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Religious participation and children's education: A social capital approach

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Abstract

Based on the argument in both economic and sociological literature that religion is conducive to children's human capital formation, this paper provides a model of religious participation and explores a mechanism that "social capital" affects children's education, *a la* Coleman [Coleman, J.S., 1988. Social capital in the creation of human capital. *American Journal of Sociology* 94, S95–S120]. The model generates several interesting implications, which help explain some important stylized facts about education and religion. Further, in a dynamic setting, the model shows that there exists a steady state in which individuals allocate a positive amount of time and resources to religious activities. Thus, it complements the existing literature to explain why seemingly unproductive religions can be everlasting.

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1. Introduction

Inspired by Coleman (1988), there has been an increasing awareness of the importance of "social capital" in the recent economic literature. As reflected in the title of his seminal contribution, Coleman particularly emphasizes that social capital greatly affects individuals' human capital formation. Along this line of research, the current paper analyzes an important and largely ignored form of social capital in the creation of human capital: religion.¹ This paper attempts to

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¹ Religion has long been and continues to be a very important social and economic phenomenon. For example, religious contributions account for about half of the philanthropic giving in the United States. Of American adults, 90 percent claim to have a religion, and more than 60 percent are formal members of a church or synagogue (Iannaccone, 1998).

achieve two purposes. First, it provides a model of religious participation that adds to the economic literature of religion. Second, it complements the existing human capital models based on social interactions by analyzing a framework in which social capital (e.g. religion) affects children's educational attainment.

This paper links religion to education and posits that individuals participate in religious activities not only because of their religious beliefs, but also because religion is conducive to their children's human capital formation. There is substantial evidence showing that religion has a significant positive impact on children's educational attainment and future earnings.² Also, sociologists' extensive research indicates that youth raised in religious homes are less likely to engage in criminal activity, use drugs or alcohol, and so on.³ Indeed, many religions emphasize hard work, honesty, seriousness, and responsibility, all of which are conducive to children's acquisition of cognitive and non-cognitive skills.⁴ In response, parents' religious participations are often affected by the concern for their children's cognitive and moral development. For example, in his influential writing on the sociology of religion, [Wilson \(1978, pp. 262–263\)](#) notes that

“... Religious training is something that all but two percent of American parents feel they should give their children ... (Parents) see (the church) as a place of character building for their children ... Children are frequently the most important consideration in choosing a particular church ... Couples with growing children have the highest rate of church attendance.”

Further, as shown by sociologists and psychologists' research, parents' religious participation is essential for their children's religious training.⁵ For example, [Nock \(1992, p. 333\)](#) summarizes:

“... American parents believe it important that their children receive moral and ethical guidelines from their church. This is why church attendance is highest among parents with young children ... children are much more responsive to the behavioral models than to instruction. They are much more likely to imitate what they see parents and others *do* than what they hear parents and others *say* ...”

Based on the above observations and analyses, I construct a model in which an individual's religious participation is due to the concern for her children's human capital formation as well as her religious beliefs. In this model, an individual's human capital is jointly determined by her family background and her social capital. Specifically, an individual's family background is represented by her parental human capital, and her social capital is measured by her religious capital. Meanwhile, a household's religious activities enhance the social capital for the children's education. In a related paper, [Weinberg \(2001\)](#) analyzes a model in which parents use external incentives, such as pecuniary rewards and/or corporal punishment, to induce their children to exert efforts in human capital accumulation. In contrast, this paper suggests that religious education

² For example, see [Evans and Schwab \(1995\)](#), [Neal \(1997\)](#), [Vella \(1999\)](#), and [Ewing \(2000\)](#).

³ See, for example, the survey by [Iannaccone \(1998\)](#).

⁴ For example, see the reviews of [Landes \(2000\)](#) and [Rosser and Rosser \(1999\)](#) on the virtues of some religions and traditions.

