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## WHICH COUNTRIES HAVE STATE RELIGIONS?\*

ROBERT J. BARRO AND RACHEL M. MCCLEARY

Among 188 countries, 72 had no state religion in 2000, 1970, and 1900; 58 had a state religion throughout; and 58 had 1 or 2 transitions. We use a Hotelling spatial competition model to analyze the likelihood that the religion market would be monopolized. Similar forces influence a government's decision to establish a state religion. Consistent with the model, the probability of state religion in 1970 and 2000 is increasing with the adherence rate to the main religion, has a nonlinear relation with population, and has little relation with per capita GDP. The probability of state religion decreases sharply under Communism, but lagged Communism has only a weak effect. With costly adjustment for institutions, the probability of state religion in 1970 or 2000 depends substantially on the status in 1900. This persistence is much stronger for countries with no major regime change than for countries with such a change.

State religion plays a central role in Adam Smith's vision of the religion market [1791, Book V, Article III]. According to Smith, the key aspect of state religion is its promotion of the monopoly position of the favored religion, partly through limitations on entry and partly through subsidies. Smith argues that the low service quality of monopoly religion providers reduces religious participation and beliefs. This argument has been broadened in the "religion-market model" by Finke and Stark [1992], Iannaccone [1991], and Finke and Iannaccone [1993].

Our previous research [Barro and McCleary 2006] investigated the effects of state religion on religiosity. We found, contrary to Smith, that the presence of state religion raised religious participation and beliefs. These relationships applied when we held fixed a measure of government regulation of the religion market, based on whether the government appointed or approved religious leaders. Our interpretation was that, for given regulation, the state-religion variable picked up subsidies that fostered organized religion. Consistent with the religion-market model, regulation depressed religious participation and beliefs. Additional research [Barro and McCleary 2003] showed that, by af-

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fecting religious participation and beliefs, state religion mattered for economic growth.

In the present study, we try to explain the choice of state religions. Aside from the interplay with economic growth, this choice is interesting for economists because, over the past 2000 years, state monopoly over religion has probably been the single most important form of state monopoly in existence. The choice of a state religion is a political calculus that involves interactions between the government and the religion sector. Our analysis accords in spirit with Gill's [2002], who argued that studies of religious liberty should take the form of positive analyses of why the government regulates religious organizations in a particular way.

#### I. HISTORICAL CONTEXT AND MEASURES OF STATE RELIGION

Many state religions go back hundreds of years and were introduced for reasons independent of forces that operated in the twentieth century. For example, the Protestant Reformation initiated by Martin Luther, John Calvin, and Ulrich Zwingli in the early 1500s flourishes today in various forms throughout the world. Historically, political leaders have been even more important than theological ones in influencing the institutionalization of religion. For England, the current Anglican environment reflects Henry VIII's ouster of the Catholic Church in 1534, purportedly over the Pope's refusal to grant permission for a divorce but probably more related to the confiscation of church property. Similarly, the long-lasting presence of the Lutheran state church in Sweden and the rest of Scandinavia stems from the ouster of the Catholic Church in Sweden by King Gustaf Vasa in 1527, also motivated by the taking of church property.

Our analysis does not attempt to explain the motivations of Henry VIII in 1534 or Gustaf Vasa in 1527. Going back further, we also do not explain why the Orthodox Church separated from the Roman Catholic Church in the Great Schism of 1054, why Christianity and Islam became the state religions of many countries much earlier, or why Buddhism arose out of Hinduism in India some 500 years before Christ and gradually became prominent in parts of East Asia. Operationally, we take as given the status of state religion in a region at some point in the past and, for us, the relevant date is a relatively recent one, 1900. This year

is the earliest time at which we have a broad classification of countries in terms of state religions.

In this study, we categorize official state religion as an all-or-nothing choice, and we focus on three dates at which we have data: 2000, 1970, and 1900. Our classifications come primarily from Barrett [1982, pp. 800–801] and Barrett, Kurian, and Johnson [2001, pp. 834–835], subsequently referred to as Barrett. These sources provide global coverage on a reasonably consistent basis. Although the designations are influenced by legal provisions, including statements about religion in constitutions, the concept employed is ultimately *de facto*, that is, guided by actual practice with respect to favoring the chosen religion or constraining alternative religions. The classifications are clearer in some cases than in others. In many situations, the constitution designates an official state religion and restricts or prohibits other forms. However, even without these provisions, governments sometimes favor a designated religion through subsidies and tax collections or through the mandatory teaching of religion in public schools. These considerations caused Barrett to classify some countries as having a “state religion,” despite the absence of an official state religion in the constitution. Controversial cases of this type in 2000 include Italy, Portugal, and Spain, which Barrett deemed to have a Catholic state religion.

Barrett classifies some governments as favoring multiple religions or religion in general, although not maintaining a single religion. Examples in 2000 are Australia, Belgium, Brazil, Cyprus, Philippines, South Africa, and Switzerland. These countries lack a state religion in the sense of favoring a monopoly religion. Therefore, we classified these cases as lacking a state religion.

Frankly, we disagree with the classifications made by Barrett in a number of cases. However, we thought it problematic to substitute our subjective judgments about particular cases for those made by Barrett and his team. In particular, we were concerned that our assessments would be biased in the direction of fitting our model. Therefore, except in cases of obvious error, we accepted the Barrett designations of state religion.<sup>1</sup>

1. We corrected a number of typos in the classifications in Barrett, Kurian, and Johnson [2001]. We also updated for two recent events: Sweden dropping Lutheranism as the state religion in 2000, and Bulgaria adopting Orthodoxy as the state religion in 2001. In addition, we departed from Barrett by classifying Cambodia as having a state religion (Buddhist) in 2000. This designation accords

For the recent period, there are alternatives and supplements to the Barrett data. Since the passage of the International Religious Freedom Act in 1998, the U. S. State Department publishes its annual report, the *International Religious Freedom Report*, which documents the extent of religious freedom in most countries. Freedom House has an ongoing project to develop indicators of religious freedom; a report for 75 countries was published by Marshall [2000]. For our purposes, a shortcoming of the State Department and Freedom House data is that they give little information about the existence of state religion, per se. Moreover, the data are available only for very recent years.

A more ambitious supplement to the Barrett data is the Religion and State database being assembled by Fox and Sandler [2004]. These data classify the relation between religion and state into four broad groupings: separation of religion and state, discrimination against minority religions, restrictions on majority religions, and religious legislation. Unfortunately, the Fox-Sandler data are available only since 1990 and cannot be used for a long-term analysis. To make a comparison with Barrett, the Fox-Sandler concept of state religion that comes closest is a composite of three categories: a country has one established religion, or it has multiple established religions (comprising only Finland and the United Kingdom in their data), or it has a civil religion, which Fox and Sandler view as amounting to an unofficial state religion. This civil religion category parallels Barrett's de facto criterion for state religion. If we specify that a country has a state religion in 2000 when it enters into one of these three Fox-Sandler categories, we get that 144 of 173 countries with data have the same designation as Barrett's. We find later that our results are similar if we substitute the Fox-Sandler data for 2000 for the Barrett data. However, for a long-term analysis, the only choice is to rely on the Barrett information.

Our study covers 188 countries that were independent in 2000.<sup>2</sup> The 188 represent the countries for which we have data on state religion and other relevant variables. Among these 188, 40 percent—75 countries—are classified as having state religions in

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with the U. S. State Department *Survey of Religious Freedom* and other sources. Moreover, the discussion in Barrett, Kurian, and Johnson [p. 165] reveals that events after 1975 in Cambodia were not taken into account.

2. The criterion of legal independence in 2000 excludes, for example, Bermuda, Hong Kong, and Macao.

2000. Going back in time, 39 percent of 189 countries—73—had state religions in 1970, and 59 percent of 188—111—had state religions in 1900.<sup>3</sup> Thus, the crude data for the twentieth century indicate a downward trend in state religion in the first part of the century but no trend over the last 30 years.

Table I shows the data on state religion in 1900, 1970, and 2000 for 188 countries. In terms of transitions, the 188 countries break down into seven groups. Group 1, 72 countries, maintained no form of state religion throughout, that is, in 1900, 1970, and 2000. Examples are Australia, Canada, France,<sup>4</sup> Germany, Mexico, and the United States.<sup>5</sup> Group 2, 58 countries, had a state religion at all three dates: 1900, 1970, and 2000.<sup>6</sup> Each of these countries maintained only one type of state religion at the three dates: 21 had Catholic state religions, 22 had Muslim, 9 had Protestant (including Anglican), 1 had Orthodox, 4 had Buddhist, and 1 had Hindu.

The remaining 58 countries had some kind of transition for state religion between 1900 and 2000. Among these, 12 countries had two transitions; therefore, our data set has 70 transitions overall. Group 3, 29 countries, had state religions in 1900, abandoned state religion by 1970, and did not reinstitute state religion

3. The 189 countries in 1970 include East and West Germany as separate entities. Many of the 188 independent countries that existed in 2000 were not independent in 1970 and, even more so, in 1900. For countries that were not independent in 1970 or 1900, the designation of state religion pertains to the regime applying to the comparable region. Some of these regions were colonies—for example, in Africa—and others were parts of larger countries—for example, republics of the Soviet Union or Yugoslavia in 1970 or pieces of the Ottoman Empire in 1900.

4. The French Republic separated completely from the Catholic Church in 1905. However, under the Third Republic, which started in 1871, there was a gradual movement toward universal and secular education. Probably for this reason, Barrett labels France as not officially Catholic in 1900. We think it would have been better to classify France as having a Catholic state religion in 1900.

5. In the colonial period, the Anglican Church was the official religion of the largest number of colonies, notably in the South. The Congregational Church (related to Presbyterianism) dominated in New England, except for Rhode Island, which lacked an official religion. The Congregational Church was not disestablished until 1818 in Connecticut, 1819 in New Hampshire, and in two parts—in 1824 and 1833—in Massachusetts. The U. S. prohibition against establishment of an official religion, a part of the Bill of Rights, was not applied to state governments until the extension of the equal-protection clause of the Fourteenth Amendment to state governments starting in the late 1800s. This extension culminated in a Supreme Court decision in 1934. For discussions, see Norman [1968, Chapters 1 and 2], Finke and Stark [1992, chapter 3], and Olds [1994].

6. We have not investigated in detail whether lapses in state religion occurred in these countries at other dates in the twentieth century. Two cases are Afghanistan lacking a state religion from the Marxist coup in 1978 until the rise of the Taliban in the mid-1990s and Cambodia lacking a state religion from the introduction of Communism in the mid-1970s until 1989.

