

Religious Market Competition in a Richer World

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Economic growth has not led to a decline in religion despite past predictions that it would. Using a formal model of religious competition, I show how economic growth produces counteracting effects on religious activity in an open religious market, and that it has little effect in a religious market that is already secularized due to regulations that prohibit religious competition or in a highly religious market with regulations that inhibit secular activities. Theories predicting the decline of religion due to rising opportunity costs of religious demand and supply ignore countervailing influences.

[T]he opinion is everywhere gaining ground that religion is a mere survival from a primitive . . . age, and its extinction only a matter of time. (Crawley 1905)

I think what I and most other sociologists of religion wrote in the 1960s about secularization was a mistake. Our understanding was that secularization and modernity go hand in hand. . . . It wasn't a crazy theory. There was some evidence for it. But I think it's basically wrong. Most of the world today is certainly not secular. It's very religious. (Berger 1997)¹

INTRODUCTION

Intellectuals and social scientists have predicted the demise of religion since the early 1700s.² The basic reasoning, termed the secularization hypothesis, is that the economic development, increasing education levels and higher urbanization associated with modernization lead to a decrease in the demand for religion. This hypothesis, however, has been severely challenged by mounting evidence on religious participation and beliefs in various countries. Evangelical Christianity on the rise in the United States, Islamic fundamentalism spreading in Africa and Asia, and increased religious participation in Eastern Europe after the fall of the USSR all attest to the continued vitality of religion (Iannaccone 1998). Yet, the debate continues (Berger 1999; Bruce 1992). Some researchers want the secularization hypothesis to 'rest in peace' (Stark 1999), while others amend secularization theory in light of new evidence (Bruce 2002).

This paper examines the impact on religion of one aspect of modernization: economic growth. According to Bruce (2002: 25), a secularization theory proponent, 'The more pleasant this life, the harder it is to concentrate on the next. The more satisfying being human, the harder to be mindful of God'. Economists would phrase the same idea differently: an increase in wages due to economic growth increases the opportunity cost of religious participation, thereby leading individuals to switch from religious activities to secular activities (Iannaccone 1998). However, this demand side logic ignores other aspects of the religious market that counter this dynamic. For example, economic growth can decrease the cost of supplying religious services thereby increasing religious supply; a denomination, like other organizations, can change formal doctrines and policies, political stances or behavioural codes to partially accommodate changes in demand (Clark 1956); and, as denominations compete for 'clientele' in the religious market, forces may compel them to cater to various segments of the religious market, thus increasing

religious pluralism (Finke and Stark 1992). Understanding the impact of economic growth on religion thus requires an examination of the various ways it affects both the demand and supply sides of the religious market.

To examine how economic growth impacts religious market outcomes, this paper presents a game theoretic study of religious competition that focuses on a denomination's degree of 'tension' with its surrounding environment as its key characteristic (Iannaccone 1994; Johnson 1963). Low tension denominations require little from their adherents, while high tension denominations have strict requirements. As done by Barros and Garoupa (2002), Montgomery (2003) and McBride (forthcoming), I model religious competition as a Hotelling location game in which individuals' ideal strictness levels are distributed on the unit interval. After denominations locate on the unit interval by choosing strictness levels, each individual chooses to affiliate with whichever denomination is closest to her ideal strictness. A religious equilibrium is a profile of denomination strictness levels and membership sizes in which no religious consumer or producer has an incentive to change behaviour.

How does economic growth affect religious participation? How does it affect religious pluralism? This paper examines the 'comparative statics' of the equilibria as parameters associated with economic growth, which in this paper occurs exogenously, change in various ways. I find that economic growth can produce counteracting influences on religiosity in an open religious market. As predicted by secularization thinkers, an increase in the return to secular activities (e.g. higher wages) shifts religious demand to favour less strict religions. However, denominations can adjust their strictness levels to maintain affiliation rates. Moreover, an increase in wage inequality can increase religious pluralism – even if the average wage increases – because there may be a larger number of individuals demanding high strictness. On the supply side, if economic growth increases the suppliers' opportunity cost of providing religious goods, then there will be a decline in pluralism as denominations exit yet if economic growth also improves the technology of providing religious benefits, then religious pluralism increases. Thus, whether economic growth reduces religious participation or pluralism in an open religious market will depend on the overall aggregation of many factors, and religious demise is not an automatic prediction.

The analysis also shows how the religious market structure matters. If regulations prohibit the entry of new religious groups (i.e. religious substitutes), a monopoly denomination's only competition arises from individuals' option to not affiliate, and it will lower its strictness to cater to those individuals considering non-affiliation. The result is a secularized monopoly religion, as claimed by religious economies proponents. Economic growth does not affect the nature of this competition, and so it has little impact on the monopoly's behaviour. However, regulations can also inhibit the availability of secular substitutes to religion, thereby maintaining high demand for religion. Such regulations, combined with those that prohibit religious entry, can yield high participation for religious monopolies even in the face of possible negative effects of economic growth on religion. These results exhibit elements of both secularization theory and religious economies theory. As in secularization theory, regulations that inhibit secular substitutes foster religious monopolies with high religiosity. As in the religious economies theory, regulations that inhibit religious entry but not secular substitutes foster secularized religion.

These findings complement a growing literature in economics and other social sciences on the theory of religion.³ The economics literature dates to Adam Smith, who first postulated that clergy act in their self-interest, that market competition constrains

denominations and that religious market regulations affect the quality of religious services (Anderson 1988). Modern treatments in economics can be grouped into three broad categories: research on individual or household religious behaviour, research on religious groups and research on religious economies. My paper belongs in the third category and is most closely related to three papers that model religious competition as a Hotelling location game. Barros and Garoupa (2002) examine religious competition in monopoly and duopoly religious markets, while Montgomery (2003) and McBride (forthcoming) examine the relationship between religious pluralism and religious participation. This paper differs both in the details of the model and in focusing on the particular issue of how economic growth affects religious competition. There is also a growing empirical literature on religious markets (e.g. Barro and McCleary 2003a, 2003b, 2006; Chen 2007; Gruber 2005; Gruber and Hungerman 2008).

The relevant non-economics literature is much larger.⁴ Proponents of secularization thinking have presented several mechanisms by which secularization occurs. Tschannen (1991) and Swatos and Christiano (1999) provide overviews of the secularization paradigm, and Bruce (2002) provides a recent comprehensive treatment. Critics emphasize the importance of the supply side of religious markets in explaining trends in religious participation. Low religious participation in western Europe, long seen as evidence in support of the secularization hypothesis, is thought to be due to regulations that deter religious entry rather than to shifting religious demand, and high religious participation in America is due to its open religious economy and vibrant religious entrepreneurs (Finke 1997; Stark and Iannaccone 1994; Warner 1993). Their supply side argument represents a paradigm shift in thinking about religion, as it draws language and ideas from rational choice economic thinking in making its arguments (Young 1997). Stark and Finke (2000) present a comprehensive treatment of this approach. My model has close ties to the supply side paradigm because it formally models a religious market and captures the role of supply side regulations on religious competition. However, it also complements the work of proponents of secularization theory by examining how changes in religious demand due to economic growth can affect religious outcomes.

Finally, note that there exists a reverse relation of interest to economists, i.e. that religion affects economic growth (see Barro and McCleary 2003a). This paper focuses only on how growth affects religion for two reasons. First, much of the secularization logic which this paper aims to re-examine has focused on that direction of causality. Second, the model used here only considers one local religious market and not an aggregate area in which we normally consider growth. Thinking about the engine of economic growth would require consideration of trade across religious markets and other issues. I leave it to future work to consider both directions of causality simultaneously.

I. MODEL

Sociologists since as early as Johnson (1963) have characterized denominations by the level of 'tension' they maintain with their local secular society. Some denominations, called sects, exist in a state of tension with the existing society because of their rejection of prevailing moral codes, while other denominations, called churches, exist with little tension because they accept the prevailing moral codes. Iannaccone (1994) uses a uni-dimensional measure of denominational 'strictness'⁵ to capture tension because high tension denominations impose stricter behavioural standards on their members.⁶

Strictness plays three important roles in the model below. First, a denomination's strictness is widely considered as a measure of the costliness of being a member of that denomination (Iannaccone 1992; Stark and Finke 2000). The stricter the denomination, the more secular opportunities are forgone to maintain full fellowship in that denomination. Members of strict churches are required to contribute more and may be stigmatized due to their behavioural standards. Second, a key idea in the economic theory of religious groups is that stricter groups are better at producing religious club goods (Iannaccone 1992, 1994; Stark and Finke 2000). Because many club goods are jointly produced, production suffers from free-rider problems, and the behavioural standards of strict religious groups act to screen out free-riders. Strict groups also maintain more tightly knit congregations, thereby fostering better monitoring of members. By limiting free-riding, strict groups receive high contributions from their members, thereby fostering club good production. Third, as will be seen below, religious groups compete with each other by offering different degrees of strictness. For example, if a local market has only one religious group and it has high strictness, then a new group can enter that market at low strictness and appeal to a segment of the market whose demand was previously only poorly satisfied.

Religious consumers' preferences

Let each individual i choose which denomination d to join in order to maximize her utility function

$$(1) \quad u_i = u(w_i, s_d) = Z(w_i, s_d) + R(s_d),$$

where Z is the 'secular' payoff, R is the 'religious' payoff, $w_i \geq 0$ is i 's exogenous wage rate, and $s_d \in [0, 1]$ is the strictness of the denomination d to which i joins. Strictness equal to 0 is essentially no religion, while strictness 1 corresponds to the maximum strictness possible. Assume that both Z and R are twice differentiable such that:

$$(A1): Z_w > 0, Z_{ww} < 0, Z_s < 0, Z_{ss} < 0, Z_{ws} < 0,$$

$$(A2): R_s > 0, R_{ss} < 0.$$

The conditions in A1 imply that i 's secular utility increases at a diminishing rate as her wage w_i increases, her secular utility decreases at an increasingly negative rate as her denomination's strictness s_d increases, and the rate at which her utility increases in wages is decreasing as the strictness increases. A2 implies that stricter denominations offer larger religious benefits with diminishing utility.