⁵ [McCleary and Barro \(2006, p. 152\)](#) also note: “... the incentive to bring children to services tends to induce greater involvement of adults, who are likely to want to participate in the process of inculcating in their children and in ensuring that religious values and traditions are transmitted across generations”.

constitutes a kind of internal enforcement mechanism for children to learn to follow moral rules and exert effort in study.⁶

In an overlapping generations framework, this model generates several interesting implications. First, it investigates how individuals' religious participations are endogenously determined in a framework where parental human capital and social capital interact in the creation of human capital. The model implies that there is a close relationship between an individual's educational attainment and the level of her religious participation. Moreover, it helps to explain an important stylized fact about education and religion revealed by [Sacerdote and Glaeser \(2001\)](#) that in the United States, while religious attendance rises sharply with education across individuals, it declines sharply with education across denominations. Sacerdote and Glaeser explain this phenomenon as that education both increases the returns to social connection and reduces the extent of religious belief. This model provides an alternative explanation, by showing that the result that is consistent with this stylized fact can be obtained if parental human capital and social capital are substitutes in a child's human capital formation.

Next, in a dynamic setting, this paper analyzes the long-run equilibria of individuals' human capital and religious activities. Under some reasonable assumptions, the model shows that there exists a steady state in which individuals allocate a positive amount of time and resources to religious activities. Thus, the model helps to explain why seemingly unproductive religions can perpetuate. In the received literature, [Bisin and Verdier \(1998, 2000\)](#) demonstrate that cultural and religious traits can be transmitted from one generation to the next because of parents' "imperfect empathy". [Cozzi \(1998\)](#) explains the perpetuation of culture and religion as a bubble phenomenon. This paper complements the existing literature by providing a model in which religion is everlasting because of intergenerational altruism and the value of religious/cultural capital in children's human capital formation.

In what follows, Section 2 provides a brief review of some related theoretical literature. Section 3 establishes the basic analytic framework. Section 4 investigates how individuals' religious participation is endogenously determined. Section 5 analyzes the long-run equilibria of the dynamics of individuals' human capital and religious activities. Section 6 offers the conclusion.

2. Theoretical antecedents

First, this paper is related to the economic literature of religion. In recent decades, some important contributions have been made in modeling religion and religious behaviors. [Azzi and Ehrenberg \(1975\)](#) analyze a model of church attendance and contributions in which individuals allocate their time and money among religious and secular commodities to maximize lifetime and afterlife utility. [Iannaccone \(1990\)](#) applies [Stigler and Becker's \(1977\)](#) idea of "consumption capital" to explain rational habit formation in religious activities. In this framework, current religious participation increases an individual's stock of "religious human capital" and thereby increases the individual's utility from future participation. [Iannaccone \(1992\)](#) presents a model that accounts for the continuing success of groups with strict requirements. In particular, the model shows that efficient religions with perfectly rational members may benefit from stigma, self-sacrifice and bizarre behavioral restrictions because deviant norms mitigate the free-rider

⁶ In fact, as stressed by [Smith \(1776\)](#), one of the most economically significant functions of religious belief is to provide strong incentives for individuals to follow moral code. Smith explains that religion effectively complements legal rules and other incentives that cause individuals to control their own behavior. (See [Anderson, 1988](#) for a comprehensive survey on Smith's writings on the economics of religion.)

problems faced by religious groups. Bisin and Verdier (2000) extend the study of religion into an intergenerational framework. Assuming that parents get more utility if the children adopt their religion, Bisin and Verdier present an economic analysis of the intergenerational transmission of religious traits through family socialization and marital segregation. Barros and Garoupa (2002) introduce spatial location models into the economics of religion. Dehejia et al. (2005) show that involvement with religious organizations insures an individual's stream of consumption and of happiness.

Second, this paper is also related to the human capital models based on social interactions.⁷ For example, Borjas (1992) and Lundberg and Startz (1998) analyze models in which an individual's human capital is determined by the average level of human capital of the ethnic group to which she belongs as well as her own parental human capital.⁸ Benabou (1993) suggests that the neighborhoods with a high level of average parental human capital facilitates one's human capital formation. He shows that for neighborhoods are formed endogenously, higher income people live in the communities whose rent and average level of human capital are both higher. Epple and Romano (1998) and Brock and Durlauf (2001b) posit that a student's academic achievement is determined by both her own ability/effort and mean ability/effort of her classmates. Epple and Romano show that in equilibrium, parents who have high income and high-ability children pay high tuition to send their children to private schools in which there is better peer-group externality than public schools. In summary, the existing literature implies that an individual's social capital is either exogenous or is essentially "purchased" by her parents. This paper extends the existing literature by suggesting that the main cost of obtaining some kinds of social capital, such as religious capital, is parents' time (of religious participation), that is, parents' opportunity cost. Indeed, as suggested by Iannaccone (1988, 1992), religious/cultural capital can be regarded as a "quasi-public good". Like a public good, it does not exclude any individual. Unlike a true public good, however, it is limited to the participants of religious activities.