TABLE I  
INTERNATIONAL PATTERNS OF STATE RELIGION

Country	(1) 1900	(2) 1970	(3) 2000	(4) Pattern*
Afghanistan	Muslim	Muslim	Muslim	YYY
Albania	Muslim	none	none	YNN
Algeria	Muslim	Muslim	Muslim	YYY
Andorra	Catholic	Catholic	Catholic	YYY
Angola	Catholic	Catholic	none	YYN
Antigua and Barbuda	none	none	none	NNN
Argentina	Catholic	Catholic	Catholic	YYY
Armenia	Orthodox	none	Orthodox	YNY
Australia	none	none	none	NNN
Austria	none	none	none	NNN
Azerbaijan	Muslim	none	Muslim	YNY
Bahamas	Protestant	Protestant	Protestant	YYY
Bahrain	Muslim	Muslim	Muslim	YYY
Bangladesh	none	Muslim	Muslim	YYY
Barbados	Protestant	Protestant	none	YYN
Belarus	Orthodox	none	Orthodox	YNY
Belgium	none	none	none	NNN
Belize	none	none	none	NNN
Benin	Ethno-religion	none	none	YNN
Bhutan	Buddhist	Buddhist	Buddhist	YYY
Bolivia	Catholic	Catholic	Catholic	YYY
Bosnia and Herzegovina	none	none	none	NNN
Botswana	Protestant	none	none	YNN
Brazil	Catholic	none	none	YNN
Brunei	Muslim	Muslim	Muslim	YYY
Bulgaria	none	none	Orthodox	NNY
Burkina Faso	Ethno-religion	none	none	YNN
Burundi	Ethno-religion	none	none	YNN
Cambodia	Buddhist	Buddhist	Buddhist	YYY
Cameroon	none	none	none	NNN
Canada	none	none	none	NNN
Cape Verde	Catholic	Catholic	none	YYN
Central African Republic	Ethno-religion	none	none	YNN
Chad	Ethno-religion	none	none	YNN
Chile	Catholic	none	none	YNN
China	Confucian	none	none	YNN
Colombia	Catholic	Catholic	Catholic	YYY
Comoros	none	none	none	NNN
Congo (Brazzaville)	none	none	none	NNN
Congo (Kinshasa)	Catholic	none	none	YNN
Costa Rica	Catholic	Catholic	Catholic	YYY
Cote d'Ivoire	none	none	none	NNN
Croatia	Catholic	none	Catholic	YNY
Cuba	Catholic	none	none	YNN
Cyprus	none	none	none	NNN
Czech Republic	none	none	none	NNN
Denmark	Protestant	Protestant	Protestant	YYY
Djibouti	none	none	none	NNN
Dominica	none	none	none	NNN
Dominican Republic	Catholic	Catholic	Catholic	YYY
Ecuador	none	none	none	NNN
Egypt	Muslim	Muslim	Muslim	YYY
El Salvador	Catholic	Catholic	Catholic	YYY
Equatorial Guinea	Catholic	none	none	YNN
Eritrea	Orthodox	Orthodox	none	YYN
Estonia	none	none	none	NNN

Ethiopia	Orthodox	Orthodox	none	YYN
Fiji	none	none	none	NNN
Finland	Protestant	Protestant	Protestant	YYY
France	none	none	none	NNN
Gabon	none	none	none	NNN
Gambia	none	none	none	NNN
Georgia	Orthodox	none	Orthodox	YNY
Germany	none	none	none	NNN
Ghana	none	none	none	NNN
Greece	Orthodox	Orthodox	Orthodox	YYY
Grenada	none	none	none	NNN
Guatemala	Catholic	Catholic	Catholic	YYY
Guinea	none	none	none	NNN
Guinea-Bissau	Catholic	Catholic	none	YYN
Guyana	none	none	none	NNN
Haiti	Catholic	Catholic	Catholic	YYY
Honduras	Catholic	Catholic	Catholic	YYY
Hungary	none	none	none	NNN
Iceland	Protestant	Protestant	Protestant	YYY
India	none	none	none	NNN
Indonesia	Protestant	none	none	YNN
Iran	Muslim	Muslim	Muslim	YYY
Iraq	Muslim	Muslim	Muslim	YYY
Ireland	Catholic	Catholic	none	YYN
Israel	none	Jewish	Jewish	NYN
Italy	Catholic	Catholic	Catholic	YYY
Jamaica	none	none	none	NNN
Japan	Buddhist**	none	none	YNN
Jordan	Muslim	Muslim	Muslim	YYY
Kazakhstan	Orthodox	none	none	YNN
Kenya	none	none	none	NNN
Kiribati	none	none	none	NNN
Korea (North)	Confucian	none	none	YNN
Korea (South)	Confucian	none	none	YNN
Kuwait	Muslim	Muslim	Muslim	YYY
Kyrgyz Republic	Orthodox	none	Muslim	YNY
Laos	Buddhist	Buddhist	none	YYN
Latvia	Orthodox	none	none	YNN
Lebanon	Muslim	none	none	YNN
Lesotho	none	none	none	NNN
Liberia	Protestant	Protestant	Protestant	YYY
Libya	Muslim	Muslim	Muslim	YYY
Liechtenstein	Catholic	Catholic	Catholic	YYY
Lithuania	Catholic	none	none	YNN
Luxembourg	Catholic	Catholic	Catholic	YYY
Macedonia	Orthodox	none	Orthodox	YNY
Madagascar	none	none	none	NNN
Malawi	none	none	none	NNN
Malaysia	Muslim	Muslim	Muslim	YYY
Maldives Islands	Muslim	Muslim	Muslim	YYY
Mali	none	none	none	NNN
Malta	Catholic	Catholic	Catholic	YYY
Marshall Islands	none	none	none	NNN
Mauritania	Muslim	Muslim	Muslim	YYY
Mauritius	none	none	none	NNN
Mexico	none	none	none	NNN
Micronesia	none	none	none	NNN
Moldova	Orthodox	none	Orthodox	YNY

(continued on next page)

TABLE I  
(CONTINUED)

Country	(1) 1900	(2) 1970	(3) 2000	(4) Pattern*
Monaco	Catholic	Catholic	Catholic	YYY
Mongolia	Buddhist	none	none	YNN
Morocco	Muslim	Muslim	Muslim	YYY
Mozambique	Catholic	Catholic	none	YYN
Myanmar	none	none	none	NNN
Namibia	none	none	none	NNN
Nepal	Hindu	Hindu	Hindu	YYY
Netherlands	none	none	none	NNN
New Zealand	none	none	none	NNN
Nicaragua	none	none	none	NNN
Niger	none	none	none	NNN
Nigeria	none	none	none	NNN
Norway	Protestant	Protestant	Protestant	YYY
Oman	Muslim	Muslim	Muslim	YYY
Pakistan	none	Muslim	Muslim	YYN
Panama	Catholic	Catholic	Catholic	YYY
Papua New Guinea	none	none	none	NNN
Paraguay	Catholic	Catholic	Catholic	YYY
Peru	Catholic	Catholic	Catholic	YYY
Philippines	none	none	none	NNN
Poland	none	none	none	NNN
Portugal	Catholic	Catholic	Catholic	YYY
Qatar	Muslim	Muslim	Muslim	YYY
Romania	Orthodox	none	none	YNN
Russia	Orthodox	none	none	YNN
Rwanda	Ethno-religion	none	none	YNN
Samoa	Protestant	Protestant	Protestant	YYY
St. Kitts and Nevis	none	none	none	NNN
St. Lucia	none	none	none	NNN
St. Vincent and Grenadines	none	none	none	NNN
San Marino	none	none	none	NNN
Sao Tome and Principe	Catholic	Catholic	none	YYN
Saudi Arabia	Muslim	Muslim	Muslim	YYY
Senegal	none	none	none	NNN
Seychelles	none	none	none	NNN
Sierra Leone	none	none	none	NNN
Singapore	none	none	none	NNN
Slovak Republic	none	none	none	NNN
Slovenia	Catholic	none	none	YNN
Solomon Islands	none	none	none	NNN
Somalia	Muslim	Muslim	Muslim	YYY
South Africa	none	none	none	NNN
Spain	Catholic	Catholic	Catholic	YYY
Sri Lanka	Buddhist	Buddhist	Buddhist	YYY
Sudan	Muslim	Muslim	Muslim	YYY
Suriname	none	none	none	NNN
Swaziland	Ethno-religion	none	none	YNN
Sweden	Protestant	Protestant	none	YYN
Switzerland	none	none	none	NNN
Syria	Muslim	Muslim	none	YNN
Taiwan	Confucian	none	none	YNN
Tajikistan	Orthodox	none	Muslim	YNY
Tanzania	none	none	none	NNN
Thailand	Buddhist	Buddhist	Buddhist	YYY
Togo	none	none	none	NNN
Tonga	Protestant	Protestant	Protestant	YYY

Trinidad and Tobago	none	none	none	NNN
Tunisia	Muslim	Muslim	Muslim	YYY
Turkey	Muslim	none	none	YNN
Turkmenistan	Orthodox	none	Muslim	YNY
Uganda	none	none	none	NNN
Ukraine	Orthodox	none	Orthodox	YNY
United Arab Emirates	Muslim	Muslim	Muslim	YYY
United Kingdom	Protestant	Protestant	Protestant	YYY
United States	none	none	none	NNN
Uruguay	none	none	none	NNN
Uzbekistan	Orthodox	none	Muslim	YNY
Vanuatu	none	none	Protestant	NNY
Venezuela	Catholic	Catholic	Catholic	YYY
Vietnam	none	none	none	NNN
Yemen	Muslim	Muslim	Muslim	YYY
Yugoslavia (Serbia)	none	none	none	NNN
Zambia	none	none	none	NNN
Zimbabwe	none	none	none	NNN
Total observations	188	189†	188	
No state religion total	77	116†	113	
Buddhist total	7	5	4	
Catholic total	35	27	22	
Confucian total	4	0	0	
Ethno-religion total	7	0	0	
Hindu total	1	1	1	
Jewish total	0	1	1	
Muslim total	31	25	29	
Orthodox total	13	3	8	
Protestant total	13	11	10	

Summary of transitions for 1900, 1970, 2000:

Group 1 (no state religion throughout, NNN) = 72

Group 2 (state religion throughout, YYY) = 58

Group 3 (dropped state religion by 1970, YNN) = 29

Group 4 (dropped state religion between 1970 and 2000, YYN) = 12

Group 5 (dropped state religion by 1970, reinstated by 2000, YNY) = 12

Group 6 (introduced state religion by 1970, NYY) = 3

Group 7 (introduced state religion between 1970 and 2000, NNY) = 2

\* Y means some type of state religion and N means no state religion.

\*\* Shinto.

† East and West Germany included separately, each with no state religion.

Data are from Barrett [1982, pp. 800–801] and Barrett, Kurian, and Johnson [2001, pp. 834–835], from which a number of typos were corrected. We added the information that Cambodia reinstated a Buddhist state religion in 1989, Sweden dropped its Lutheran state religion in 2000, and Bulgaria adopted an Orthodox state religion in 2001 (treated as the 2000 status in our table).

Some transitions that cannot be seen in the tabulations for 1900, 1970, 2000 are as follows. Afghanistan lacked a state religion from 1978 until the mid-1990s. Cambodia lacked a state religion from the mid-1970s until 1989. Bangladesh lacked a state religion from 1972 (the time of independence from Pakistan) until 1975. For the United Kingdom, England has Anglican, and Scotland has Presbyterian. The Anglican religion was disestablished in Ireland in 1869 and in Wales in 1919.