That secular utility is decreasing in strictness captures the idea that membership with a stricter denomination involves devoting relatively more time and effort to denomination activities instead of secular wage-earning activities, as well as contributing relatively more income to the denomination instead of secular consumption. Note that R captures the religious benefits of group membership and not the religious benefits of private religious activities such as prayer or meditation. Religious group benefits are increasing in strictness because, consistent with the club theory of religious production (Iannaccone 1992, 1994), religious goods are collectively produced using members' contributions, and high strictness denominations that obtain high contributions from their members can provide more or higher quality collectively produced goods.

Given an exogenous wage w_i , we can derive the denominational strictness s_d^* that maximizes i 's utility. We denote s_d^* i 's *ideal strictness*. Because a change in the wage alters

the marginal benefits and costs of religious goods, ideal strictness will be a function of the wage, i.e. $s_d^*(w_i)$. Further conditions (in addition to A1 and A2) on the secular and religious benefit functions allow us to make specific claims about $s_d^*(w_i)$.

Condition 1. $R_s(0) > -Z_s(w_i, 0)$.

Condition 2. $R_s(1) < -Z_s(w_i, 1)$.

Lemma 1. Suppose A1 and A2.

- (a) Fix w_i . Then Conditions 1 and 2 together are sufficient for $s_d^*(w_i) \in (0, 1)$.
- (b) Individual i 's ideal strictness is a monotonically decreasing function of her wage w_i , i.e. $\partial s_d^*(w_i) / \partial w_i \leq 0$. Moreover, if Conditions 1 and 2 hold for all finite $w_i \geq 0$, then ideal strictness is strictly decreasing monotonically, i.e. $\partial s_d^*(w_i) / \partial w_i < 0$.

Condition 1 states that, given w_i , the marginal religious benefit of having a little strictness exceeds the secular opportunity cost. Condition 2 states that, given w_i , the marginal religious benefit of strictness at the maximum strictness 1 is less than the secular opportunity cost. See Appendix A for a proof of the lemma. Lemma 1(a) establishes that the two conditions together yield an interior ideal strictness. Lemma 1(b) matches our intuition. An increase in w_i raises the opportunity cost of strictness, resulting in a decrease in optimal strictness $s_d^*(w_i)$. Whether or not ideal strictness strictly decreases in wage depends on whether or not it is an interior or border solution. If it is in the interior, the decrease is strict; if it is at a boundary, then the ideal strictness does not change. Empirical studies find that, as implied by Lemma 1(b), stricter denominations do indeed have memberships with lower incomes on average (e.g. see Iannaccone 1994).

It will generally be true for most i that no denomination will have strictness $s_d^*(w_i)$. Given our assumptions, i would prefer s_d over $s_{d'}$ if either $s_d^*(w_i) < s_d < s_{d'}$ or $s_{d'} < s_d < s_d^*(w_i)$. When $s_d < s_d^*(w_i) < s_{d'}$, then there will be some $s' \in (s_d, s_{d'})$ such that if $s_d^*(w_i) = s'$ then i will be indifferent between s_d and $s_{d'}$. Under appropriate conditions on Z and R , the utility function in (1) can be more simply represented as

$$(2) \quad \begin{aligned} u_i &= \phi(\Delta_i), \phi_\Delta < 0, \\ \Delta_i &\equiv |s_i - s_d|, \end{aligned}$$

where s_i is now i 's ideal strictness ($s_i \equiv s_d(w_i^*)$). Individual i 's utility from not affiliating with a group is $-s_i$, which is akin to joining a group with strictness 0. The results below will use the symmetry in the distance above or below the ideal strictness. However, none will depend on a constant marginal rate of disutility, so $\phi(\cdot)$ need only be strictly monotonic (i.e. it does not have to be linear).

From now on, I use the simplified Euclidean preferences in (2), and assume that if i is indifferent between joining multiple denominations, then she has equal probability of joining one of those denominations. I also let $F(s)$ be the distribution of ideal strictnesses among the religious consumers that is implied by the exogenous distribution of their wages $F(w)$.

This representation of religious preferences greatly simplifies the affiliation decision in the model below. It abstracts from the socialization of children in their parents' religion, conversion experiences, and other qualitative features of religious goods that

make them different from normal secular goods.⁷ However, the model of utility maximization on which it is based stems from a model of utility maximization used in other work (Iannaccone 1988, 1994; Montgomery 1996).

Denomination leaders' preference functions

Let $D = \{1, 2, \dots\}$ be the set of potential denominations. Each potential denomination d , if it chooses to enter the religious market, chooses strictness level s_d to maximize its payoff function

$$(3) \quad \pi_d(s_d, s_{-d}) = Am_d(s_d, s_{-d}) - c,$$

where m_d is the final share of the population that are members of denomination d , $A > 0$ is a religious technology parameter and $c > 0$ is the fixed cost of providing religious services. The technology parameter A captures various elements of religious supply, e.g. the ability of the denomination to extract benefits from its members. If the denomination does not enter, it expends its efforts in a secular industry and earns profits $\bar{\pi}$, so that $\bar{\pi}$ is d 's opportunity cost of providing religious services.

This depiction of denominations' preferences abstracts from actual denomination leaders' motivations and differs from other representations of denomination preferences and religious production technology. For example, Barros and Garoupa (2002)⁸ assume each denomination maximizes the utility of its membership, Iannaccone (1992) describes how the services a denomination provides may depend on its membership size and Ekelund *et al.* (1989) examine the medieval Church as a rent-seeking institution. My model simplifies by assuming that denomination leaders prefer to have larger memberships all else equal. In reality, denomination leaders have many objectives that may matter more to them than membership size, such as the well-being of denomination members, social justice, community solidarity, etc. Moreover, production costs may depend on the membership size; e.g. too many members can create more dramatic free-rider problems. Extending the model to account for these factors will alter the exact characterization of the equilibrium outcomes; yet, the substantive results in the propositions below will not be meaningfully affected because the underlying market and regulatory environment will have similar effects on religious outcomes in a richer model as they do in this paper's model.⁹

The religious market game

Decisions are made in the following order:

1. Potential denominations simultaneously choose to either locate at a strictness level or postpone the decision to period 2. Once a potential denomination locates, it cannot change its strictness or exit.
2. Any potential denomination that did not locate in period 2 now chooses to locate or never locate (exit). Assume that it exits if indifferent between entering and not entering.
3. After observing the located denominations' strictness levels, individuals simultaneously choose denominational affiliations.
4. Located denominations and individuals receive their payoffs, and non-located potential denominations receive payoff $\bar{\pi}$.

This game is a Hotelling location game with two unique features: the presence of a firm with location fixed at strictness 0 and a two-stage representation of firm entry. The first feature captures various elements related to non-affiliation. If religious benefits derive only from membership in a denomination, then not affiliating yields no religious benefits. Because there is a cost to strictness ($Z_s < 0$), an individual who does not affiliate will choose strictness 0.

Two-stage denomination entry captures the idea that denominations currently in the market must be concerned not just about competition from located denominations but also from future potential entrants. In technical terms, actors in an equilibrium should consider not just their own deviations holding others' entry decisions fixed, but should also consider entry that might result from their own deviations. A standard static non-cooperative concept (e.g. Nash equilibrium) would not consider such dual deviations with only one entry period.

II. EQUILIBRIA WITH UNIFORM $F(s)$

As will be discussed in greater detail below, there will generally be multiple equilibria of this religious market game. I focus on a particular class of subgame perfect equilibria (SPE), in which D^* potential denominations locate in period 1, the remaining potential denominations exit in period 2, and all individuals affiliate with the denomination whose strictness is closest on the unit interval (with non-affiliation still an option at strictness 0).¹⁰ This equilibrium, which I denote as a D^* -SPE, has a pertinent interpretation: a D^* -SPE can be considered as the long-run steady state of a religious market in which denominations can adjust their strictness levels over time in response to other denominations' strictness levels, and "incumbent" denominations face the threat of religious entry.

To illustrate the essential strategic elements of the game, I restrict attention in this section to a special case: the unit interval uniform distribution of ideal strictnesses with p.d.f. $f(s) = 1$ for all $s \in [0, 1]$ and 0 otherwise. Let us now construct a simple D^* -SPE.

Let

$$\begin{aligned}\tilde{s}_1 &= 1 - \frac{c + \bar{\pi}}{A} \\ \tilde{s}_2 &= 1 - 3\frac{c + \bar{\pi}}{A} \\ \tilde{s}_3 &= 1 - 5\frac{c + \bar{\pi}}{A} \\ &\dots \\ \tilde{s}_d &= 1 - (2d - 1)\frac{c + \bar{\pi}}{A}.\end{aligned}$$

If $\tilde{s}_d > 0$, then have d locate at \tilde{s}_d in period 1. Otherwise, if $\tilde{s}_d \leq 0$, then have d not locate in period 1 and exit in period 2. As constructed, we have a profile with denominations spread across the unit interval.