3. The analytic framework

3.1. Preferences

Individuals operate in a two period overlapping generations world. Every individual belongs to a family, where she is a child in her first period and becomes a parent in her second period. Each family has one parent and one child, and the parent is the decision maker of a household.

A parent cares about her household's current consumption and her child's future earnings. Also, she may obtain utility or disutility from participating in religious activities. The utility function of a parent of generation t is defined as

$$\ln(C_t) + \eta \ln(Y_{t+1}) + \theta \alpha_t \quad (1)$$

where C_t , Y_{t+1} , and α_t denote the household's consumption, the child's future wage and the fraction of the parent's time devoted to religious participation respectively. η and θ are constant parameters. η ($\eta > 0$) measures the relative weight between a parent's concern for her child's future income and that for her family's current consumption.

⁷ For the extensive surveys of this literature, see Becker and Murphy (2000) and Brock and Durlauf (2001a).

⁸ In a broader sense, Lucas (1988) and Galor and Tsiddon (1996) study a human capital formation function in which the inputs are one's parental human capital and the average level of human capital of the whole society.

θ measures an individual's taste for participating in religious activities *per se*. The greater θ is, the more utility one gets from religious participation. (Note that θ can be either positive or negative or 0.) An individual's value of θ may depend on many factors, such as the degree to which she believes in God, her "afterlife consumption motive" (Azzi and Ehrenberg), and the desire for social interactions (Iannaccone, 1992, Sacerdote and Glaeser).

Y_t is the total earnings when a parent devotes all of her time to working. If one allocates α_t of her time in religious activities, her net earnings become $(1 - \alpha_t)Y_t$.⁹ For simplicity, there are no bequests of wealth in this model. Thus, the consumption of a household is equal to the parent's net earnings. Namely,

$$C_t = (1 - \alpha_t)Y_t. \quad (2)$$

3.2. Human capital formation

An individual's parental human capital and social capital are both important in her human capital formation. The importance of parental human capital on an individual's educational attainment is consistently confirmed in numerous empirical studies.¹⁰ Also, as discussed in the introduction, the social capital a child is exposed to affects her motivation and effort at study, and so on, and hence influences her human capital formation. In this model, the social capital a child is exposed to, S , is represented by the religious capital. Meanwhile, the amount of the religious capital that a child is exposed to depends on her parents' religious participation. Thus, I define

$$S = g(\alpha).$$

and I assume

$$g'(\alpha) > 0, \quad g''(\alpha) < 0. \quad (3)$$

Let H_t denote the level of human capital of an individual of generation t , and the human capital production function is defined as follows:

$$H_{t+1} = h(H_t, S_t) = h(H_t, g(\alpha_t)). \quad (4)$$

The production function of human capital is assumed to be strictly increasing and strictly concave with respect to its variables, that is,

$$h_1(H, S) > 0, \quad h_2(H, S) > 0, \quad h_{11}(H, S) < 0, \quad h_{22}(H, S) < 0. \quad (5)$$

3.3. Production

In this economy, there is a single good that can be produced by two constant returns to scale technologies. One is "modern" production technology, which is human capital (or skilled labor) intensive; the other is "traditional" production technology, which is physical (or unskilled) labor

⁹ This assumption is consistent with the empirical finding by Lipford and Tollison (2003). McCleary and Barro also emphasize opportunity costs as the main costs of religious participations.

¹⁰ In fact, much empirical research seems to suggest that the effect of parental education on children's education is much greater than that of parental expenditure on children's education in developed countries. For example, based on his exhaustive survey of the existing literature, Hanushek (1996, p. 16) concludes that "schools (i.e. expenditure on children's schooling) seemed relatively unimportant in determining student achievement, while families were the key element of student success".

intensive. To present the model in the simplest way, I follow Galor and Zeira (1993), Hazan and Berdugo (2002), and Fan (2003), among others, by assuming that the only input in the modern (skilled) sector is human capital (or mental labor, simply speaking), while the only input in the traditional (unskilled) sector is physical labor.