Barrett designations with which we disagree but nevertheless accepted are as follows. We would have classified Ireland as lacking a state religion in 1900 (when it was part of the United Kingdom). We would have classified France as having a Catholic state religion in 1900 (before the final break with the Catholic Church in 1905). We would have classified Guatemala as lacking a state religion in 2000 (following the new constitution in 1993 and de facto changes thereafter).

by 2000. Examples are Brazil and Chile (which dropped the Catholic state church), Turkey (Muslim), Indonesia (which dropped the Dutch Reformed Church imposed by the former colonial ruler), Russia (Orthodox), Japan (Shinto), and China and

Korea (Confucianism). Group 4, 12 countries, had state religion in 1900 and abandoned state religion between 1970 and 2000. This group includes Ireland (which dropped Catholic<sup>7</sup>), Syria (Muslim), and Sweden (Protestant).

Group 5, 12 countries, had a state religion in 1900, dropped the state religion by 1970, but then reinstated a state religion by 2000. These cases are all former republics of the Soviet Union or Yugoslavia. Four Asian countries that were previously parts of the Soviet Union had Orthodox state religions in 1900 (as parts of the Russian empire) but adopted Muslim state religions by 2000. Five other former Soviet republics, including Armenia and Ukraine, reinstated an Orthodox state religion by 2000. Croatia had a Catholic state religion in 1900 and 2000 but no state religion, as part of Yugoslavia, in 1970.

The final two groups had no state religion in 1900 but introduced one by 1970 (three cases) or 2000 (two cases). The three countries that adopted a state religion by 1970 were not independent entities in 1900: Bangladesh<sup>8</sup> and Pakistan, which instituted a Muslim state religion, and Israel, which adopted a Jewish state religion. The two countries that adopted between 1970 and 2000 are Vanuatu, which introduced a Protestant state religion upon independence in 1979, and Bulgaria, which established the Orthodox Church (in 2001, rather than 2000).<sup>9</sup>

## II. THEORY OF THE CHOICE OF A STATE RELIGION

We start with an unregulated market for religion goods. Within this setting, the outcome will sometimes be a monopoly; that is, the unregulated market may be a natural monopoly. A critical element for natural monopoly is the presence of large fixed costs, such as those applicable to the creation and dissemination of a set of religious beliefs. Relative to these fixed costs, the

7. Our classification follows Barrett's designation of Ireland as having a Catholic state church in 1900 and 1970. However, the official status of the Catholic Church in Ireland was not established until after Irish independence in 1921. Moreover, the Anglican Church was disestablished in Ireland in 1869. Therefore, it would have been preferable to treat Ireland as lacking a state religion in 1900 and having one in 1970. A 1972 referendum eliminated the Catholic Church's official status in Ireland.

8. Bangladesh lacked a state religion from the time of its independence from Pakistan in 1972 until the military coup of 1975.

9. Barrett classifies Bulgaria as not having an Orthodox state religion in 1900, when the country was subject to competing influences from the Russian and Ottoman empires.

marginal costs of membership and participation are likely to be small and would not tend to be increasing. Therefore, if people view alternative religions as close substitutes, a single type of religion might prevail in equilibrium. Within this setting, we can assess how changes in exogenous variables affect the likelihood of the monopoly outcome. We argue subsequently that analogous forces motivate a government to enforce a monopoly, that is, to establish a state religion.

### *II.A. Hotelling Model of Unregulated Competition in Religions*

An important constraint on the monopoly of religion goods is heterogeneity in individuals' preferences. This diversity applies to religious doctrine and tradition, to degrees of strictness, and so on. We model this heterogeneity with Hotelling's [1929] spatial model of variety, previously applied to religion denominations by Montgomery [2003].

Suppose that consumer  $i$  has religion preference  $x_i$ , arrayed along a straight line,  $(0, \bar{x})$ . We assume that each religion provider can offer only a single variety. Therefore, a monopolist supplies only one type of religion (possibly changing over time), and the availability of multiple types requires more than one religion, that is, the absence of monopoly.

Assume that religion provider  $j$  is located at  $x_j$  and charges the price  $P_j$  for religion goods. Consumer  $i$ 's effective price for goods purchased from firm  $j$ ,  $P_{ij}^*$ , is increasing in the "distance,"  $|x_i - x_j|$ . We can represent this effective price by

$$(1) \quad P_{ij}^* = P_j + f(|x_i - x_j|),$$

where  $f(\cdot)$  is an increasing function. Given the prices,  $P_j$  and locations  $x_j$ , consumer  $i$  buys from the provider who offers the lowest effective price  $P_{ij}^*$ . The quantity bought is given from a downward-sloping demand curve (unlike in the standard Hotelling model, where consumers buy either zero or one unit of the good). We assume, only for simplicity, that each individual has the same form of demand function; that is, differences across individuals are captured fully by the  $x_i$ . Given the locations of all providers, each firm chooses its price  $P_j$  to maximize profit, given the prices of the other firms (Bertrand competition). We assume that costs of provision,  $c$ , are constant and the same for all firms.

At an earlier stage, the religion firms that have chosen to enter the market select their locations  $x_j$ . We assume that firms choose locations simultaneously. For example, firm 1 chooses  $x_1$ ,

given the positions of the other  $x_j$  and given the dependence of the prices  $P_j$ , on  $x_1$ . An additional firm enters the market if the prospective present value of profit exceeds its fixed cost, assumed to be the same for all firms. We let  $\hat{N}$  represent the number of firms that arises in equilibrium.

An important assumption in the model is religious tolerance, in the sense that individual utility depends only on the quantity and type of a person's own religion good and not on the quantities and types of religion goods consumed by others. The model also neglects network externalities or other spillovers—such as reinforcing beliefs—that cause adherents to a particular religion to benefit from the participation of other persons in the same type of religion. However, the structure of fixed costs with constant marginal costs provides analogous reasons for economies of scale.

For present purposes, we are not interested in the full equilibrium of the Hotelling model. Rather, we are interested in factors that determine the probabilities of the three possible types of outcomes:

- $\hat{N} > 1$ , which represents diversity of religion,
- $\hat{N} = 1$ , which represents a monopoly religion, and
- $\hat{N} = 0$ , which represents nonreligion.

Our primary interest is in conditions that generate a monopoly religion provider,  $\hat{N} = 1$ . However, it is worth stressing that this outcome is contending with alternatives on both sides, that is,  $\hat{N} > 1$  and  $\hat{N} = 0$ .

The monopoly outcome arises when one producer makes profit but a second provider cannot profitably enter the market. It is straightforward that the monopoly equilibrium will be more likely to hold when the distribution of individual preferences,  $x_i$ , is more compressed. In the limiting case, where everyone has the same preferences, all customers want the same type of religion good. In general, for given fixed costs and forms of demand functions, more similarity in preferences makes  $\hat{N} = 1$  more likely to hold.

Two other straightforward results are that  $\hat{N}$  is higher the lower the fixed cost of being a religion provider and the greater the scale of the market (in the sense of the number of persons and the per capita demands for religion goods). Therefore, if we consider only the choice between  $\hat{N} = 1$  and  $\hat{N} > 1$ , the monopoly outcome is more likely the higher fixed costs and the smaller the scale of demand. However, these conclusions are reversed if the

religion market contracts to the extent that  $\hat{N} = 0$  becomes the alternative to  $\hat{N} = 1$ .

When a monopoly outcome prevails,  $\hat{N} = 1$ , the provider's chosen location  $x_1$  is central relative to the distribution of the  $x_i$ . In contrast, if the distribution of preferences is highly dispersed, if fixed costs are low, and if the scale of the market is large, the equilibrium features two or more providers with spacing between them.

## *II.B. Government*

We consider in this section why the government might want the number of religion providers,  $N$ , to deviate from the free-market choice  $\hat{N}$ . One reason is externalities in beliefs—an individual's beliefs may be enhanced when other people hold similar views. These spillovers could motivate a benevolent government to support an official religion as a way of strengthening faith—and, thereby, making the typical person happier. Similar influences might arise from network externalities, for example, communication benefits from citizens sharing a common institution, such as a designated religion.<sup>10</sup>

The government may also respond to religious intolerance, modeled as a dependence of individual utility on other persons' religious practices and beliefs. Specifically, an individual may lose utility when other people practice different faiths. Viewed this way, religious intolerance is similar to externalities in beliefs. Thus, intolerance of individuals would motivate the government—possibly still benevolent—to favor the majority religion by subsidizing its practices and by restricting religious expression of minorities. These subsidies and restrictions are hallmarks of a state religion.

Stark [2001, 2003] argues that religious intolerance is especially powerful in the three principal monotheistic faiths—Jewish, Christian, and Muslim. Stark's argument, motivated more by the Old Testament than the Enlightenment, is that these reli-

10. The literature on product variety, summarized in Mankiw and Whinston [1986], provides additional reasons why the unregulated outcome may not be socially optimal. The excess of price over marginal cost in these models (and in the Hotelling model) means that, for a given number of religion firms, the quantity of religion goods is inefficiently low. In addition, the number of firms,  $\hat{N}$ , typically differs from the socially optimal number. The unregulated number tends to be too small because an entrant counts only part of the social surplus from expanded variety. However, an offsetting force is that an entrant counts as private reward the profit taken from incumbent firms, whereas a benevolent government excludes this "business-stealing effect."

gions regard their own faith as essential for salvation and are therefore likely to press for a state religion as a way to suppress “inappropriate” worship by others. According to Stark [2003, p. 32], “Those who believe there is only One True God are offended by worship directed toward other Gods.” Thus, his argument predicts that a state religion is more likely when the main religion is monotheistic.

Aspects of constitutional and legal structure would influence the ability of the government to restrict religious expression of minorities. For example, the constitution or legal history might commit the government to maintaining civil liberties, including religious freedoms. These constraints inhibit differential treatment of majority and minority religions and, thereby, make state religion less likely or, at least, less meaningful. However, the empirical challenge is to isolate exogenous dimensions of legal structure that influence the probability of state religion. The favoring of civil liberties and the maintenance of religious freedoms would typically emerge simultaneously as parts of liberal regimes.

From a political standpoint, the government—not necessarily benevolent—might want to use organized religion as a cooperative force for controlling the citizenry. This control might be facilitated by having a monopoly religion. Exogenous features of the political system, such as separation of powers between the executive and other branches, would affect the government’s ability to collude with private groups, such as organized religion. Thus, on these grounds, more separation of powers makes state religion less likely.