Figure 1(a) depicts this profile with $A = 6$ and $c + \bar{\pi} = 1$. We have $\tilde{s}_1 = 5/6$, $\tilde{s}_2 = 3/6$, $\tilde{s}_3 = 1/6$ and, because $\tilde{s}_d \leq 0$ for all $d > 3$, any such d exits in stage 2. Given these locations for denominations 1, 2 and 3, any individual to the right of s_1 will affiliate with

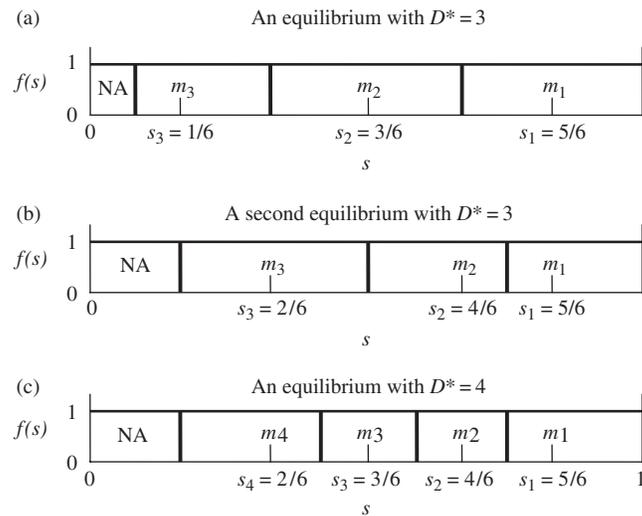


FIGURE 1. Equilibria with a uniform ideal strictness distribution.

denomination 1. Individuals between s_1 and s_2 will affiliate with either denomination 1 or 2, depending on which is closer. Individuals to the left of s_3 but closer to 0 will not affiliate, while those closer to s_2 will affiliate with denomination 2. The resulting membership sizes are $m_1 = 2/6$, $m_2 = 2/6$, $m_3 = 1.5/6$, and $0.5/6$ not affiliating (NA).

To show that this profile is an equilibrium, consider the payoff to a denomination d that did not enter in period 1 but considers entering in period 2. It will not enter unless $Am_d - c > \bar{\pi} \Rightarrow m_d > (c + \bar{\pi})/A$, where m_d is the size of membership it will get if it enters and holding fixed all other denominations' actions. Given the current profile of denomination locations, d cannot get a membership that large. Its best location to 1's right is at $s_1 + \varepsilon$, but this yields $m_d = (c + \bar{\pi})/A - \varepsilon/2 < (c + \bar{\pi})/A$: it gets the $(c + \bar{\pi})/A - \varepsilon$ members to the right of its location but only $\varepsilon/2$ members to its left. If d locates between 1 and 2, between 2 and 3 or exactly at s_1 or s_2 , it will get membership equal to $(c + \bar{\pi})/A$. If it locates between 3 and 0 or exactly at 3, it will get membership less than $(c + \bar{\pi})/A$. Because d can do no better than its exit payoff, exiting is a best response for d in period 2.

Now consider whether a located denomination wants to move its location. Although 1 can potentially increase its denomination size by deviating slightly to its left, doing so will leave room for entry on its right by a firm in period 2, so 1 will not want to shift left. It will not want to shift right either since, if it does, it decreases its membership size and creates room for an entrant to enter between 1 and 2. By similar logic, no other located denomination can improve by deviating to the opposite side of another denomination.

This is not the only D^* -SPE. Figure 1(b) depicts an equilibrium in which $s_1 = 5/6$ as before, but where s_2 and s_3 have both shifted rightward to $s_2 = 4/6$ and $s_3 = 2/6$. In fact, there are an infinite number of equilibria with $D^* = 3$. Any profile with $s_1 = 5/6$, $s_2 \in [3/6, 4/6]$ and $s_3 = s_2 - 2/6$ will be an equilibrium. These are obtained by sliding s_2 and s_3 to the right when starting from the equilibrium in Figure 1(a). There is also another continuum of equilibria: any profile with $s_1 = 5/6$, $s_2 = 3/6$ and $s_3 \in [1/6, 2/6]$ is also an equilibrium. There can also exist equilibria with $D^* = 4$, such as the one depicted in Figure 1(c), and, again, there is a continuum of $D^* = 4$ equilibria, each obtained by sliding all denominations but s_1 .

Although there are many equilibria, these equilibria all share a few key features.

Proposition 1. Suppose $F(s)$ is the unit interval uniform distribution. A D^* -SPE with $D^* > 1$ must have the following features:

- (a) Any located denomination d must have $m_d \geq c + \bar{\pi}/A$.
- (b) The least strict denomination $d = D^*$ must be located at $s_{D^*} \leq 2(c + \bar{\pi}/A)$.
- (c) $s_d - s_{d+1} \leq 2(c + \bar{\pi}/A)$ for $d < D^*$.
- (d) The strictest denomination $d = 1$ must be at located $s_1 = 1 - c + \bar{\pi}/A$.

If (a) did not hold, then a located denomination would be better off exiting than remaining in the market. If (b) did not hold, then entry will occur between 0 and s_{D^*} . If (c) did not hold, then entry would occur between s_{d+1} and s_d . For (d), note that denomination 1 increases her membership by shifting towards s_2 if no entry occurs in period 2 after her deviation. However, if $s_1 < 1 - (c + \bar{\pi})/A$, there will be entry to 1's right. Thus, $1 - (c + \bar{\pi})/A$ is the farthest left she can be and still prevent entry on her right. Because she has an incentive to shift left, she will locate at $1 - (c + \bar{\pi})/A$.

Part (a) implies that a D^* -SPE must have sufficiently few denominations that any located denomination receives enough membership to remain in the market, while (b) and (c) imply that there must be sufficiently many denominations to prevent the existence of niches that would lead to entry. Thus, for any given A , c and $\bar{\pi}$, there will usually exist a compact range of positive integer D^* s, such that there is a D^* -SPE with $D^* \in \{D_L^*, D_L^* + 1, \dots, D_H^*\}$. Note as well that if A increases or if c or $\bar{\pi}$ decreases, all else constant, then this range will shift to the right. That is, both D_L^* and D_H^* will increase if A increases or if c or $\bar{\pi}$ decreases.

These equilibria demonstrate how religious competition determines the distribution of denomination types and membership sizes. The incentive to obtain membership drives denominations to specialize by choosing unique strictness levels in order to obtain market niches, but in equilibrium, they will also be not so far from other denominations that there is room for religious entry.¹¹ Thus, the underlying parameters of the model place restrictions on both the distribution of denomination types and on the sizes of those denominations. Some denominations will maintain large tension with the surrounding environment, while others will not demand much from their members. Summarizing:

Proposition 2. Fix A , c and $\bar{\pi}$, and let $F(s)$ be a uniform distribution.

- (a) There always exists a D^* -SPE with $D^* \geq 0$.
- (b) D_L^* and D_H^* , the number of denominations in the D^* -SPE with the least and most denominations, will both increase as A increases, c decreases or $\bar{\pi}$ decreases.
- (c) Average denomination sizes decrease (generically) as A increases, c decreases, or $\bar{\pi}$ decreases.

Please note that the equilibria will be qualitatively similar with more realistic denomination preferences. Suppose that, consistent with the current theory about religious production (Iannaccone 1992, 1994), the benefits of membership decrease as the congregation gets too large, and so denominations do not maximize membership size but instead will have an optimal membership size. Even in this setting, the nature of the competition will still generally lead to an equilibrium similar to that described in the analysis above. If the denominations are too large, then entry will lead denominations to enter, while if they are too small, denominations will exit. An equilibrium will again have denominations just far enough apart in the strictness space to prevent entry in between,

and they will be not too close to prevent a denomination from exiting. As a result, the equilibrium results presented below will qualitatively apply in settings with more realistic representations of religious suppliers' preferences.

III. THE EFFECTS OF ECONOMIC GROWTH IN AN OPEN RELIGIOUS MARKET

To examine how economic growth affects religious vitality, we need to specify how economic growth affects the exogenous parameters of the model and what is meant by vitality. A standard conception of economic growth is growth in per capita incomes, which would correspond in the model to increases in the mean of the wage distribution. However, a key concern of the paper is that other exogenous parameters may also change with growth, and these are looked at in closer detail later in this section.

I consider two concepts of religious vitality that have received much attention in the literature: religious pluralism and religious participation.¹² One simple measure of religious pluralism is the number of equilibrium denominations so that one equilibrium is more pluralistic than another if it has more denominations. We may also suppose that pluralism should reflect the underlying religious behaviour and not just denominational affiliations so that pluralism should be tied to religious strictness. Essentially, one equilibrium is more pluralistic than another if it exhibits a wider range of observed strictness. If some individuals do not affiliate, this range will be $[0, s_1]$; otherwise, the range is $[s_{D^*}, s_1]$.

One measure of religious participation is the percentage of the population affiliated with a denomination. One equilibrium has more participation than another if it has a smaller percentage of non-affiliated individuals. However, affiliation does not necessarily capture religious behaviour if behaviour is tied to religious strictness. For example, less strict denominations tend to impose fewer behavioural requirements – such as attendance at church meetings – on their members than stricter denominations (Iannaccone 1994). Insofar as participation is tied to strictness, the range of observed strictness is a better indication of religious participation. It turns out that these distinctions will matter.

The effects of growth on religious supply

It will be easiest to first examine the effects of economic growth on the supply side of the religious market. Consider now the effect of increased secular opportunities on religious suppliers. As secular opportunities increase, the opportunity cost $\bar{\pi}$ of producing religious benefits also increases. This will decrease the number of denominations and increase the size of denominations (Proposition 2), and the strictest denomination will become less strict (Proposition 1). Thus, according to both pluralism measures, we will observe a decrease in religious pluralism.