This simple assumption is, in fact, very intuitive. For example, for professors and doctors, their productivity is determined by their human capital (knowledge and skills); for janitors and porters, their productivity is determined mainly by their raw labor, and is little affected by their academic performance. This assumption is also supported by some formal empirical studies. For example, Bishop (1990) shows that achievement in science, mathematical reasoning, reading, and vocabulary has almost no effect during the decade following graduation on the wage rates and earnings of those not going to college. However, it should be noted that the purpose of this assumption is only for technical simplicity. It is both intuitive and easy to verify that we can obtain similar results as long as we maintain that human capital is used more intensively in the skilled sector.

Specifically, the production function of the “modern” technology is described by

$$Y_t^s = L_t^s \quad (6)$$

where Y_t^s and L_t^s are the output and the total human capital input in this sector at time t , respectively. The production function of the “traditional” technology is described by

$$Y_t^n = w_u L_t^n \quad (7)$$

where Y_t^n and L_t^n are the output and the total unskilled labor force in this sector at time t , respectively.

The above two production technologies are available to every individual. However, an individual has to choose to work either as a skilled or an unskilled worker, but not both. Every individual is assumed to be endowed with *one* unit of physical labor in her second period (regardless of the level of her educational attainment), while the amount of human capital that an individual has in her second period is acquired entirely in her first period. From (6) and (7), one can see that since the economy is perfectly competitive, the wage rate for human capital in the “modern” sector and the wage rate for raw labor in the “traditional” sector are 1 and w_u , respectively. Thus, if an individual acquires H_t amount of human capital in her first period, then her earnings will be

$$Y_t = \begin{cases} H_t & \text{if she becomes a skilled worker} \\ w_u & \text{if she becomes an unskilled worker.} \end{cases} \quad (8)$$

4. Religious participation and children's education

This section analyzes how individuals' religious participation is endogenously determined. It shows that an individual's educational attainment plays a critical role in the level of her religious participation, her child's human capital formation, and her occupational choice.

4.1. Religious participation and children's occupation choice

First, the following analysis shows that parents' religious participation depends on children's occupational choices.

4.1.1. Case 1: Children will be unskilled

If the child will be unskilled, as described in Section 3.3, $Y_{t+1} = w_u$. Thus, a parent's utility function is

$$U^u \equiv \ln((1 - \alpha_t)Y_t) + \eta \ln(w_u) + \theta\alpha_t. \tag{9}$$

In this case, clearly, the parent's choice on religious participation is only determined by her taste for religion, θ .¹¹ Maximizing (9) subject to $\alpha_t \geq 0$, I get the first order condition as

$$-\frac{1}{1 - \alpha_t} + \theta \leq 0, \tag{10}$$

which holds with strict equality if $\alpha_t > 0$. I denote the solution to (10) by α^u , then

$$\alpha^u = \begin{cases} 0 & \text{if } \theta < 1 \\ \frac{\theta-1}{\theta} & \text{if } \theta \geq 1. \end{cases} \tag{11}$$

From (11), one can see that when an individual is not concerned about her child's education, she will not participate in any religious activities if she does not have strong religious beliefs (i.e. $\theta < 1$).

When $\theta \geq 1$,

$$d\left(\frac{\theta - 1}{\theta}\right) = \frac{1}{\theta^2} > 0.$$

Thus, α^u is a strictly increasing function of θ when $\theta \geq 1$. For example, it is often observed that people participate in more religious activities when their beliefs grow stronger.

4.1.2. Case 2: Children will be skilled

In this case, from (8), $Y_{t+1} = H_{t+1} = h(H_t, g(\alpha))$, and a parent's utility function is

$$U^s \equiv \ln((1 - \alpha_t)Y_t) + \eta \ln(h(H_t, g(\alpha_t))) + \theta\alpha_t. \tag{12}$$

The first order condition is

$$-\frac{1}{1 - \alpha_t} + \theta + \frac{\eta h_2 g'}{h} \leq 0 \tag{13}$$

with strict equality holds if $\alpha_t > 0$. I denote the solution to (13) by α_t^s . Then, comparing (10) and (13), I obtain the following lemma.