Alternatively, organized religion may be a competing force that the government seeks to constrain. This competition typifies Communism, a regime in which antireligion is a central tenet. Communist countries, such as the Soviet Union, East Germany, and China, attempted to destroy organized religion partly on ideological grounds and partly as a way to weaken or eliminate organized competition with state power. In the Soviet Union and East Germany, the government promoted “scientific atheism” to reinforce opposition to standard religion.<sup>11</sup> Since we do not count atheism as a religion, we think of Communist governments as attempting to enforce the outcome  $N = 0$ , that is, nonreligion. We

11. See Froese and Pfaff [2003] for a discussion of East Germany and Froese [2004] for an analysis of the Soviet Union.

therefore predict that the probability of state religion,  $N = 1$ , is low under Communism.<sup>12</sup> Note, however, that  $N = 1$  is unlikely not because Communist governments push the outcome toward religion diversity,  $N > 1$ , but, rather, toward nonreligion,  $N = 0$ .

Our empirical analysis includes the presence of a Communist regime as an explanatory variable. In practice, the antireligion nature of Communist regimes is so powerful that our sample contains only one example of a Communist government with a state religion—Somalia with a Muslim state religion in 1970. We treat the presence of Communism as exogenous with respect to state religion. In particular, we do not allow for the possibility that the extent of religiosity—which influences the probability of state religion—affects the likelihood that a Communist regime would come to power. We also investigate whether Communism has an influence on state religion that persists after the end of the Communist regime.

In the previous section we described a number of exogenous variables that affect  $\hat{N}$  and, thereby, the likelihood of monopoly in an unregulated setting. A key point is that these variables influence in a similar way the number of religion firms sought by the government. Suppose, for example, that  $\hat{N}$  is high because individual religion preferences,  $x_i$ , are highly dispersed or because the fixed costs of religions are low or because the overall scale of demand is high. In these cases, the government will find it costly to enforce a monopoly religion, that is, to have a state religion. Thus, our previous predictions about effects on the probability of state religion still apply even in the presence of a government that may or may not be benevolent.

### *II.C. Empirical Implementation*

We use the observed dispersion of religion adherence shares to get an empirical measure of the distribution of preferences over types of religion. Our enumeration of adherence in 1900, 1970, and 2000 comes from Barrett [1982] and Barrett, Kurian, and Johnson [2001]. We use an eleven-way breakdown: Catholic,

12. If we instead viewed Communism as its own religion, we would get that the probability of state religion under Communism is high. In our earlier research we found that the presence of state religion—defined to exclude Communism as a religion—raised customary religious beliefs, such as in an afterlife, which in turn enhanced economic growth. Communism does not work this way. That is, the beliefs supported by Communism are antithetical to an afterlife and are likely to detract from economic growth. For this reason, we think it advisable to stick with the usual classification of Communism as not being a religion.

Protestant, Orthodox, other Christian, Muslim, Jewish, Hindu, Buddhist, other Eastern religion, other religion, and nonreligion (which includes atheists).<sup>13</sup> One limitation of the Barrett data is that they do not systematically break down Muslim adherence by type. We use other sources to get a rough breakdown in 2000 among Sunni, Shia, and other forms.<sup>14</sup>

The principal variable that we use is the square of the fraction of the population that adheres to the most popular religion. This variable, which we call the main-religion variable, can be interpreted as the probability that two randomly selected persons belong to a country's most popular religion. The numbers that we get for the main-religion variable depend, to some extent, on the groupings used. If the data were available, we could think of starting from a much finer division than the eleven-way one we used and then attempt to assess the distances between the groups in the sense of the relevant cumulative pressure for having a state religion. We go a little bit in this direction by examining whether the Muslim population is best treated as a single group (as in our main analysis) or, instead, as three distinct subgroups. Similarly, we assess whether the Christian population is best viewed as four distinct subgroups (as in our main analysis) or, instead, as an amalgam of Catholic, Protestant, other Christian, and Orthodox.

The Hotelling model says that the greater the concentration of religion adherence the more likely that the unregulated market will have a monopoly religion,  $\hat{N} = 1$ . Based on our earlier reasoning, this effect implies that a state religion,  $N = 1$ , is more probable. We also allow for the endogeneity of religion concentration, that is, for the possibility that state religion influences this concentration. We try to sort out the direction of causation by using religion concentration in 1900 as an instrument for concentration in 1970 and 2000.

Given the main-religion variable, we can also use the Hotelling model to assess the impact of the distribution of adherence to the remaining religions. When the adherence of this remaining

13. The Protestant category includes Anglican. The other Christian group comprises independent Christians, marginal Christians, such as Mormons and Jehovah's Witnesses, and unaffiliated Christians. Buddhist includes Shinto. Hindu includes Jains and Sikhs.

14. The information comes from U. S. State Department *International Religious Freedom Reports* for 2001 and 2004, discussions in Barrett, Kurian, and Johnson [2001], Marshall [2000], and *Encyclopedia Britannica* online edition for 2004.

group is more concentrated, it is more likely that the market equilibrium would sustain a second religion; that is, state religion would be *less* probable. For example, if the main religion has 50 percent of the population, state religion would be less likely if the remaining 50 percent were in one religion, rather than scattered among several types. Empirically, we assess this influence by including the square of the adherence share of the second most popular religion—called the second-religion variable. We should note that this specification departs from the common practice of using a Herfindahl index of, in this case, religion adherence shares. Our prediction is that the square of the main-religion adherence share has a positive effect on state-religion probability, whereas the square of the second-religion adherence share has a negative effect. The Herfindahl specification constrains the coefficients of these two variables (and of the square of other religion adherence shares) to be the same.

Consider the predictions for how state religion relates to the scale of the religion market. One straightforward determinant of market size is population. Higher population raises the scale of demand and tends, thereby, to increase the equilibrium number of religions,  $\hat{N}$ , in the Hotelling model. Therefore, in the range where  $\hat{N} = 0$  is not a relevant alternative, the prediction is that higher population makes state religion less likely.

If we begin with a very small market, so that  $\hat{N} = 0$  applies, the conclusion is reversed. An increase in market size—caused, for example, by higher population—makes the monopoly outcome,  $\hat{N} = 1$ , more probable. Thus, in this range, higher population makes state religion more likely.

Overall, the Hotelling model predicts a nonlinear relationship between population and state religion. For very small countries, the relation is positive. However, once the population becomes large enough to sustain at least one organized religion, the relation is negative. Since  $\hat{N} = 0$  is likely to be a relevant alternative only for very small countries, we anticipate that the effect of population on the probability of state religion would be negative in the main range of experience.

The positive relation between population and state religion for very small countries is analogous to the effect of market size on the propensity to regulate in the model developed by Mulligan and Shleifer [2005]. Their key assumption is that regulation entails fixed costs. We can apply this reasoning to religion if we think about the maintenance of a state religion as a form of

regulation. We then get that a lower scale of demand for religion goods—generated, for example, by a smaller population—makes it less likely that the government would find it worthwhile to administer a state religion. In other words, we can think of the outcome  $\hat{N} = 0$  in the Hotelling model not as literally no religion but as the absence of a formal structure in which the government maintains an official religion.

Another determinant of market size is per capita income, which we measure by real per capita GDP. The standard view is that richer countries are less likely to have state religions.<sup>15</sup> However, the Hotelling model does not necessarily make this prediction. The key issue is whether an increase in per capita GDP raises or lowers the market demand for religion services. The secularization hypothesis predicts that economic development causes individuals to become less religious, and this view receives empirical support in international data; see, for example, Inglehart and Baker [2000] and Barro and McCleary [2006]. The principal finding is that increases in standard of living lead to small, but statistically significant, decreases in religious participation and beliefs. Nevertheless, the effect on market demand is ambiguous because richer nations may spend less time on religion but still spend more money on activities related to organized religion. Thus, the overall effect of an increase in per capita GDP on the equilibrium number of religion firms,  $\hat{N}$ , is ambiguous in the Hotelling model. Consequently, per capita GDP has an ambiguous effect on the probability of state religion.

In the empirical analysis we treat population as exogenous with respect to state religion (thereby ignoring possible endogenous responses of migration and fertility). We allow for two-way causation between per capita GDP and state religion by using instrumental variables that predict per capita GDP and are arguably exogenous with respect to state religion. We use as instruments two geography measures—the absolute value of degrees latitude (which matters for climate and, thereby, for health and agriculture) and landlocked status (which matters for transportation and trade).

With respect to political structure, we use information from Polity IV [Marshall and Jaggers 2003] on the overall polity index (the difference between “democracy” and “autocracy”) and on the

15. This idea—a part of the secularization hypothesis—appears in Weber [1930] and was extended in Wilson [1966], Berger [1967], and Chaves [1994].

extent of constraints on the chief executive. These variables may also be simultaneously determined with state religion. Therefore, we use as instruments measures of a country's colonial heritage and legal origins.

### III. EMPIRICAL FINDINGS

We focus on linear probability models for the presence of state religion in 1970 and 2000. A limitation of these linear specifications is that the fitted values for explaining state religion need not lie in the interval (0,1), as would be true for a probability. This problem can be handled by a binary-model specification, such as a probit form. The results from probit estimation are similar to those for the linear model. Since the linear models are more tractable, especially for instrumental estimation, we emphasize these results.

#### *III.A. Empirical Setup*

Table II shows means and standard deviations of the variables used in the analysis. Table III gives estimates of linear probability models. The dependent variable is a (0,1) dummy for the presence of a state religion in 1970 or 2000. Thus, we investigate only whether a state religion exists, not the form of state religion. The estimation treats the equations for state religion in 1970 and 2000 as a system, where the error terms for each country for the two years are allowed to be correlated. The method weighs countries the same, independently of size, geographical proximity to other countries, and so on. The seemingly unrelated regression (SUR) systems neglect the potential endogeneity of the right-hand-side variables. The three-stage least-squares (3SLS) systems allow for endogeneity of some of the explanatory variables. The sample for 2000 has 188 countries, and that for 1970 has 189 countries (with East and West Germany included separately).