Religious participation is also likely to drop according to each measure. For intuition, consider the uniform $F(s)$ case. Because the least strict denomination D^* must be no farther than $2(c + \bar{\pi})/A$ from strictness 0, an increase in $\bar{\pi}$ can result in the D^* being more strict. This, in turn, leads to an increase in the non-affiliated population. This might sound contradictory because the most strict denomination is becoming less strict, but it is clearly possible if the number of denominations decreases. If we consider the strictness measure of participation, then the shrinking observed strictness range signifies a drop in participation.

It is also possible that economic growth increases the religious technology A or decreases the cost of religious production c . For example, denominations may discover cheaper direct costs of religious advertising, better capabilities of monitoring denomination members or leaders, more effective abilities to extract resources from affiliated members, and so on. Because an increase in A or a decrease in c has the opposite effect as an increase in $\bar{\pi}$, such positive supply shocks will offset the effect of the increased opportunity costs on both pluralism and participation. Which effect dominates is a question I return to later, but for now Proposition 3 summarizes the results relating growth and religious supply.

Proposition 3. Through the supply side of the religious market, economic growth can increase or decrease religious pluralism and participation in a D^* -SPE. Specifically,

- (a) Increases in the opportunity cost $\bar{\pi}$ of supplying religion will decrease religious pluralism and religious participation.
- (b) Increases in the religious technology A or decreases in the religious production costs c will increase religious pluralism and participation.

The effects of growth on religious demand

Considering the impact of economic growth on religious demand means considering how it affects the distribution of ideal strictnesses $F(s)$, which in turn requires moving away from the uniform distribution case. Let us restrict analysis to bell-shaped (i.e. single-peaked) distributions for which the peak occurs at some s in the interior of the unit interval. Such would be the case if, say, a single-peaked wage distribution (e.g. log normal) translates into a single-peaked distribution of ideal strictnesses. Stark and Finke (2000: 197) suggest that such a distribution approximates actual religious preferences.

An important consideration is whether or not the distribution of ideal strictnesses contains only interior ideal strictnesses. Say that $F(s)$ is interior if its support $[\underline{s}, \bar{s}]$ is a subset of the strictness range $[0, 1]$. Figure 2(a) depicts a single-peaked interior distribution. As with a uniform distribution, the strictest denomination must still locate as far left as possible without allowing entry on its right. We can calculate s_1 to be the location for 1 that makes the a potential entrant exactly indifferent between entering and not entering:

$$A(1 - F(s_1)) - c = \bar{\pi} \Rightarrow$$

$$s_1 = F^{-1}\left(1 - \frac{c + \bar{\pi}}{A}\right).$$

The uniform $F(s)$ with $s_1 = 1 - c + \bar{\pi}/A$ is clearly just a special case.

The non-uniformity in the distribution now matters when determining the other denominations' equilibrium behaviour. Suppose denomination D^* is the least strict denomination in an equilibrium with D^* denominations. In the general $F(s)$ case, the entrant's membership size will depend on where it enters on D^* 's left. If the p.d.f. is increasing over $(0, s_{D^*})$, which is the case if s_{D^*} is to the left of the peak, then potential entrant d will get larger membership by choosing as high a strictness as possible in that interval, essentially $s_d = s_{D^*} - \varepsilon$. In this case, s_{D^*} must be located such that

$$A\left(F(s_{D^*}) - F\left(\frac{s_{D^*}}{2}\right)\right) - c = \bar{\pi}.$$

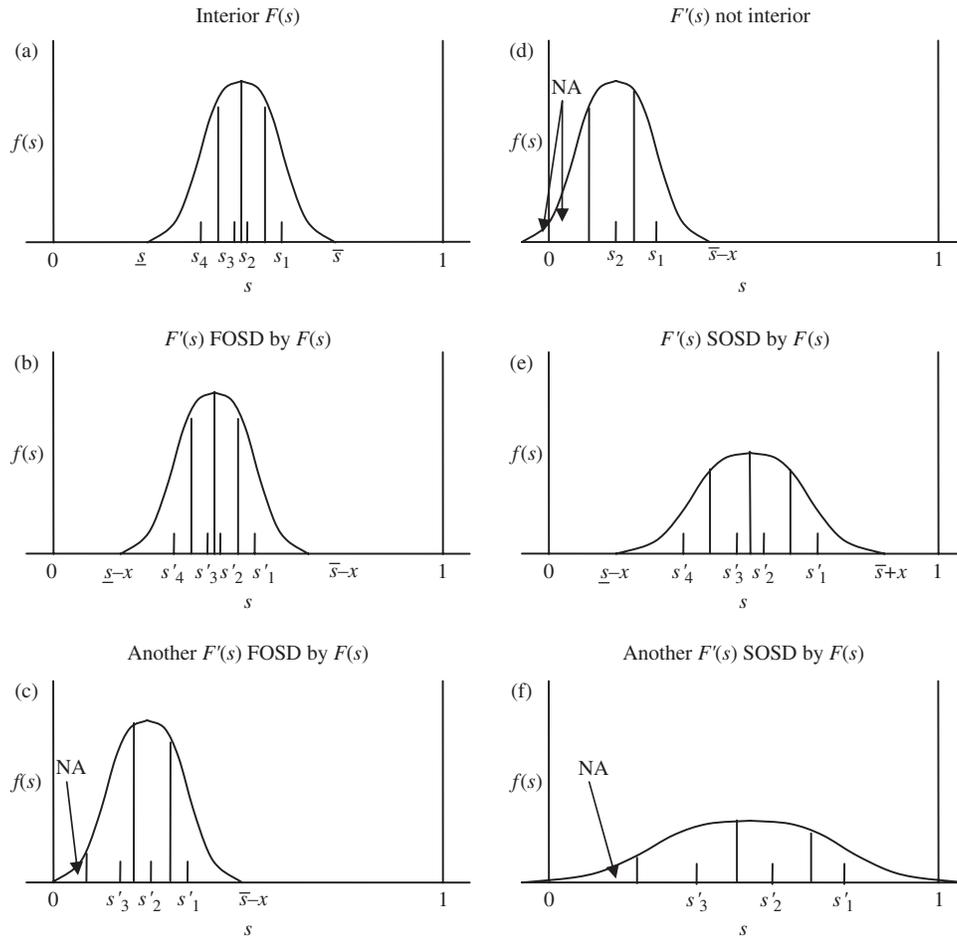


FIGURE 2. Equilibria with non-uniform ideal strictness distributions.

Just as the most strict denomination has membership size exactly $(c + \bar{\pi})/A$ on its right in equilibrium, the least strict denomination has that much on its left in equilibrium. The other denominations in a D^* -SPE would then be spaced between s_1 and s_{D^*} in a manner so that each has membership size at least $(c + \bar{\pi})/A$ and each is maximizing its membership size subject to preventing entry between itself and another denomination. For example, in a single-peaked $F(s)$, a denomination $d = 2, 3, \dots, D^* - 1$ would, to maximize membership, be as far towards the peak as possible, but, to prevent entry between it and denomination $d - 1$, would also want any potential between it and a neighbour to be less than $(c + \bar{\pi})/A$.

We can focus on the two boundary denominations – the most strict and least strict – when examining the effects of economic growth on religious demand. As mentioned earlier, economic growth that increases average wages will increase the return to secular activities, thereby increasing the opportunity cost of religious activity and shifting the distribution of ideal strictness leftward. One manifestation of this, though not the only one, is a shift in the distribution from $F(s)$ to $F'(s)$ such that $F'(s)$ is first-order stochastically dominated by $F(s)$, i.e. $F'(s) \geq F(s)$ for all s .

The equilibrium location of the denominations under $F'(s)$ will differ from under $F(s)$. A shift in $F(s)$ to $F'(s)$ entails a drop in the lowest strictness from \underline{s} to, say, $\underline{s} - x$, so the most strict denomination will have lower strictness under $F'(s)$ than under $F(s)$. The least strict denomination will also be less strict than under the original distribution for the same reason. If $F(s_{D^*}^*/2) \leq \underline{s}$ and $F'(s_{D^*}^*/2) \leq \underline{s} - x$, where $s_{D^*}^*$ is the least strict denomination under $F'(s)$, then the new equilibrium may have no changes in membership sizes or number of denominations if all denominations' strictnesses shift left equally. As measured by the range of religious behaviour, however, there will be a decrease in the pluralism of observed strictness because the most strict denomination is now less strict. Figures 2(a) and (b) illustrate this pattern. Let $F(s)$ have the p.d.f. in Figure 2(a), while $F'(s)$ has the p.d.f. in Figure 2(b). As depicted, we see that $s_1 - s_{D^*} = s'_1 - s'_{D^*}$ (i.e. the range of observed strictnesses is unchanged) as all denominations shifted left equally.

However, if $F'(s_{D^*}^*/2) > \underline{s} - x$, which is depicted in Figure 2(c), then there can be a drop in pluralism and participation by all measures because non-affiliation now becomes a viable option to consumers. The same occurs if $F'(s)$ is a non-interior distribution, as depicted in Figure 2(d), which essentially means all individuals at $s_i < 1$ have $s_i = 0$. The number of equilibrium denominations has decreased because many people strictly prefer strictness 0 to any strictly positive strictness. The affiliation rate decreases and pluralism decreases, both according to the number of equilibrium denominations and the range of observed strictness. Whether income growth generates non-interior ideal strictnesses in real life is a question to which I return in the discussion below.

