02555**	0.00933
	(0.01473)	(0.01238)	(0.01225)	(0.00158)	(0.01047)	(0.01301)	(0.01266)
Muslim Share	-0.00002	-0.04455***	-0.00006	-0.01968	-0.02798	-0.00044	-0.01824
	(0.00108)	(0.01416)	(0.00213)	(0.01394)	(0.01862)	(0.00378)	(0.0166)
Orthodox Share	-0.00172	-0.61222***	-0.01253	-0.15267	-0.37149*	-0.01741	-0.29678
	(0.03132)	(0.2155)	(0.06944)	(0.20641)	(0.21792)	(0.07866)	(0.23967)
Protestant Share	-0.00004	-0.02002***	-0.00003	-0.01055	-0.01402	-0.00091	-0.00992
	(0.00109)	(0.00718)	(0.00134)	(0.01047)	(0.00854)	(0.00382)	(0.00874)
Other Religion Share	-0.0001	-0.03328	0.00007	-0.00056	-0.0239	-0.00003	-0.00846
	(0.00174)	(0.02111)	(0.00325)	(0.00638)	(0.02017)	(0.00243)	(0.0162)

Table 4 presents the posterior means and std. errors for the coefficients of the religiosity variables and religion shares for seven different modeling averaging exercises for the growth regression described in equation (1) of the text. The time periods are 1965– 1975, 1975–1985, and 1985–1995. Time dummies are included for each period. The dependent variable is always the growth rate of real per capita GDP over 1965–1975, 1975–1985, and 1985–1995. For all the exercises other growth determinants were included but coefficients are not shown. In fact we used the same set of determinants and instruments as in Table 3. Columns (1)-(5) and (7) refer to BMA exercises using Hierarchical priors while exercise (6) refers to a BMA exercise using Uniform priors. Exercises (1)-(6) employed the BIC approximation while exercise (7) employed the AIC criterion. Finally, columns (1), (6), and (7) refer to BMA exercises that allowed for model uncertainty for all the variables. Column (2) corresponds to the exercise that assumed that the specification of Barro and McCleary is always kept (included) in all the models considered in the BMA. Column (3) assumed that the variables suggested by Solow (i.e. population growth, investments, schooling, and initial income) are always kept. Column (4) assumed that the religiosity variables are always kept while column (5) assumed that both religiosity and shares are always kept. Notice that column (1) is identical to column (5) of table 4. Posterior robust (White) standard errors are in parentheses. "***" denotes significance at 1%, "**" at 5%,. and "*" at 10% while "#" denotes posterior probability of theory inclusion.