One explanatory variable is the value in 1970 or 2000 of the main-religion variable (the square of the religion-adherence share of the most represented religion). The underlying data on religion adherence are subject to measurement error in all countries. However, this problem is especially serious in sub-Saharan Africa. As an example, Barrett's [1982, p. 527] discussion for Nigeria notes that lack of census information is a major problem. More significantly for our purposes, the Barrett classifications for

TABLE II  
MEANS AND STANDARD DEVIATIONS OF VARIABLES (UNWEIGHTED AVERAGES  
ACROSS COUNTRIES)

	2000 (N = 188)		1970 (N = 189)		1900 (N = 188)	
	mean	s.d.	mean	s.d.	mean	s.d.
State religion	0.40	0.49	0.39	0.49	0.59	0.49
Main-religion adherence	0.66	0.22	0.66	0.24	0.83	0.17
Square of above	0.48	0.28	0.51	0.31	0.71	0.25
Sub-Saharan Africa	0.26	0.44	0.25	0.44	0.26	0.44
Log (population)	8.57	2.09	7.99	2.10	—	—
Square of above	77.7	34.5	68.2	32.6	—	—
Log (per capita GDP)	8.44	1.07	7.95	0.84	—	—
Communist	0.03	0.16	0.18	0.38	0.00	0.00
Communist, 15-year lag	0.22	0.42	0.16	0.37	0.00	0.00
Second-religion adherence	0.15	0.11	0.15	0.12	0.12	0.12
Square of above	0.035	0.044	0.036	0.047	0.030	0.049
Main religion monotheistic	0.87	0.34	0.82	0.39	0.69	0.46
Main religion Muslim	0.26	0.44	0.24	0.43	0.21	0.41
Polity IV polity index	0.41	0.36	—	—	—	—
Polity IV executive index	0.43	0.36	—	—	—	—
Absolute degrees latitude	25.5	16.8	25.6	16.9	25.5	16.8
Landlocked status	0.22	0.41	0.22	0.41	0.22	0.41
British colony	0.31	0.47	0.31	0.46	—	—
French colony	0.15	0.36	0.15	0.36	—	—
Spanish or Portuguese colony	0.12	0.33	0.12	0.33	—	—
Other colony	0.08	0.27	0.08	0.27	—	—
British legal origin	0.32	0.47	0.32	0.47	—	—
French legal origin	0.43	0.50	0.42	0.50	—	—
German legal origin	0.04	0.19	0.04	0.19	—	—
Scandinavian legal origin	0.03	0.16	0.03	0.16	—	—
Regime change since 1900	0.72	0.45	0.60	0.49	—	—
Adherence shares:						
Catholic	0.289	0.332	0.298	0.354	0.259	0.378
Protestant	0.137	0.207	0.130	0.219	0.127	0.264
Orthodox	0.054	0.163	0.051	0.152	0.065	0.200
Other Christian	0.084	0.112	0.070	0.108	0.028	0.073
Muslim	0.235	0.346	0.221	0.345	0.214	0.357
Jewish	0.005	0.056	0.006	0.062	0.005	0.014
Hindu	0.022	0.095	0.022	0.105	0.022	0.101
Buddhist	0.036	0.141	0.037	0.153	0.041	0.164
Other Eastern religions	0.019	0.071	0.016	0.072	0.014	0.089
Other religions	0.057	0.110	0.076	0.146	0.222	0.361
Nonreligion	0.062	0.105	0.073	0.156	0.003	0.027

The dummy variable for the presence of a state religion comes primarily from Barrett [1982] and Barrett, Kurian, and Johnson [2001]; see the text for discussion. Population numbers (in 1000s) are from World Bank, *World Development Indicators*. The main-religion variable is the share of the population that adheres to the most popular religion; the second-religion variable is the share of the second most popular religion. Main religion is monotheistic if a dummy variable for whether the most popular religion is Jewish, Christian, or Muslim. Main religion is Muslim if a dummy variable for whether the main religion is Muslim. Data on religion adherence are from Barrett, as above. GDP data (1996 dollars) are from Heston, Summers, and Aten [2002]. The dummy variable for a Communist regime is from Kornai [1992] and CIA *World Fact Book*; see the text. Polity IV data for 1965 are from Marshall and Jaggers [2003]. Data on latitude are from the web site: [www.bcca.org/misc/qiblih/latlong\\_oc.html](http://www.bcca.org/misc/qiblih/latlong_oc.html). Prior colonial status is from Barro [1997, Table 3.5]. Legal-origins variables are from La Porta et al. [1998]. The left-out category is socialist legal origin. The regime-change variable is a dummy variable for whether an independent country in 2000 had, since 1900, 1) achieved independence from a former colonial authority; 2) split off as an independent entity from a larger country; or 3) adopted or dropped a Communist regime.

sub-Saharan Africa seem to overclassify people as adhering to Christianity or Islam, as opposed to maintaining dual adherence with an indigenous faith.<sup>16</sup> For this reason, the Barrett data likely overstate the concentrations of religion adherence in 1970 and 2000. As an attempt to correct this problem, we include a dummy variable for sub-Saharan Africa. The three-stage least-squares estimates may also help to correct for measurement error. In some specifications, we add the second-religion variable (the square of the adherence share for a country's second most popular religion).

Another explanatory variable is the presence of a Communist regime.<sup>17</sup> We include contemporaneous and fifteen-year lags of this variable (for 1970 and 1955 in the 1970 equation and for 2000 and 1985 in the 2000 equation).

To measure market size, we use the log of population. Since the Hotelling model implies a nonlinear relation between state religion and market size, we also include the square of the log of population.

We include the log of per capita GDP as an additional determinant of market size. However, as discussed before, the effect of per capita GDP on the demand for religion services is ambiguous. The data on GDP are the purchasing-power adjusted numbers from Heston, Summers, and Aten [2002]. Many countries lack these data—in our sample, 74 countries in 1970 and 40 in 2000. Moreover, the selection of which countries lack GDP data is not random—for example, only 5 of the 35 countries designated as

16. For unweighted averages of 48 sub-Saharan African countries that existed in 2000, the Barrett data show that the fraction of the adhering population professing the Catholic religion rose from 0.06 in 1900 to 0.23 in 2000; the fraction Protestant, other Christian, or Orthodox rose from 0.04 to 0.28; the fraction Muslim increased from 0.20 to 0.30; and the fraction associated with indigenous and other religions fell from 0.69 to 0.16.

17. In 2000 we classified 5 of the 188 countries as having Communist regimes, based on the descriptions of governmental systems in *CIA World Fact Book*. The five are China, Cuba, Laos, North Korea, and Vietnam. In 1970 we used Kornai's list [1992, Table 1.1] to classify 34 of 189 countries plus one-half of Vietnam as having Communist governments. Since our data for Vietnam are not separated into North and South, we entered the Communism dummy for Vietnam in 1970 as one-half, corresponding to the roughly equal breakdown of the population between North and South. Many of the Communist "countries" in 1970 were parts of larger states (republics of the Soviet Union and Yugoslavia) or were Eastern European countries that were heavily influenced by the Soviet Union. Also classified as Communist were China, Congo (Brazzaville), Cuba, Mongolia, North Korea, North Vietnam, and Somalia. South Yemen was also Communist in 1970, but our data for 1970 refer only to non-Communist North Yemen (roughly 80 percent of the combined population of Yemen). Our data for Communism in 1955 also come from Kornai's list, and our data for Communism in 1985 come from *CIA World Fact Book* and individual country sources.

TABLE III  
 LINEAR PROBABILITY MODELS FOR STATE RELIGION IN 1970 AND 2000  
 (COEFFICIENTS SHOWN WITH STANDARD ERRORS IN PARENTHESES)

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	SUR	3SLS	SUR	3SLS	SUR	3SLS
Main religion	0.683** (0.086)	1.007** (0.165)	0.659** (0.111)	1.173** (0.272)	0.683** (0.088)	1.087** (0.174)
adherence squared						
Sub-Saharan Africa	-0.354** (0.072)	-0.178* (0.088)	-0.354** (0.072)	-0.167 (0.091)	-0.354** (0.072)	-0.163 (0.088)
log (population)	0.187** (0.064)	0.161* (0.066)	0.186** (0.064)	0.159* (0.067)	0.187** (0.064)	0.163* (0.067)
log (population) squared	-0.0114** (0.0040)	-0.0098* (0.0041)	-0.0113** (0.0040)	-0.0095* (0.0042)	-0.0114** (0.0040)	-0.0101* (0.0042)
log (per capita GDP)	-0.053* (0.025)	0.015 (0.036)	-0.055* (0.025)	0.033 (0.040)	-0.053* (0.025)	0.031 (0.037)
Communism	-0.354** (0.057)	-0.263** (0.071)	-0.360** (0.059)	-0.215* (0.092)	-0.354** (0.057)	-0.245** (0.072)
Lagged Communism	-0.152* (0.061)	0.005 (0.073)	-0.156* (0.062)	0.038 (0.086)	-0.152* (0.061)	0.023 (0.074)
Second religion adherence squared	—	—	-0.22 (0.63)	1.59 (1.69)	—	—
Main religion is monotheistic	—	—	—	—	-0.001 (0.063)	-0.157* (0.079)
No. observations:						
1970, 2000	189, 188	189, 188	189, 188	189, 188	189, 188	189, 188
R <sup>2</sup> : 1970, 2000	0.40, 0.38	0.37, 0.36	0.40, 0.38	0.36, 0.34	0.40, 0.38	0.36, 0.35

TABLE III  
(CONTINUED)

	(7)	(8)	(9)	(10)	(11)	(12)
Estimation method	SUR	3SLS	SUR	3SLS	SUR	3SLS
Main religion	0.631**	0.992**	0.667**	0.934**	0.650**	0.910**
adherence squared	(0.090)	(0.169)	(0.087)	(0.164)	(0.086)	(0.156)
Sub-Saharan Africa	-0.359**	-0.181*	-0.351**	-0.183*	-0.355**	-0.188*
	(0.072)	(0.088)	(0.072)	(0.086)	(0.071)	(0.085)
log (population)	0.176**	0.157*	0.225**	0.224*	0.215**	0.220*
	(0.064)	(0.067)	(0.082)	(0.090)	(0.082)	(0.089)
log (population)	-0.0109**	-0.0096*	-0.0132**	-0.0129*	-0.0126**	-0.0127**
squared	(0.0039)	(0.0041)	(0.0047)	(0.0051)	(0.0047)	(0.0050)
log (per capita GDP)	-0.045	0.017	-0.046	0.018	-0.037	0.022
	(0.025)	(0.036)	(0.026)	(0.037)	(0.025)	(0.037)
Communism	-0.357**	-0.264**	-0.352**	-0.268**	-0.354**	-0.270**
	(0.056)	(0.071)	(0.056)	(0.067)	(0.056)	(0.066)
Lagged Communism	-0.151*	0.006	-0.174**	-0.016	-0.220**	-0.041
	(0.061)	(0.073)	(0.062)	(0.085)	(0.065)	(0.097)
Main religion is Muslim	0.115*	0.047	—	—	—	—
	(0.059)	(0.072)				
Polity: constraints on executive†	—	—	-0.143	-0.012	—	—
			(0.081)	(0.166)		
Polity: overall polity index†	—	—	—	—	-0.258**	-0.068
					(0.085)	(0.166)
No. observations:						
1970, 2000	189, 188	189, 188	189, 188	189, 188	189, 188	189, 188
R <sup>2</sup> : 1970, 2000	0.40, 0.38	0.37, 0.37	0.41, 0.38	0.39, 0.37	0.42, 0.39	0.40, 0.38

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

† Observations with missing Polity data have the sample mean for the variable entered. A separate dummy variable (not shown) is included for these observations.

Constant terms are included but not shown. The dependent variable is a dummy for the presence of state religion in 1970 or 2000. The estimates weight each country equally. When the estimation method is denoted SUR, the equations are estimated using the seemingly unrelated technique, which allows for different error variances for the two periods and for correlation of the error terms over the periods for each country. When the estimation is denoted 3SLS, the equations are estimated using three-stage least-squares. The endogenous and instrumental variables are described below.