Economic growth may also cause other changes in the distribution of ideal strictnesses. Suppose economic growth is uneven so that there is increased inequality in the return to secular activities. The so-called Kuznet's Curve, for example, postulates that income inequality increases in the early stages of economic development before eventually decreasing, possibly due to a transition from an agriculturally based economy to a manufacturing-based one. Technological advancements that increase the wages of one sector at the expense of other sectors may also lead to increased dispersion in wages.¹³

In the model, increasing wage inequality leads to a wider variance in ideal strictnesses. Consider the distribution in Figure 2(e), which is a mean-preserving spread of the distribution in Figure 2(a) (i.e. $F(s)$ second-order stochastically dominates $F'(s)$). The lowest ideal strictness is now $\underline{s} - x$, while the highest ideal strictness is $\bar{s} + x$. Wider variance implies that $f'(s)$ has fatter tails than $f(s)$. If the mass above s_1 increases due to the fatter right tail, then $s'_1 > s_1$. With a small enough spread x , the spread implies greater mass in the left tail is still far enough away from the non-affiliation option so that the strictness of the least strict denomination decreases. We may observe no change in the number of denominations or in the percentage affiliated, while we do observe an increase in the range of observed strictnesses. When too much mass is pushed to the left tail (i.e. x sufficiently large), then the affiliation rate and number of denominations decline. However, as mass is pushed to or above strictness 1, the range of observed strictness can span the entire feasible strictness range and participation tied to strictness is very high in some groups. If enough mass goes beyond strictness 1, then the market will have one or more denominations located at strictness 1.¹⁴ We thus may observe a decline in pluralism as number of denominations and participation as affiliation rates, but we may also observe an increase in pluralism and participation as measured by the range of observed strictnesses.

Altogether, these results show that demand side changes resulting from economic growth produce ambiguous effects on both pluralism and participation. The following proposition summarizes the above analysis.

Proposition 4. Through the demand side of the religious market, economic growth can increase or decrease religious pluralism and participation in a D^* -SPE. Specifically,

- (a) (i) An increase in the return to secular activities from one interior ideal strictness distribution to another can have little or no effect on the number of denominations and affiliation rates, but it will decrease pluralism and participation tied to the range of observed strictness. (ii) If the new distribution has shifted sufficiently leftward, then there can be a decrease in the number of denominations, in observed strictness, and in affiliation rates.
- (b) (i) An increase in inequality of the returns to secular activity from one interior ideal strictness distribution to another can have little or no effect on the number of denominations and affiliation rates, but it can increase pluralism and participation tied to the range of observed strictness. (ii) A sufficiently large increase in inequality to an ideal strictness distribution that is non-interior on the left can result in a decrease in the number of denominations and in affiliation rates, but an increase in pluralism and participation tied to the range of observed strictness.

Discussion

Economic growth potentially affects both the demand and supply sides of an open religious market, and it can do so in a manner that produces countervailing influences. Thus, it is not economic growth *per se* that will be ‘the end of religion’, but the nature of that growth that determines religion’s future. Theories that link economic growth only to diminished demand for religious activities may therefore incorrectly predict the demise of religion if they ignore both opposing demand side forces and adaptation by religious suppliers.

That is not to say that religious demise is impossible. The model does not predict the demise or the triumph of religion, nor does it predict that demise or triumph is impossible. Each is possible depending on the manner in which economic growth affects various demand and supply factors. If rising opportunity costs to religious suppliers and demanders overpower other effects of growth, then religious pluralism and participation will decline as predicted by the secularization paradigm. If the other effects keep pace, then religion will survive.

Which effects will dominate? While this is ultimately an empirical question beyond the scope of this paper, I mention here three issues of direct relevance. The first relates to adaptation and innovation by religious suppliers. The standard notion of economic growth as rising per capita incomes suggests that producers’ secular opportunities $\bar{\pi}$ will increase. Moreover, the Baumol Effect, which states that productivity growth is likely to be slower in labour-intensive industries such as religion, suggests that $\bar{\pi}$ would increase faster than c decreases and A increases (Baumol 1967). While this suggests eventual religious demise (all else constant), another feature of the Baumol Effect may work to offset this trend. If religious producers’ skills are tied to labour-intensive industries, then their outside opportunities will not rise as quickly as outside opportunities for secular good producers with skills in capital-intensive industries. Thus, $\bar{\pi}$ might not increase very rapidly for religious producers, and changes in c and A may keep pace or even outpace the increase in $\bar{\pi}$.

Some anecdotal evidence indicates that suppliers are adapting to meet changing religious demand. For example, some religious groups are attempting to adapt twenty-

first century technology to suit their uses. Consider the following from *The Christian Century* (2002: 9):

Technology has found religion; or perhaps it's the other way around, according to the *New York Times* (May 16). Churches are going beyond the typical digital sound systems, PowerPoint sermon outlines and the use of video clips to illustrate sermon points. Take 'The Rock,' an interdenominational church in Roseville, California. 'The church has a 330-seat sanctuary with a big-screen television and integrated keypads built into seat armrests. The buttons on the keypads allow members of the congregation to answer multiple-choice questions asked by the pastor during the service. The answers, which often touch on delicate issues like emotional abuse or spending habits, are quickly compiled into percentages. . . . The pastor takes the responses and adjusts his sermon on the spot, recounting stories about life experiences that address the congregation's concerns.'

In fact, some secularists fear that religionists are too successful in adapting new technologies into religious production. An article in *Free Inquiry* (Porteous 1994), a secular humanist publication, warns its readers of how the religious right uses technology to make the political aspect of its religious production more efficient. Nonetheless, religious producers such as Bonnot *et al.* (2001) – a priest, a minister and a producer of spirituality-enhancing media products – argue that more supply side adaptations are required to keep pace with changing demand.

The second issue relates to how easy it is to substitute away from religious consumption. With diminishing marginal utility to secular consumption ($Z_w > 0$, $Z_{ww} < 0$) and with relatively steep marginal religious benefits at low ideal strictness levels so that the Conditions 1 and 2 are satisfied for all feasible wages, then each unit increase in wage will lead to successively smaller decreases in ideal strictnesses. An example of a utility function which has an interior ideal strictness for any finite wage rate is

$$\begin{aligned} u(w_i, s_d) &= Z(w_i, s_d) + R(s_d) \\ &= w_i^{1-\alpha}(1 - s_d)^\alpha + s_d^\alpha, \quad 0 < \alpha < 1, \end{aligned}$$

which has ideal strictness

$$s_d^*(w_i) = \frac{1}{1 + w_i}.$$

If a utility function with these properties adequately represents a significant proportion of people, then continued wage increases will not drive ideal strictnesses to 0, and religious demand might not shift or disappear as quickly as secularization theorists suggest. Is there reason to believe this to be the case? The question is partly one about the relative perceived quality of religion and substitutes for religion. Certain religious benefits do not have effective secular substitutes. For example, while denominations provide benefits consumable in the present such as friendship and social support, Stark and Finke (2000) emphasize that religious groups also provide promises of other worldly rewards. Because other worldly rewards are not consumed in the present, it is the promise of otherworldly rewards that is valued, and these promises are tied to religious doctrine and behaviour. If these promises do not have adequate secular substitutes, then rising income levels will not lead individuals to completely substitute away from religious consumption.

The third issue relates to trends in income inequality. Both the theoretical literature (Aghion *et al.* 1999) and the empirical literature (O'Rourke 2001) provide mixed pictures

of the impact of economic growth and globalization on economic inequality, yet there was enough evidence in the minds of the United Nations to issue a report in 2006 sounding the alarm about 'persistent and deepening' inequality (Rizvi 2006). The model predicts that rising income inequality will lead to highly strict religious groups. To the extent that highly strict groups may become radical, rising inequality will also be associated with the radicalization of religion. This logic could be part of the story behind the rise in radical religious groups in various parts of the world, such as Central Asia. If indeed globalization drives increasing inequality and continues to do so, then the model predicts continued radicalization of religion – a far cry from a prediction of religion's demise.

Overall, the successful adaptation of religious producers, the uniqueness of religious goods and trends in inequality, will determine whether economic growth will cause religious decline in an open religious market. Given that religion has thrived in some religiously open countries that have experienced a century of economic growth, such as the USA, the future of religion in open religious markets will likely involve more of the same. Religious suppliers will continue to adapt, and religion will not decline.

IV. THE EFFECTS OF GROWTH IN A REGULATED RELIGIOUS MARKET

Regulations that inhibit entry in religious markets

Secularization thinking survives because its proponents point to highly secularized western Europe for empirical verification. Low religious participation is found in mono-Catholic Belgium and France, mono-Protestant England, Wales, Scandinavia and Iceland, and multi-denominational Germany, Switzerland and The Netherlands (Barros and Garoupa 2002). While proponents of secularization thinking refer to these countries as examples in support of their case, supply side thinkers argue that secularized western Europe is due more to religious market regulations than to secularized religious preferences (Finke 1997).

There are two main types of religious regulation: suppression and subsidies. Suppression includes laws or other state-sponsored activities that forbid or inhibit the formation of new denominations or the activities of their members. Consider some recent examples from Germany: Scientologists have been excluded from government employment; entry visas have been refused to prominent non-German Scientologists; some public officials have suggested putting Jehovah's Witnesses under secret service watch; new denominations are routinely hindered from getting proper licences or building permits; and many Pentecostal groups cannot get tax-free status unless they register as secular groups instead of churches (Stark and Finke 2000). Subsidies include the provision of state resources for church operations, such as the payment of church employees' salaries. For example, the Church of Sweden for years received funding via taxes (even paid by those not affiliated with the Church), the Swedish clergy have civil service job security, and other denominations do not receive the same support (Stark and Finke 2000).

Both suppression and subsidies are common throughout the world and more common historically than open religious markets. Some restrictions are so severe that they are deemed human rights violations. The United States Commission on International Religious Freedom (USCIRF), for example, issues an annual report on the current state of religious freedom around the world and identifies countries in severe violation of certain standards of religious rights as 'countries of particular concern'.¹⁵ Grim and Finke (2006) provide a numerical picture of religious regulations in their indices of religious regulations.