Lemma 1. For a parent with any given level of human capital,

$$\begin{aligned} \alpha_t^s &\geq \alpha^u & \text{if } \theta < 1, \text{ and} \\ \alpha_t^s &> \alpha^u & \text{if } \theta \geq 1. \end{aligned}$$

¹¹ For simplicity, the model abstracts from the consideration that religious beliefs can reduce the likelihood of children's undesirable behaviors (e.g. criminal activities, premature pregnancy). If the model were extended to take into account this issue, it would conclude that the concern for children will lead all parents to participate more in religious activities no matter whether their children will be skilled or unskilled. However, as will be clear, this consideration will not change the results of the paper qualitatively.

Proof. First, when $\theta < 1$, $\alpha^u = 0$. Because the time of religious participation cannot be negative, obviously, $\alpha_t^s \geq 0 = \alpha^u$.

Second, when $\theta \geq 1$, (10) holds with strict equality, namely

$$\frac{1}{1 - \alpha^u} = \theta. \tag{14}$$

Meanwhile, (13) implies

$$\frac{1}{1 - \alpha_t^s} \geq \theta + \frac{\eta h_2 g'}{h} > \theta. \tag{15}$$

(14) and (15) imply

$$\frac{1}{1 - \alpha_t^s} > \frac{1}{1 - \alpha^u}$$

which implies

$$\alpha_t^s > \alpha^u. \quad \square$$

This lemma implies that parents tend to participate in more religious activities if they are concerned about their children’s human capital formation. Moreover, from the above proof, it is easy to see that the difference between α_t^s and α^u tends to increase as the marginal benefit of religious participation, $g'(\alpha)$, increases.

At this point, note that if we relax an assumption in Section 3.3 by assuming that the inputs of the unskilled sector include both human capital and physical labor, it can be verified that similar to the proof of Lemma 1, we can still get the result “ $\alpha_t^s > \alpha^u$ ” if “ $\alpha^u > 0$ ”; that is, parents whose children will be skilled tend to participate more in religious activities, although in this case α^u would also be affected by the concern for children’s human capital formation. In other words, Lemma 1 will still materially hold under the relaxed assumption. Therefore, the simplifying assumption made in Section 3.3 significantly reduces the algebra without any loss of generality.

4.1.3. Occupational choice

From (8), clearly, an individual will choose to be skilled in her second period if and only if

$$H_{t+1} \geq w_u.$$

Now, I define H^h as satisfying

$$h(H^h, g(\alpha^u)) = w_u.$$

Then, for all $H_t > H^h$,

$$H_{t+1} = h(H_t, g(\alpha_t)) > h(H^h, g(\alpha^u)) = w_u.$$

Thus, an individual will choose to be skilled if her parental human capital is greater than H^h .

If $H_t < H^h$, a child’s occupational choice may depend on her parent’s religious participation. A parent will prefer that her child will be skilled if and only if

$$U^s \geq U^u.$$

I define

$$\begin{aligned} \Delta U \equiv U^s - U^u &= \ln((1 - \alpha_t^s)Y_t) + \eta \ln(h(H_t, g(\alpha_t^s))) + \theta\alpha_t^s - \ln((1 - \alpha^u)Y_t) - \eta \ln(w_u) \\ &\quad - \theta\alpha^u = \ln((1 - \alpha_t^s)) + \eta \ln(h(H_t, g(\alpha_t^s))) + \theta\alpha_t^s - \ln((1 - \alpha^u)) - \eta \ln(w_u) - \theta\alpha^u. \end{aligned}$$

Then, no matter whether the parent is skilled or unskilled, by the Envelop Theorem, we have

$$\frac{d(\Delta U)}{dH_t} = \frac{\eta h_1}{h} > 0. \tag{16}$$

Thus, there exists a unique $H^c \in [0, H^h)$ such that $U^s \geq U^u$ if and only if $H_t \geq H^c$. In summary, the following lemma is obtained.

Lemma 2. *There exists a critical value, H^c , such that a child will become skilled if and only if her parental human capital is greater than or equal to H^c .*

4.2. Education and religion

The above analysis shows that the level of an individual's religious participation is a function of her human capital. Thus, I define an individual's optimal choice of the level of her religious participation as

$$\alpha(H_t).$$

Then, from Lemmas 1 and 2, we have the following result.