The following explanatory variables are for 1970 in the first equation and 2000 in the second equation: main and second religion squared, log of population, log of real per capita GDP, the dummy variable for a contemporaneous Communist regime, and the dummy variables for whether the main religion is monotheistic or Muslim. Lagged Communism is for 1955 in the 1970 equation and for 1985 in the 2000 equation. The Polity variables (from Polity IV, described in Marshall and Jaggers [2003]) are for 1965. These variables are measured on a (0,1) scale, with 0 denoting least constraints on the executive or least democratic. In column (2), the variables treated as endogenous are main-religion squared and log of per capita GDP. Instruments are main-religion squared in 1900, a dummy variable for landlocked status, and absolute degrees latitude. In column (4), second-religion squared is treated as endogenous, and second-religion squared in 1900 is added as an instrument. In columns (10) and (12), the Polity variables are treated as endogenous. The additional instruments are four dummy variables for legal origins (British, French, German, and Scandinavian) and four dummy variables for colonial history (former colony of Britain, France, Spain, or Portugal, and other rulers). The legal-origins variables are from La Porta et al. [1998].

Communist in 1970 have data for 1970. Since the idea is to include an indicator of standard of living, rather than per capita GDP, per se, we used information on life expectancy at birth and other variables to construct proxies for the standard of living in

countries that lack GDP data. Specifically, we use fitted values computed from regressions of the log of per capita GDP on the contemporaneous log of life expectancy at birth, the absolute value of degrees latitude, the dummy for landlocked status, and dummy variables for Communism. The  $R^2$  values for these regressions are reasonably high—0.70 in 1970 and 0.80 in 2000—and the fitted values should serve adequately as proxies for the standard of living.<sup>18</sup>

From Polity IV [Marshall and Jaggers 2003] we used the indicator for constraints on the chief executive. The original scale from 1 to 7 was converted to 0 to 1, with 1 signifying the most constraints. We also used the overall polity index from Polity IV—the difference between the measures of democracy and autocracy. The original scale from  $-10$  to  $+10$  was converted to 0 to 1, with 1 signifying the most democracy or least autocracy.

### *III.B. Linear Probability Models*

The baseline specification in Table III, columns (1) and (2), excludes political variables, except for Communism. For the SUR estimation in column (1), the main-religion variable has a statistically significant, positive coefficient. The point estimate of 0.68 means that a one-standard deviation increase in the square of the main-religion adherence share (by 0.28 in 2000, see Table II) raises the probability of state religion by 0.19. This result supports the hypothesis that greater concentration of adherence in the main religion raises the probability of state religion. However, this interpretation assumes that the coefficient reveals the influence from religion concentration to state religion, rather than the reverse. In the three-stage least-squares estimates, we treat the main-religion variable as endogenous.

The coefficient on the dummy variable for sub-Saharan Africa,  $-0.35$  ( $s.e. = 0.07$ ), is significantly negative. Thus, for given concentration in the main religion, presence in sub-Saharan Africa is associated with a lower probability of state religion. As mentioned, our interpretation is that the main-religion variable, based on the reported religion adherence numbers, systematically overstates the share of the main religion in sub-Saharan African countries.

18. Life expectancy has the most explanatory power in these regressions (positive). However, absolute degrees latitude is also important (positive), as is Communism in 1985 in the 2000 equation (negative).

For market size, the log of population has statistically significant effects on the probability of state religion. The effects are nonlinear in the way predicted by the Hotelling model: in Table III, column (1), the coefficient on the log of population is positive, 0.187 (*s.e.* = 0.064) and that on the square is negative,  $-0.0114$  (0.0040). These coefficients imply that, for very small countries, an increase in population raises the probability of state religion. However, when the population exceeds 3.6 million, the point estimates imply that an increase in population reduces the likelihood of state religion. In 2000 the median population was 6.6 million, and 62 of the 188 countries had populations below 3.6 million. In 1970 the median was 4.2 million, with 88 of 189 below 3.6 million. Thus, a majority of countries—and a much larger majority of the world's population—are in the range where higher population makes state religion less likely.

For the log of per capita GDP, the predicted effects on state religion were ambiguous because the impact of per capita GDP on the scale of the religion market was unclear. In Table III, column (1), the coefficient on the log of per capita GDP is significantly negative:  $-0.053$  (*s.e.* = 0.025). However, this result does not hold up in our instrumental estimation.

The contemporaneous presence of a Communist government has a statistically significant, negative effect,  $-0.35$  (*s.e.* = 0.06). Our sample has, in 1970, 34 of the 189 countries, plus one-half of Vietnam, classified Communist. In 2000, 5 of the 188 countries are designated Communist. As mentioned, the only one of these countries that had a state religion contemporaneously with Communism was Somalia in 1970.<sup>19</sup>

We also estimated lagged effects of Communism by entering a dummy variable for 1955 in the 1970 equation and for 1985 in the 2000 equation.<sup>20</sup> The results show a significantly negative coefficient,  $-0.15$  (*s.e.* = 0.06), about half the magnitude of the contemporaneous effect. In our sample, the main distinctions between contemporaneous and lagged Communism come from the 28 countries in 2000 that were no longer Communist because of the collapses in the 1990s of the Soviet Union and Yugoslavia.

19. The autocrat Siad Barre, who came to power in Somalia in 1969, argued that his brand of socialism was consistent with Islam. Thus, initially, there were no changes in the official status of Islam. However, in the pursuit of "scientific socialism" in the 1970s, Siad Barre moved increasingly to weaken the political influence of religious leaders.

20. The 1985 value of the Communism dummy for unified Germany is set to 0.20, the population share of the eastern parts.

Thus, the estimated coefficient on the lagged Communism variable suggests that the negative influence of Communism on state religion has about 50 percent persistence after ten years.<sup>21</sup>

The 3SLS estimates in Table III, column (2), treat the main-religion variable and the log of per capita GDP as endogenous. One instrument is a long lag of the main-religion variable—the value applying in 1900. We would prefer to use instruments related to the main-religion variable other than long lags but have not come up with any.<sup>22</sup> The instrument list also includes the two geography measures mentioned before—the absolute value of degrees latitude and the dummy variable for landlocked status.

We can examine first-stage regressions to gauge the explanatory power of the instruments for the endogenous variables. For the main-religion variables in 2000 and 1970, the  $R^2$  values for the first-stage equations are 0.4–0.5. The most important explanatory variable in these regressions is the main-religion variable for 1900, which has significantly positive coefficients: 0.59 (*s.e.* = 0.07) in the 1970 equation and 0.52 (0.07) in the 2000 equation. The other important explanatory variable is the dummy variable for sub-Saharan Africa, which is significantly negative.

For the log of per capita GDP in 1970 and 2000, the  $R^2$  values in the first-stage regressions are 0.5–0.7. The significant variables are the absolute value of degrees latitude (positive), the dummy for sub-Saharan Africa (negative), the dummy for landlocked status (negative), and the dummy for lagged Communism (negative).

Comparing columns (1) and (2) of Table III, one difference is that the point estimate of the coefficient on the main-religion

21. These results hold constant the adherence share of the main religion, but another channel for persisting influence of Communism on state religion involves religion adherence. Communism tends particularly to shift persons away from adherence to any religion and toward nonreligion. For example, Russia had an Orthodox state religion in 1900 when the adherence shares were 76 percent in the main religion—Orthodox—and 0 percent nonreligion. Under Communism, these numbers went by 1970 to 28 percent Orthodox and 52 percent nonreligion. Then, after the fall of Communism, the Orthodox share recovered by 2000 to 50 percent, and the nonreligion share fell to 33 percent. Thus, the effect of Communism on religion adherence, particularly nonreligion, seems to die out gradually and may not be permanent. We are presently studying the dynamic effects of Communism on religion adherence.

22. One possibility would be the composition of cumulated immigration. However, we lack the data to implement this idea.

variable is higher under 3SLS than under SUR.<sup>23</sup> This result may be surprising because, if there were a positive reverse effect of state religion on adherence to the main religion, the SUR estimate would tend to be biased upward. The likely explanation is that the instrumentation corrects for measurement error, which is important in the data on religion adherence. This error tends to bias the SUR coefficient on the main-religion variable toward zero. This interpretation may also explain why the 3SLS results show a coefficient of smaller magnitude for the sub-Saharan African dummy. In the SUR estimation, the African dummy likely serves as a proxy (in a negative direction) for true religion concentration.

The coefficient on the log of per capita GDP was negative and marginally significant in the SUR results (Table III, column (1)) but is insignificantly positive in the 3SLS estimates (column (2)).<sup>24</sup> The likely explanation is that the coefficient of the GDP variable in the SUR estimation is biased downward because of a negative effect of state religion on per capita GDP. If we enter the state-religion dummy variable for 1900 into the first-stage regressions for the log of per capita GDP, the coefficients are  $-0.26$  (*s.e.* = 0.09) in the 1970 equation and  $-0.14$  (0.10) in the 2000 equation.

The coefficient of lagged Communism was significantly positive in the SUR estimation (Table III, column (1)) but is essentially zero in the 3SLS results (column (2)). Note that current and lagged Communism are included in the instrument lists. Therefore, the different results reflect the interaction between lagged Communism and the instrumentation for the endogenous vari-

23. Our main-religion variable uses the concept that emerges naturally from the underlying theory—the share of adherents to the most popular religion in total population. Arguably, a less endogenous variable is the share of adherents to the most popular religion in the population that adheres to some religion, that is, after excluding the fraction designated as nonreligion. If we replace the main-religion variable in the SUR estimates (Table III, column (1)) by this alternative concept, we get a somewhat lower coefficient on the main-religion variable (0.607, *s.e.* = 0.085) and a slightly poorer fit ( $R^2$  values of 0.38 in 1970 and 0.37 in 2000). A better procedure is to modify the three-stage least-squares estimation (Table III, column (2)) to retain the original main-religion variable but to replace the associated instrument with the main-religion variable for 1900 calculated from the share in the population that adheres to some religion. This procedure yields results that are very close to those reported in Table III, column (2).

24. One concern is that, over long periods, landlocked status is endogenous because it reflects changes in country borders. For example, Bolivia currently lacks access to the sea because it lost its coastline in a war with Chile in the late 1800s. Moreover, this military defeat might be related to Bolivia's potential per capita GDP. The results change little if we drop the landlocked dummy variable from the instrument lists.

ables, particularly the log of per capita GDP. Most importantly, the instrumental estimates indicate that a history of Communism may have little remaining effect on the probability of state religion after 10–15 years.

Columns (3) and (4) of Table III show that the second-religion variable has a coefficient that is insignificantly different from zero, whereas the Hotelling model predicted a negative effect. The problem is the large standard errors for the second-religion coefficients. For given concentration in the main religion, there is not enough variation in the share of the second most popular religion to tell whether this feature of religion concentration matters for the probability of state religion.

Columns (5)–(8) of Table III check whether the type of main religion—monotheistic (Judeo-Christian) or, more specifically, Muslim—matters for the probability of state religion. The coefficient of the dummy variable for monotheism as the main religion is essentially zero in the SUR estimation (column (5)) and marginally significant with the wrong sign (relative to Stark's hypothesis) in the 3SLS results. The coefficient of the dummy variable for Muslim as the main religion is marginally significant with a positive sign in the SUR results but insignificantly different from zero in the 3SLS estimation. Our conclusion is that state religion depends primarily on the extent of concentration in the main religion, not the identity of the main religion.