We observe from these sources that there is wide variation in the regulation of religion across countries. Some countries, particularly ‘countries of particular concern’, severely regulate religion, others provide more moderate regulation, while others do not regulate.

Religious regulations have the potential to impact religious competition in a variety of ways. Regulations can raise the cost of entry to new denominations, thus leading to larger incumbent monopoly or duopoly denominations. Adam Smith commented years ago that regulations alter the incentives of religious providers, e.g. a protected incumbent who does not need to compete against other denominations for religious clientele will be less likely to provide high quality religious benefits. Finally, an incumbent may be more concerned about the political economy of maintaining the advantaged market position than with adapting to changes in consumers’ religious demand.

Consider the extreme case of a regulated monopoly setting with an interior ideal strictness distribution. Assume that regulations are sufficient to prevent entry of any group other than the privileged group, and that the monopoly needs to only focus on amassing membership instead of trying to maintain its monopoly position. A monopoly M that locates at s_M will receive payoff $A(1 - F(s_M/2)) - c$. All individuals to the right of s_M will affiliate with the monopoly, while only those between $s_M/2$ and s_M on its left will affiliate. The monopoly’s only competition comes from the non-affiliation option, so by lowering its strictness it can entice individuals to switch from non-affiliation to affiliation. In equilibrium, the monopoly will locate at any $s_M \in [\underline{s}, 2\underline{s}]$ and obtain the entire population for its membership.¹⁶ Religious pluralism will be low in terms of the number of denominations and in terms of observed strictness, affiliation rates will be high, but participation tied to strictness will be low if \underline{s} is close to 0.

This result matches the predictions of the supply side theory of religion, that a monopoly denomination will not demand much from its affiliates (low strictness), and its affiliates will not devote much to the denomination in return (Stark and Finke 2000). Such denominations are already secularized in that they do not place demands on members much above what secular society already demands. Such is the case in some regulated religious markets of western Europe. To choose one particular example, again consider the Church of Sweden. Nearly all Swedes are registered as members, but only 2% attend on any given Sunday (Finke 1997).

There is very little impact of economic growth on religiosity in this setting. On the supply side, so long as the regulations prevent entry and the monopoly group is sustained, changes in the costs or technology of religious production have no effect on the equilibrium strictness or affiliation rates. On the demand side, if \underline{s} decreases due to increased wages or increased wage inequality, the new equilibrium will have a monopoly with even lower strictness. If the new distribution of ideal strictnesses is interior, then again, we have low pluralism and strictness and full affiliation. If the new distribution is not interior but crosses ideal strictness 0 (akin to Figure 2(c)), then monopoly’s equilibrium strictness is essentially 0, pluralism is very low and affiliation rates are not full but are still half or more of the population.¹⁷

Proposition 5. Suppose regulations prevent religious entry but do not change the costs of non-affiliation. Then a monopoly denomination will choose strictness close to the minimum ideal strictness, and economic growth will lead to decreases in the denomination’s strictness.

A regulated duopoly will have a limited degree of denominational competition. The duopoly outcomes fit qualitatively between the open and monopoly markets, i.e.

strictnesses and pluralism will be lower than in an open market and higher than in monopoly. The same holds for the effects of economic growth. The effects on pluralism, affiliation and participation are limited.

These findings support the religious economies claim that, 'To the degree that a religious economy is unregulated, it will tend to be very pluralistic' (Stark and Finke 2000: 198). In support of this claim, Barro and McCleary's (2003a, 2003b, 2006) recent cross-country regressions find that countries with religious regulations exhibit less religious vitality.¹⁸ Religious economies' proponents have long referred to thriving religious organizations in the United States as the best example of the impact of open religious markets (Warner 1993). While some relate American religiosity to cultural backwardness, a lack of sophistication, too little influence by intellectuals, and other factors (Stark 1999), my model presents a different picture. Instead of 'American exceptionalism' in terms of religious preferences, it is an open market environment on the supply side that explains American religious pluralism.

Observers have also noted that American clergy are very responsive to their congregations, and even act to maintain or increase their memberships (Stark and Finke 2000). Because my model predicts that pluralism is increasing in A , it could be argued that deregulation of a religious economy acts to increase pluralism through two mechanisms. There is a direct effect of a decreased cost of entry, but there may also be an indirect effect through a change in denominational preferences. In an open and competitive religious market, only those clergy that are responsive to their members' needs (i.e. have higher A) will succeed and, therefore, survive. Thus, reducing regulations can also lead to denominational leaderships that care more about meeting the religious needs of their memberships, which in turn increases religious pluralism as denominations compete for members.¹⁹

Regulations that inhibit secular substitutes to religion

Governments can also undertake actions that inhibit the formation or quality of secular substitutes to religion. So-called 'blue laws' restricted certain activities, such as certain forms of shopping or other consumption activities, on Sundays in the United States well into the twentieth century. Sabbath laws continue in Israel today, with many activities forbidden from sundown on Friday to sundown on Saturday. Secular restrictions are or have been much more extensive in today's Islamic states. Sabbath laws exist that prohibit certain businesses from operating, or laws might require fasting during certain periods of the year. Women may be legally required to wear certain clothing or forbidden from participating in various activities. Other laws may require certain religious observances.

Restrictions that reduce the value of secular activities have two immediate potential effects in the model. On the supply side, the restrictions may limit religious leaders' outside opportunities thereby lowering $\bar{\pi}$. From Proposition 2, we know that this would work to increase pluralism. On the demand side, the restrictions decrease $Z(w_i, s_d)$ in equation (1) for all values of w_i and s_d by lowering the opportunity cost of strictness. This results in an increase in each i 's ideal strictness, i.e. a rightward shift in the entire ideal strictness distribution, akin to a shift from Figure 2(b) to Figure 2(a). If religious entry is allowed, then we can observe many denominations with relatively high strictness and observed religious behaviour. Yet prohibitions on secular activities are often combined with regulations that support religious monopolies, as is the case in Islamic states. In such a scenario, the second effect is the important one to consider.

Assuming an interior distribution, the earlier logic still holds: a religious monopoly that seeks to maximize its membership size will still locate sufficiently near the minimum ideal strictness at $s_M \in [\underline{s}, 2\underline{s})$ to compete with non-affiliation. However, the difference in this setting is that the regulations make non-affiliation a less appealing option by lowering the quality of non-participation. This means that the chosen s_M may actually be a fairly high level of strictness. As the lowest ideal strictness \underline{s} increases due to the regulations, the upper strictness bound on the range of feasible equilibrium locations, $2\underline{s}$, increases twice as fast. Thus, we may observe high strictness monopoly religion when regulations hinder both religious entry and secular substitutes to religion.

The impact of economic growth in this setting now depends on the extent of the regulations. If wages increase but the regulations are sufficiently extensive to prevent much increase in the value of the secular substitutes, then ideal strictnesses will not shift dramatically. Thus, regulations on secular activities can work to maintain high religiosity even in the presence of economic growth.

Proposition 6. Suppose regulations prevent religious entry and maintain very low values for secular substitutes for religion. Then a monopoly religion can sustain strictness above the minimum strictness, and the regulations can maintain high religiosity even as economic growth brings higher wages.

As in Proposition 5, regulations dramatically alter the religious market outcome. Regulations that inhibit religious entry may lead to secularized monopoly religion unaffected by economic growth, while regulations that inhibit the availability of secular substitutes may lead to high religiosity monopoly religion unaffected by economic growth. This result matches what we observe in many Islamic states: highly regulated secular activities and high levels of religiosity.²⁰

V. CONCLUSION

This paper presents a model of religious competition that accounts for both the demand and supply sides of the religious market. The effects of economic growth on religious participation and pluralism in an open religious market are ambiguous *a priori*. Economic growth can increase the opportunity costs of religious demand and supply, thereby working towards religion's demise. However, there are countervailing factors. Economic growth can lead to increased inequality and improved technology of religious production, both of which increase the range of observed religious behaviour. Thus, competitive forces in an open religious market can lead denominations to adapt to changing demand and supply conditions, thereby keeping religion alive despite forces leading to secularization. In a regulated market, however, the effects of economic growth are minimized. Secularization that results from regulated entry will not change with economic growth, while high religiosity supported by restrictions on secular activities will also not change with economic growth if the regulations artificially maintain high religious demand.

The model provides an analytically tractable method for exploring the relationship between economic growth and religion. The model itself is a variant of a Hotelling model which can account not only for the threat of religious entry, but also for shifts in religious supply and demand factors that could be caused or correlated with economic growth.

The model also provides some specific predictions about the manner in which those shifting factors will affect religiosity. As such, it provides a theoretical framework to interpret existing empirical work and guide future empirical work.

Consider the recent cross-country panel regressions by Barro and McCleary (2003a, 2003b, 2006). They find that there is no relationship between income and religiosity (i.e. church attendance, belief in heaven, etc.) when controlling for education, urbanization and life expectancy. The lack of a clear correlation is likely due to the presence of counteracting factors also associated with rising income levels, some of which act to increase religiosity while others act to decrease religiosity. The model suggests that a negative relationship will be found once the regressions control for other supply and demand factors. Future empirical work should use the Barro–McCleary framework to explore other connections between economic development and answer questions such as the following. Do changes in religious technology also change as income levels increase? Is the negative impact of rising income levels on religiosity diminishing? Does pluralism (which Barro and McCleary find has a positive impact on religiosity) increase as growth increases thereby countering the secularization trend?