Columns (9)–(12) of Table III add two political structure indicators from Polity IV. In column (9) the estimated coefficient for constraints on the chief executive in 1965 is negative but not statistically significant. In column (11), the estimated coefficient for the overall polity index in 1965 is significantly negative.<sup>25</sup> However, the coefficients on neither of the political variables are statistically significant when we treat these indicators as endogenous and instrument with an array of variables for legal origins and colonial heritage (columns (10) and (12)). Thus, a reasonable interpretation of the negative coefficients in columns (9) and (11) is that more liberal political regimes (greater constraints on the executive or a higher polity score) correlate with the absence of

25. Mulligan, Gil, and Sala-i-Martin [2004, Table III] report a statistically significant negative relation between a measure of regulation of religion and the Freedom-House indicators for electoral rights/civil liberties. However, their results are hard to relate to ours because their measure of religious regulation is whether a state religion exists (as designated by Barrett) or whether a country is indicated by Barrett to have lots of atheists.

state religion but do not isolate causation from exogenous political features to the probability of state religion.

As discussed before, our analysis treats Muslim as a single religion. We broke down Muslim adherence into three subtypes—Sunni, Shia, and other—using rough information on the composition of Muslim adherence around 2000 (see footnote 14). Since we lacked data for 1970, we assumed that the breakdown among the three types in 1970 was the same as in 2000. Among the 48 countries in 2000 for which Muslim was the most popular religion, 31 had at least 90 percent estimated adherence to one type, mostly Sunni. Thus, the new treatment significantly affects about one-third of the Muslim countries. The countries in which this treatment lowers the adherence share of the most popular religion by 25 percent or more were Albania, Azerbaijan, Bahrain, Iraq, Kuwait, Oman, and Yemen.<sup>26</sup>

We calculated a revised main-religion variable that treats the three Muslim subtypes as distinct religions. If we add this variable to the SUR system in Table III, column (1), we get that the coefficient on the original main-religion variable is 0.82 (*s.e.* = 0.27) and that on the new variable is  $-0.15$  (0.28). Hence, the model clearly prefers the original specification, where the pressure for state religion reflects overall Muslim adherence. This conclusion is particularly important for Iraq, because the Muslim share of the population is 0.96, but the Shia share is only 0.61.

We carried out this exercise in reverse for our four Christian groups: Catholic, Protestant, other Christian, and Orthodox. We recalculated the main-religion variable with these four denominations treated as a single religion. If we add this variable to the SUR system in Table III, column (1), we get that the coefficient on the original variable is 0.83 (*s.e.* = 0.11) and that on the new variable is  $-0.28$  (0.13). Hence, these results indicate that the pressure for state religion comes from concentration within one of the Christian religions and not from Christian representation overall.<sup>27</sup>

We mentioned that some of Barrett's designations of state religion are controversial. To get some idea of the sensitivity of

26. For Lebanon, the identity of the main religion shifts from Muslim to Catholic, but the magnitude of the adherence share of the main religion changes little.

27. In fact, the significantly negative coefficient on the new variable suggests that, if the most popular religion is one of the Christian faiths, a state religion is particularly unlikely when a second Christian faith is also highly represented.

the results to these measurement concerns, we focused on three difficult cases: Barrett's classifications of Spain, Portugal, and Italy as having Catholic state religions in 2000. For Spain, movements away from the official status of the Catholic Church occurred after President Franco's death in 1975—in particular, a 1978 referendum ratified a new constitution in which the state no longer was deemed to have an official religion. Barrett argues, however, that the situation remained one in which the Catholic Church had a special relationship with the government—for example, the constitution says: "The public authorities will keep in mind the religious beliefs of the Spanish society and will maintain cooperation with the Catholic Church and other confessions." Similarly, in Portugal, movements away from the monopoly status of the Catholic Church occurred after the death of President Salazar in 1969. The monopoly position of the Church was weakened by the Law of Religious Liberty in 1971 and, even more so, by actions taken by the left-wing government that came to power with the coup in 1974. However, Barrett observes that the prominent legal position of the Catholic Church was only modified, not eliminated. Again in Italy, the official status of the Catholic Church was weakened in the 1970s by modifications of the concordant that had been in place since 1929. Barrett argues, however, that the official position of the Catholic Church remained preeminent.

To see whether the results are sensitive to these classifications, we reran the systems from Table III, columns (1) and (2), with the designations for Spain, Portugal, and Italy changed to no state religion in 2000. This change has little effect on the results—the main difference is that the coefficient on the log of per capita GDP in the SUR estimation becomes larger in magnitude:  $-0.072$  (*s.e.* =  $0.025$ ). However, this coefficient is still essentially zero,  $-0.010$  ( $0.037$ ), when we use instrumental variables.

We also noted that the Fox and Sandler [2004] data can be used to form a different measure of state religion in 2000.<sup>28</sup> We redid the estimation of Table III, columns (1) and (2), with the Fox and Sandler data used for 2000 (and the Barrett data used in 1970 and in 2000 for countries not covered by Fox and Sandler). The results are similar to those found before. The main changes

28. Fox and Sandler classify Italy as not having a state religion but Spain and Portugal as having unofficial state religions in 2000. Thus, our implementation of the Fox and Sandler data classifies Spain and Portugal, but not Italy, as having state religions in 2000.

are that the coefficients on the sub-Saharan African and lagged Communism variables are smaller in magnitude: for the results that parallel column (1), the new estimates are, respectively,  $-0.28$  (*s.e.* = 0.07) and  $-0.10$  (0.07). Overall, our inference is that reasonable modifications of Barrett's classifications of state religions are unlikely to change the main findings.

### III.C. Probit Estimates of Probability Models

Table IV shows probit estimates of systems that parallel the specifications in Table III, columns (1) and (2). The coefficients in Table IV, column (1), come from an ordinary probit and those in column (3) come from a probit with instrumental variables.

TABLE IV  
PROBIT MODEL FOR STATE RELIGION IN 1970 AND 2000  
(COEFFICIENTS SHOWN WITH STANDARD ERRORS IN PARENTHESES)

Independent variable	Ordinary probit		Probit with I.V.	
	(1) Coefficient	(2) Marginal effect on probability	(3) Coefficient	(4) Marginal effect on probability
Main religion adherence squared	2.63** (0.38)	0.631	3.51** (0.70)	0.752
Sub-Saharan Africa	-1.18** (0.30)	-0.291	-0.79** (0.41)	-0.176
log (population)	0.79** (0.28)	0.189	0.78** (0.27)	0.166
log (population) squared	-0.051** (0.018)	-0.0123	-0.050** (0.017)	-0.0107
log (per capita GDP)	-0.21 (0.11)	-0.051	-0.10 (0.22)	-0.022
Communism	-1.88** (0.54)	-0.362	-1.57** (0.52)	-0.306
Lagged Communism	-0.20 (0.28)	-0.049	-0.05 (0.30)	-0.010
No. observations: 1970, 2000	189, 188		189, 188	

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

Constant terms are included but not shown. The specification in column 1 corresponds to that in Table III, column 1; the specification in column 3 corresponds to Table III, column (2). The coefficient standard errors allow for correlation of the error terms over time for each country. Column (1) is an ordinary probit. Column (3) is a probit with instrumental variables. The endogenous variables are the main-religion variable and the log of per capita GDP. The instruments are those used in Table III, column (2). For the continuous variables, columns (2) and (4) show the sample mean of the effect on the probability of state religion from a marginal change in each explanatory variable. For the dummy variables, columns (2) and (4) show the sample mean of the effect on the probability of state religion from a shift from zero to one in each explanatory variable.

In terms of statistical significance, the main difference between the ordinary probit in Table IV, column (1), and the linear probability model in Table III, column (1), is that the coefficient on lagged Communism is not statistically significant in the probit. For the probit with instrumental variables in Table IV, column (3), the pattern of statistical significance is the same as that for the linear probability model in Table III, column (2).

Much easier to interpret than the probit coefficients in Table IV are the implied marginal effects of each explanatory variable on the probability of state religion. The values in columns (2) and (4) are the sample averages of the marginal effects for the continuous variables—the main-religion variable, the log of population and its square, and the log of per capita GDP. For the dummy variables, the values are the sample average effects from a change in each dummy variable from 0 to 1. Most of the marginal effects shown in columns (2) and (4) are close to the corresponding coefficients of the linear probability models in columns (1) and (2) of Table III. Hence, the coefficients in the linear probability models correspond well to the average marginal effect of each explanatory variable in the probit specifications.

#### *III.D. Adjustment Costs for Institutions*

The theory that underlay our empirical analysis suggested a number of variables that influence the probability of state religion. We can think of these variables as determining the likely long-run status of state religion in a country. In the short run, however, there is inertia in changing state religion, just as there is in modifying other political and legal institutions. Even for a benevolent government, it would not be optimal to change institutional procedures and legal rules each time there is a shift in an exogenous variable that affects the procedures and rules that would be optimal if one were erecting institutions from scratch. Therefore, we expect that institutions will not change in most years but will adjust in a discrete manner on rare occasions. In our context, the history of state religion has an important effect on the current status of state religion over at least a 100-year horizon.

Although institutional changes are costly, a change in any one feature—such as the implementation or removal of a state religion—is easier when other regime changes are already taking place. For example, for a former colony, independence entails the creation of a new form of government, which typically involves

the enactment of a constitution and other aspects of a legal system. At such times, the government can also select the status of state religion that is optimal without paying a large adjustment cost. Similarly, when a large country breaks apart—such as the disintegrations of the Ottoman Empire, the Soviet Union, and Yugoslavia—the newly independent states can readily change the legal treatment of religion.

To capture this force, we classified countries in 1970 and 2000 as to whether they had experienced at least one major regime change since 1900. The question of what constitutes a major regime change is subjective. To enhance our objectivity, we labeled as a major regime change only an occurrence of one of the following three events: a transition from colonial status to independence, a split-off of a new state from a larger country, and the adoption or elimination of Communism. Based on these criteria, our classification for 1970 has 113 of 189 countries or 60 percent with at least one major regime change since 1900. In 2000, 136 of 188 countries or 72 percent had experienced such a change. Most of the classifications of major regime change are straightforward but some are not. For example, we do not label as major regime changes war-related occupations of countries and the associated postwar shifts in governing institutions. Cases of this type include Japan, South Korea, and Turkey, each of which we classify as having no major regime change since 1900. We explore later how our results change if we shift the classifications for these cases. In any event, we treat major regime change as exogenous with respect to the determination of state religion.