Also deserving of mention is Chen (2007). Using data collected during the Indonesian financial crisis of the late 1990s, he finds evidence that negative income shocks led to increased participation in community Koran study groups due to the ability of these groups to provide certain club goods, such as social insurance. Though my model does not consider instability, it suggests that negative income shocks will help maintain or increase the demand for strict religions. Continued instability may thus be another source of continued religiosity. Future work should incorporate instability into a complete model of religious markets.

The model also provides a game theoretic structure within which to theoretically consider still other factors thought to affect religious demand. Consider Iannaccone's (1990) notion of 'religious capital' – the idea that past consumption within one denomination or religious tradition increases the value of present consumption of that denomination. As a technical matter, incorporating religious capital into an overlapping generations version of this model will lead to denominations with memberships of overlapping strictnesses and it would allow for consideration of 'stickiness' in a denomination's ability to change its strictness.²¹ A more significant implication is that in a country with years of state regulation that ties individuals' religious capital to the dominant church, then recent deregulation may not lead to immediate religious revival because the existing religious capital remains strongly tied to the dominant church. Thus, we may observe continued secularization in countries that recently opened their religious markets but were regulated in the past. This observation, in turn, helps explain the religious revival in eastern Europe after the fall of communism and the lack of revival in western Europe where religious capital is still tied to the dominant churches. Moreover, not properly controlling for centuries of past regulations in Barro–McCleary style regressions may lead to estimates that understate the overall impact of state regulations on religiosity over the long run as economic growth occurs.

Future work should examine these issues as they will yield added insights into our understanding of how economic growth affects religion. Religion is thriving in many parts of the world, and competitive forces are likely to keep religion alive for now – at least in open religious markets and regulated markets that hinder engagement in secular activities.

APPENDIX A: PROOF OF LEMMA 1

Lemma 1: Suppose A1 and A2.

- (a) Fix w_i . Then Conditions 1 and 2 together are sufficient for $s_d^*(w_i) \in (0, 1)$.
 (b) Individual i 's ideal strictness is a monotonically decreasing function of her wage w_i , i.e. $\partial s_d^*(w_i)/\partial w_i \leq 0$. Moreover, if Conditions 1 and 2 hold for all finite $w_i \geq 0$, then ideal strictness is strictly decreasing monotonically, i.e. $\partial s_d^*(w_i)/\partial w_i < 0$.

Proof: (a) Given wage w_i , individual i 's utility is maximized at s_d^* such that

$$s_d^* \in \arg \max_{s_d} \{Z(w_i, s_d) + R(s_d) - \lambda_1 s_d - \lambda_2 (s_d - 1)\},$$

where λ_1 and λ_2 are the Lagrangian multipliers on the lower and upper bounds of s_d , $s_d \geq 0$ and $s_d \leq 1$. Ideal strictness s_d^* satisfies i 's FOC when

$$Z_s(w_i, s_d^*) + R_s(s_d^*) - \lambda_1 - \lambda_2 = 0.$$

Sufficiency is established by showing that Conditions 1 and 2 are sufficient for there to exist a s_d^* that satisfies the interior solution FOC

$$R_s(s_d^*) = -Z_s(w_i, s_d^*).$$

Fix w_i and suppose $R_s(0) > -Z_s(w_i, 0)$. Then an increase in s_d from 0 to some $s_d' = \varepsilon$, $\varepsilon > 0$ small, leads to an increase in i 's utility because the marginal religious benefit of an increase in s_d exceeds the marginal secular cost of that increase in s_d . Thus, the ideal strictness s_d^* is strictly greater than 0. Now suppose $R_s(1) < -Z_s(w_i, 1)$. Then a decrease in s_d from 1 to some $s_d = 1 - \varepsilon$, $\varepsilon > 0$ small, leads to an increase in i 's utility because the marginal decrease in religious benefits is smaller than the marginal secular benefit. Thus, the ideal strictness s_d^* is strictly less than 1. It follows that s_d^* should exist, must be in $(0, 1)$. Existence follows from applying the Intermediate Value Theorem on the interior FOC.

- (b) Suppose Conditions 1 and 2 are satisfied given wage w_i , i.e. $s_d^* \in (0, 1)$ solves

$$R_s(s_d^*) = -Z_s(w_i, s_d^*).$$

As w_i increases, the right-hand side of the interior FOC increases by A1 ($Z_{w_i} < 0$). To maintain the equality, the right-hand side must increase or the left hand side must decrease, or both. Given A1 ($Z_{ss} < 0$) and A2 ($R_{ss} < 0$), a decrease in s_d will do both. Thus, by applying the Envelope Theorem, we obtain the optimal interior strictness as a strictly decreasing function of the wage at wage w_i , i.e. $s_d^*(w_i)$ has $\partial s_d^*(w_i)/\partial w_i < 0$.

Now suppose Condition 1 is violated at wage w_i so that $R_s(0) < -Z_s(w_i, 0)$. Then i 's best feasible $s_d^* \in [0, 1]$ is 0, which solves the FOC with a strictly negative Lagrangian multiplier λ_1 :

$$R_s(s_d^*) = -Z_s(w_i, s_d^*) + \lambda_1.$$

A small increase in w_i will increase the first term of the RHS. Because s_d cannot decrease to offset the rise in the RHS, the multiplier must become more negative. We thus have $\partial s_d^*(w_i)/\partial w_i = 0$. If Condition 1 is violated with $R_s(0) = -Z_s(w_i, 0)$, then $s_d^* = 0$. The increase in the first RHS term now caused by an increase in w_i cannot be offset by a decrease in s_d^* , so again $\partial s_d^*(w_i)/\partial w_i = 0$.

Now suppose Condition 2 is violated at wage w_i so that $R_s(1) > -Z_s(w_i, 1)$. Then i 's best feasible $s_d^* \in [0, 1]$ is 1, which solves the FOC with a strictly positive Lagrangian multiplier λ_2 :

$$R_s(s_d^*) = -Z_s(w_i, s_d^*) + \lambda_2.$$

A small increase in w_i will increase the first term of the RHS, but a sufficiently small increase in w_i will still leave $R_s(1) > -Z_s(w_i, 1)$, leaving an optimal feasible strictness of 1. We thus have $\partial s_d^*(w_i)/\partial w_i = 0$. If Condition 2 is violated with $R_s(1) = -Z_s(w_i, 1)$, then, as above, the small increase in w_i will lead to a strictness just below 1 that equates the interior FOC at the new wage. Thus, $\partial s_d^*(w_i)/\partial w_i < 0$.

After considering all cases, we observe that $\partial s_d^*(w_i)/\partial w_i < 0$ holds at $s_d^*(w_i)$ in the interior, and either $\partial s_d^*(w_i)/\partial w_i < 0$ or $\partial s_d^*(w_i)/\partial w_i = 0$ when $s_d^*(w_i)$ is either 0 or 1. Clearly, if Conditions 1 and 2 are met for all finite w_i , then every $s_d^*(w_i)$ is in the interior. Having $\partial s_d^*(w_i)/\partial w_i < 0$ follows.

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NOTES

1. The Crawley and Berger quotes are both taken from Stark (1999).
2. For example, writing in 1710, Englishman Thomas Woolson (1670–1731) predicted the end of Christianity by 1900, and half a century later Voltaire predicted the end would come within 50 years (Stark 1999).
3. The ‘economics of religion’ literature is to be distinguished from the ‘religious economics’ literature (Kuran 1994). Iannaccone (1998) reviews many key issues in the economics of religion literature.
4. For a broad treatment of each side of the secularization debate, simultaneously read Bruce (2002) and Stark and Finke (2000).
5. Tension and strictness tend to go together, yet the two are distinct. Tension refers to the social context and possible stigmas, while strictness refers to the behavioural codes of conduct. A group may be equally strict in multiple environments while having different tension in each. For example, Mormons exist in tension with their surrounding neighbours, but that tension is much lower in Utah where there is a very large Mormon population than in Germany with a much smaller Mormon population.
6. See Chapter 6 of Stark and Finke (2000) for a discussion of another use of the terms ‘church’ and ‘sect’. In short, a church is usually thought of as a conventional religious organization that accepts the existing social order and does not impose demands far beyond society’s moral code. A sect, on the other hand, demands a ‘higher’ order of living. The church–low tension, sect–high tension connections follow. A sect can be further distinguished from a ‘cult’. A sect is rooted in the dominant religious tradition of the society, while a cult is a novel or alien religion. Because I use a uni-dimensional measure for tension or strictness, I do not distinguish between sect and cult. See Dawson (2003) for a discussion of cults.
7. For example, some religious goods are promises concerning the next life, which are not directly consumed in this life and which are not falsifiable.
8. My model was developed independently of Barros and Garoupa (2002) and originally used a different denomination production function. It assumed $\pi_d = Am_d - s_d$, which captures the notion that a denomination must offer larger benefits to its membership if it requires higher strictness from them, and these larger benefits are only possible at an increased cost. The main implication of this different production function is that equilibrium denomination sizes will differ according to strictness, whereas with fixed cost c equilibrium denomination sizes are roughly equal.
9. The primary effect of assuming denominations prefer larger memberships, all else equal, is that a denomination will only enter the market if it can meet a minimum membership size – a likely consideration for actual religious leaders with richer preferences but who require a minimum membership to provide services. In fact, if other goals are correlated with strictness, then a denomination leader pursuing various objectives will prefer locating at certain strictness levels more than others. With sufficiently numerous potential entrants of different preferred strictness locations, the results match those from the model used in the paper because the threat of entry is credible for any strictness level. Thus, having identical preferences for denomination leaders is a simplifying assumption but not a critical one for the results.
10. If located denominations receive payoffs higher than the reservation opportunity $\bar{\pi}$, then there will likely be competition in the first period to see who gets to enter. Thus, there can exist equilibria in which mixed entry strategies are played in period 1. I do not examine SPE with such mixed strategies because a pure equilibrium corresponds better to a long-run equilibrium with long-lived denominations.
11. A natural question is whether there is any empirical support for this result. I am aware of no direct empirical test of this prediction, though there is cross-country evidence that suggests that countries with fewer religious regulations have higher religious pluralism. An interpretation is that the costs of entry are lower in countries with lower regulations, which results in better filling of religious niches. See McBride (forthcoming) for a discussion on connecting the theory and empirics on the studies of religious pluralism and participation.
12. For recent formal examinations of these two concepts, see Montgomery (2003) and McBride (forthcoming). Chaves and Gorski (2001) survey the earlier empirical work.