We use an empirical specification that allows for persistence of state religion over time but that distinguishes countries with at least one major regime change from those without such a change. Let  $S_t$  be a zero-one dummy variable for the presence of state religion for a country in year  $t$ . Let  $R_t$  be a (0,1) dummy variable for whether the country has experienced at least one major regime change since 1900. In a linear form, the specification of the deterministic part of our dynamic probability model is then

$$(2) \quad S_t = S_{1900} \cdot [\lambda_1 \cdot (1 - R_t) + \lambda_2 \cdot R_t] \\ + [1 - \lambda_1 \cdot (1 - R_t) - \lambda_2 \cdot R_t] \cdot \beta Z_t + \text{constant},$$

where  $S_{1900}$  is a dummy variable for the presence of state religion in 1900, the coefficients  $\lambda_1$  and  $\lambda_2$  ( $0 < \lambda_1 < 1$  and  $0 < \lambda_2 < 1$ ) determine the persistence over time in the probability of state

religion for countries without and with regime changes, respectively ( $R_t = 0$  or  $R_t = 1$ ), and the coefficients  $\beta$  determine the long-run influence of the explanatory variables,  $Z_t$ , considered in Table III.

The coefficients  $\lambda_1$  and  $\lambda_2$  would differ depending on whether  $S_t$  is observed in 1970 or 2000, the two years that we study. Since 70 years have elapsed since 1900 in 1970 and 100 years in 2000, we anticipate that  $\lambda_1$  and  $\lambda_2$  would each be higher in 1970 than in 2000. That is, more of the persisting influence from the status of state religion in 1900 would remain in 1970. We estimate one pair of coefficients,  $(\lambda_1, \lambda_2)$ , for 1970 and another pair for 2000. The other coefficients, given by  $\beta$  in equation (2), are the same for the two years, because they represent the long-run effects of the variables  $Z_t$  on the probability of state religion.

The results for linear probability models are in Table V. We use the baseline specification for the long-run influences from Table III, columns (1) and (2). Column (1) of Table V estimates by the seemingly unrelated (SUR) technique, and column (2) uses three-stage least-squares (3SLS). The main new results concern the coefficients on the state-religion variable for 1900. These coefficients differ for 1970 and 2000 and also differ depending on whether a change in political regime occurred since 1900. These coefficients provide information about the inertia in institutions, as represented here by state religion.

Given the other explanatory variables, the existence of a state religion in 1900 matters a great deal for the probability of state religion in 1970 and 2000. For a country that has experienced no major regime change since 1900, the SUR coefficients for state religion in 1900 are 0.914 (*s.e.* = 0.053) for 1970 and 0.723 (0.086) for 2000. These coefficients are each statistically significantly different from zero with *p*-values less than 0.01.<sup>29</sup> The coefficient in the 1970 equation is higher than that for 2000 with a *p*-value for the difference of 0.008.<sup>30</sup> This result signifies that less of the effect from the initial condition in 1900 would have decayed by 1970 than by 2000.

For a country with at least one major regime change, the SUR coefficients for state religion in 1900 are 0.294 (*s.e.* =

29. Using a one-sided Wald test, each coefficient is also significantly less than one (*p*-value of 0.055 for 1970 and 0.001 for 2000).

30. This result applies for a Wald test of equal coefficients against the alternative hypothesis that the coefficient for 1970 is larger than that for 2000, that is, a one-sided test.

TABLE V  
 DYNAMIC VERSIONS OF LINEAR PROBABILITY MODELS  
 (COEFFICIENTS SHOWN WITH STANDARD ERRORS IN PARENTHESES)

Independent variable	(1) SUR estimation	(2) 3SLS estimation
State religion in 1900, no regime change		
Coefficient for 1970:	0.914 (0.053)**	0.948 (0.063)**
Coefficient for 2000:	0.723 (0.086)**	0.690 (0.105)**
State religion in 1900, regime change		
Coefficient for 1970:	0.294 (0.049)**	0.242 (0.055)**
Coefficient for 2000:	0.316 (0.054)**	0.289 (0.064)**
Main religion adherence squared	0.841 (0.113)**	1.257 (0.201)**
Sub-Saharan Africa	-0.571 (0.084)**	-0.408 (0.095)**
log (population)	0.249 (0.086)**	0.167 (0.089)
log (population) squared	-0.0144 (0.0053)**	-0.0097 (0.0054)
log (per capita GDP)	-0.067 (0.036)	-0.055 (0.047)
Communism	-0.508 (0.083)**	-0.381 (0.089)**
Lagged Communism	-0.212 (0.089)*	-0.107 (0.100)
No. observations: 1970, 2000	189, 188	189, 188
$R^2$ : 1970, 2000	0.73, 0.56	0.71, 0.54

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

The systems take the form of equation (2) in the text. Coefficients of state religion in 1900 differ for 1970 and 2000 and also depending on whether a major change in political regime occurred since 1900. (See the notes to Table II and the text for a discussion of the regime-change variable.) Column (1) is estimated by the SUR technique, analogous to Table III, column (1). Column (2) is estimated by three-stage least-squares, analogous to Table III, column (2). The endogenous variables are the main-religion variable and the log of per capita GDP. The instruments are those described in the notes to Table III, plus the state-religion variable in 1900, the regime-change variable, and interactions between the regime-change variable and the exogenous variables.

0.049) for 1970 and 0.316 (0.054) for 2000. These coefficients are statistically significantly different from zero with  $p$ -values less than 0.01.<sup>31</sup> Each coefficient is significantly lower, with  $p$ -values less than 0.01, than its counterpart for countries with no major regime change (point estimates of 0.914 and 0.723, respectively). Thus, as expected, the status of state religion in 1900 is substantially more important for countries with no major regime change than for those with such a change. Among countries with regime changes, we would have expected a smaller coefficient for 2000, but the two estimated coefficients (0.294 and 0.316) do not differ significantly from each other. This outcome may signify that, for

31. The coefficients are also significantly less than one.

countries with regime changes, the most important influence on the probability of state religion is the fact of such a change (interacted with the other explanatory variables), rather than the time elapsed since 1900. The results for the coefficients on state religion in 1900 from the 3SLS estimation in Table V, column (2), are similar.

We should stress that the results imply that countries with no regime change are more likely than those with a change to retain the status of state religion that existed in 1900. The results—and the underlying model—do not imply that countries with regime changes are more or less likely to have state religion. If we add the dummy variable for regime change directly into the equations in Table V, we get estimated coefficients that differ insignificantly from zero—0.08 (*s.e.* = 0.21) with SUR and 0.06 (0.18) with 3SLS—and the other coefficients change negligibly.

For countries with no major regime change, we can view the estimated coefficients on state religion in 1900 as gauging the rate at which the historical presence of state religion becomes unimportant for the current environment. The point estimates of 0.914 for 1970 and 0.723 for 2000 (Table V, column (1)) imply decay rates of 0.13 percent and 0.32 percent per year, respectively. These results can be extrapolated to the long-term evolution of state religion. If we assume a decay rate of 0.2 percent per year, the probability of observing state religion in 2000 would depend on the presence of state religion at the time of the Reformation—say, 470 years earlier—with a coefficient of 0.39. Thus, the establishments around 1530 of the Lutheran Church in Scandinavia and the Anglican Church in England would still matter substantially for the likely character of current state religion. An even earlier event—the Great Schism between the western (Rome) and eastern (Constantinople) branches of the Catholic Church in 1054—would matter in 2000 with a coefficient of 0.15.

One caveat is that the changes during the Reformation and the Great Schism refer to shifts in the forms of state religion, not to movements from state religion to no state religion. It may be that the probability of eliminating state religion entirely was close to zero for a long time in the years before the twentieth century. Another point is that the calculations apply only to countries that do not experience major regime changes. If changes occur to the basic form of government (which could itself be modeled probabilistically), the influence from the presence of state religion in the long ago past would be negligible.

We mentioned that our classification of regime change was debatable in some cases—specifically, we were uncertain about the labeling of Japan, South Korea, and Turkey as having experienced no major regime change since 1900. If we change the classifications of these three cases to having regime changes by 1970, our fitted model improves. For example, in the SUR specification in Table V, column (1), the  $R^2$  values rise from 0.73 to 0.76 in the 1970 equation and from 0.56 to 0.58 in the 2000 equation. The fits improve because the three countries at issue had state religions in 1900 but dropped them by 1970. Thus, classifying these countries as having experienced a regime change makes it easier to fit the transitions in state religion. Otherwise, the change in status for these three cases does not materially affect the results.

#### IV. SUMMARY OF MAJOR FINDINGS

We used a Hotelling-style model of spatial competition to assess the probability of a monopoly outcome in the religion market. In this model, we can assess how changes in exogenous variables affect the likelihood of monopoly. We argued that these influences carry over in a political setting to a government's decision on whether to establish a state religion.

The empirical analysis examined the presence or absence of state religion in 188 countries in 1970 and 2000. Consistent with the theory, an increase in the fraction of the population that adheres to a country's main religion raises the probability of state religion. This relation does not depend much on the identity of the main religion, for example, whether it is monotheistic or, more specifically, Muslim. Instrumental estimates, using adherence to the main religion in 1900 as an instrument, suggest that the relation between religion concentration and state religion reflects causation from concentration to state religion, rather than the reverse.

Presence in sub-Saharan Africa has a negative effect on the probability of a state religion. Our interpretation is that the standard data on religion adherence for sub-Saharan Africa understate dual adherence to indigenous faiths and, therefore, overstate the adherence rate for the main religion.

Communism has a strong negative effect on the probability of state religion. Our sample contains only one example (Somalia in 1970) with state religion in the usual sense. The negative influ-

ence from past Communism on state religion may have little impact after 10–15 years.

The theory and empirical results imply that market size, gauged by population, has a nonlinear effect on the probability of state religion. For very small countries, an increase in population raises the probability of state religion. However, when the population exceeds 3–4 million, an increase in population reduces the likelihood of state religion.

For per capita GDP the predicted effect on state religion is ambiguous because the impact of standard of living on the demand for religion services is unclear. Consistent with this ambiguity, our instrumental estimation does not find significant effects of per capita GDP on the probability of state religion.

In a setting of costly adjustment for institutions, the probability of state religion in 1970 and 2000 depends substantially on the status in 1900. Dynamic estimates show that, for given religion concentration and other explanatory variables, a state religion is more likely to exist in 1970 or 2000 if it existed in 1900. This inertia is much stronger for countries that experienced no major change in political regime than for those that experienced such a change. For countries with no major regime change, the rate of decay is slow enough so that religious institutions from the distant past—such as at the time of the Reformation in the 1500s—matter a great deal for the shape of present day institutions.

Our results about regime change relate to the two historical events highlighted at the outset. The Swedish King Gustaf Vasa in 1527 and the English King Henry VIII in 1534 introduced forms of Protestantism as state religions in place of Roman Catholicism. Vasa acted just after a major regime change associated with separation from Denmark, following a period of expensive and bloody warfare through 1520. Henry VIII made his change in state religion at a turbulent time (through 1542) in which England was changing its relations with Wales, Ireland, and Scotland, implementing English as the official language, and instituting a uniform bureaucracy. Thus, these events support the general thesis that changes in state religion tend to occur at times of major changes in political regimes. However, Vasa and Henry VIII both retained state religions—they just changed the forms from one Christian type to another.

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