13. See Aghion *et al.* (1999) for a detailed discussion of the possible relationships between economic growth and income equality.
14. If $F(\bar{s}) - F(1) \geq (c + \bar{\pi})/A$, then at least one denomination will locate at strictness 1; if $F(\bar{s}) - F(1) \geq 2((c + \bar{\pi})/A)$, then at least two denominations will locate at strictness 1; and so on.
15. See the USCIRF website for more information: <http://www.uscirf.gov/home.html>. A recent list of countries of particular concern included Burma, China, Eritrea, Iran, North Korea, Saudi Arabia, Sudan, Uzbekistan.
16. If $\underline{s} > 0$, then the monopoly can obviously maximize its membership by selecting $s_M = \underline{s}$. But if it selects some s_M larger than \underline{s} but still closer to \underline{s} than 0, then it will still obtain the entire population for its membership. It is easy to show that any strictness in $[\underline{s}, 2\underline{s})$ is closer to \underline{s} than 0 and thus maximizes the membership.
17. By locating at $s_M = 0$, all individuals are indifferent between non-affiliation and affiliation. The monopoly will split the population with non-affiliation for a membership size of $\frac{1}{2}(F(\bar{s}) - F(\underline{s}))$. By moving to strictness $\varepsilon > 0$ small, the monopoly is then strictly preferred to non-affiliation by all strictly positive ideal strictness individuals but strictly not preferred by all individuals with negative or zero ideal strictness. This yields the monopoly a membership of $F(\bar{s}) - F(0)$. Thus, the monopoly prefers locating at ε if $F(\bar{s}) - F(0) \geq \frac{1}{2}(F(\bar{s}) - F(\underline{s}))$, and prefers 0 otherwise. Notice that if ε is optimal, then membership exceeds one-half of the population, but it is equal to one-half of the population when strictness is 0.
18. Although they also find that countries with state religions exhibit higher vitality, likely due to religious subsidies.
19. Such analysis helps explain religious revival in post-communist eastern Europe. Communist ruling parties attempted to regulate or eliminate all religious practices and institutions. Official anti-religious sentiment vanished with the fall of communism, and as predicted by the model, many of the former communist countries then experienced an increase in religious vitality. However, not all countries experienced this upsurge, e.g. see Froese and Pfaff (2001) for an examination of the East German and Polish exceptions. The future of religion in eastern Europe is not clear, however, as more established religions are attempting to reassert monopoly or privileged status (Stark and Finke 2000).
20. See Gruber and Hungerman (2008) for evidence of how the repeal of Blue Laws in the United States led to reduction in demand for religious participation.
21. Montgomery (1996) studies a non-game theoretic version of this scenario. Members exert voice which, over time, leads to changes in the denomination's strictness. Such a consideration can account for 'stickiness' in a denomination's strictness over time if the distribution of members' characteristics persists through time. Such a setting would specifically account for dynamics in denominational strictnesses. My model here does not, technically speaking, consider dynamics; it is a static model with comparative static equilibrium analysis.

REFERENCES

- AGHION, P., CAROLI, E. and GARCIA-PENALOSA, C. (1999). Inequality and economic growth: the perspective of the new growth theories. *Journal of Economic Literature*, **37**, 1615–60.
- ANDERSON, G. (1988). Mr. Smith and the preachers: the economics of religion in the *Wealth of Nations*. *Journal of Political Economy*, **96**(5), 1066–88.
- BARRO, R. and MCCLEARY, R. (2003a). Religion and economic growth across countries. *American Sociological Review*, **68**(5), 760–81.
- and ——— (2003b). International determinants of religiosity. NBER Working Paper 10147.
- and ——— (2006). Religion and political economy in an international panel. *Journal for the Scientific Study of Religion*, **45**(2), 149–75.
- BARROS, P. and GAROUPA, N. (2002). An economic theory of church strictness. *Economic Journal*, **112**, 559–76.
- BAUMOL, W. (1967). Macroeconomics of unbalanced growth: the anatomy of urban crisis. *American Economic Review*, **57**(3), 415–26.
- BERGER, P. (ed.) (1999). *The Desecularization of the World: Resurgent Religion and World Politics*. Grand Rapids, MI: Eerdmans Publishing Company.
- BONNOT, B., BOOMERSHIRE, T. and SWEENEY, B. (2001). A liturgical via media: electronic media can energize people's experience, participation, and interactivity. *America*, **185**(14), 12–17.
- BRUCE, S. (ed.) (1992). *Religion and Modernization*. Oxford: Clarendon Press.
- (2002). *God is Dead: Secularization in the West*. Oxford: Blackwell.
- CHAVES, M. and GORSKI, P. (2001). Religious pluralism and religious participation. *Annual Review of Sociology*, **27**, 261–81.
- CHEN, D. (2007). Club goods and group identity: evidence from islamic resurgence during the Indonesian financial crisis. Manuscript.

- Christian Century, The* (2002). Faith amplified. *The Christian Century* **119**(11), 9.
- CLARK, B. (1956). Organizational adaptation and precarious values: a case study. *American Sociological Review*, **21**(3), 327–36.
- DAWSON, L. (ed.) (2003). *Cults and New Religious Movements: A Reader*. Malden, MA: Blackwell.
- EKELUND, R., HERBERT, R. and TOLLISON, R. (1989). An economic model of the medieval Church: usury as a form of rent seeking. *Journal of Law, Economics, and Organization*, **5**(2), 307–31.
- FINKE, R. (1997). The consequences of religious competition. In L. Young (ed.), *Rational Choice Theory and Religion: Summary and Assessment*. New York: Routledge.
- and STARK, R. (1992). *The Churching of America: 1776–1990*. New Brunswick: Rutgers University Press.
- FROESE, P. and PFAFF, S. (2001). Replete and desolate markets: Poland, East Germany, and the new religious paradigm. *Social Forces*, **80**(2), 481–507.
- GRIM, B. and FINKE, R. (2006). International religion indexes: government regulation, government favoritism, and social regulation of religion. *Interdisciplinary Journal of Research on Religion*, **2**, Article 1.
- GRUBER, J. (2005). Religious market structure, religious participation, and outcomes: is religion good for you? *Advances in Economic Analysis and Policy*, **5**(1), Article 5.
- and HUNGERMAN, D. (2008). The Church versus the mall: what happens when religion faces increased secular competition? *Quarterly Journal of Economics*, **123**(2), 831–62.
- IANNACONE, L. (1988). A formal model of church and sect. *American Journal of Sociology*, **94**(Suppl.), S241–68.
- (1990). Religious participation: a human capital approach. *Journal for the Social Scientific Study of Religion*, **29**(3), 297–314.
- (1992). Sacrifice and stigma: reducing free-riding in cults, communes, and other collectives. *Journal of Political Economy*, **100**(2), 271–91.
- (1994). Why strict churches are strong. *American Journal of Sociology*, **99**(5), 1180–211.
- (1998). Introduction to the economics of religion. *Journal of Economic Literature*, **XXXVI**, 1465–96.
- JOHNSON, B. (1963). On church and sect. *American Sociological Review*, **28**(4), 539–49.
- KURAN, T. (1994). Religious economics and economics of religion. *Journal of Institutional and Theoretical Economics*, **150**, 769–75.
- MCBRIDE, M. (forthcoming). Religious pluralism and religious participation: a Game theoretic analysis. Department of Economics, University of California, Irvine.
- MONTGOMERY, J. (1996). Dynamics of the religious economy: exit, voice, and denominational secularization. *Rationality and Society*, **8**(1), 81–110.
- (2003). A formalization and test of the religious economies model. *American Sociological Review*, **68**(5), 782–809.
- O'ROURKE, K. (2001). Globalization and inequality: historical trends. *NBER Working Paper 8339*.
- PORTEOUS, S. (1994). The techno-religious right. *Free Inquiry*, **14**(4), 7–8.
- RIZVI, H. (2006). Globalization driving inequality, UN warns. *Inter Press Service News Agency*, 26 August: <http://www.commondreams.org/headlines05/0826-03.htm>
- STARK, R. (1999). Secularization, RIP. *Sociology of Religion*, **60**(3), 249–73.
- and FINKE, R. (2000). *Acts of Faith: Explaining the Human Side of Religion*. Berkeley, CA: University of California Press.
- and IANNACONE, L. (1994). A supply-side reinterpretation of the 'secularization' of Europe. *Journal for the Scientific Study of Religion*, **33**(3), 230–52.
- SWATOS, W. and CHRISTIANO, K. (1999). Secularization theory: the course of a concept. *Sociology of Religion*, **60**(3), 209–28.
- TSCHANNEN, O. (1991). The secularization paradigm: a systemization. *Journal for the Scientific Study of Religion*, **30**(4), 395–415.
- WARNER, R. S. (1993). Work in progress toward a new paradigm for the sociological study of religion in the United States. *American Journal of Sociology*, **98**, 1044–93.
- YOUNG, L. (ed.) (1997). *Rational Choice Theory and Religion: Summary and Assessment*. New York: Routledge.