Proposition 1.

$$\begin{aligned} \alpha(H_t) &= \alpha^u && \text{if } H_t < H^c \\ \alpha(H_t) &\geq \alpha^u \text{ (with strict inequality holds if } \theta \geq 1) && \text{if } H_t \geq H^c. \end{aligned}$$

Proposition 1 means that there is a threshold level of human capital such that the individuals whose human capital is below the threshold level tend to participate less in religious activities. The intuition of this proposition is straightforward. If an individual's human capital is low, her child will likely work in an occupation in which raw labor is intensively used and human capital acquired through formal education is not intensively used. Consequently, her decision on religious participation will be little affected by the concern for her child's education. Therefore, *ceteris paribus*, an individual's level of religious participation is higher if her human capital is above a certain threshold level so that her child will likely be skilled. Proposition 1 is consistent with a stylized fact about education and religion in the United States, that is, education is the most statistically important factor explaining church attendance, and religious attendance rises sharply with education across individuals (Iannaccone, 1998, Sacerdote and Glaeser).

The following analysis will examine the relationship between education and religious activities for those whose human capital is above the threshold level, H^c . For simplicity, I only consider the case when the optimal solution is interior so that (13) holds with strict equality. Totally differentiating (13) with respect to α_t and H_t and rearranging, I get

$$\left[-\frac{1}{(1 - \alpha_t)^2} + \frac{\eta}{h^2} (hh_{22}(g')^2 + hh_2g'' - (h_2g')^2) \right] d\alpha_t + \frac{\eta g'}{h^2} (hh_{12} - h_1h_2) dH_t = 0. \tag{17}$$

I define

$$A \equiv -\frac{1}{(1 - \alpha_t)^2} + \frac{\eta}{h^2} [hh_{22}(g')^2 + hh_2g'' - (h_2g')^2]. \tag{18}$$

Clearly $A < 0$. Then, from (17), I get

$$\frac{d\alpha_t}{dH_t} = \frac{\eta g'}{Ah^2}(h_1h_2 - hh_{12}). \quad (19)$$

From (19), the following proposition is obtained.

Proposition 2. *When $H_t \geq H^c$, the level of an individual's religious participation decreases with her human capital (i.e. $d\alpha_t/dH_t < 0$) if and only if*

$$h_{12} < \frac{h_1h_2}{h}. \quad (20)$$

From (20), one can see that Proposition 2 implies that an individual's religious participation is negatively correlated with her education level if

$$h_{12} \leq 0. \quad (21)$$

When (21) is satisfied, it can be interpreted as that social capital and parental human capital are substitutes in creating children's human capital. In this case, when $H_t \geq H^c$, individuals with higher levels of human capital and wage rate will have less incentive to participate in religious activities because they have higher opportunity cost of religious participation and their religious activities are less efficient in enhancing their children's human capital due to the substitution effect between parental human capital and social capital in children's education.

Moreover, when (20) is satisfied, the combination of Propositions 1 and 2 has the following implication. Proposition 1 implies that better educated individuals are more likely to participate in religious activities; Proposition 2 indicates that the frequency of an individual's religious participation may decrease with her educational attainment. Meanwhile, Iannaccone (1992) demonstrates that in an efficient market of religions, individuals are usually sorted into different denominations according to their intensity of participation. In other words, individuals belonging to the same denomination tend to have similar levels of religious attendance. Therefore, based on Iannaccone (1992), the combination of Propositions 1 and 2 provides an explanation for an important stylized fact about education and religion in the United States revealed by Sacerdote and Glaeser: while religious attendance rises sharply with education across individuals, it declines sharply with education across denominations.

Finally, note that if social capital and parental human capital are complements in creating children's human capital and the complementary effect is sufficiently strong such that (20) is violated, individuals with a higher level of human capital and wage rate will participate in more religious activities. However, it should be pointed out that there is little empirical research on the interactions between social capital and other factors (e.g. family background) in an individual's human capital formation function. This theoretical analysis illustrates the importance for such an empirical endeavor in future research.

The following example helps to illustrate the above proposition and assumptions.

Example 1. Suppose that the human capital production function takes the following form,

$$H_{t+1} = h(H_t, S_t) = B(H_t^\sigma + S_t^\sigma)^{1/\sigma}. \quad (22)$$

where B and σ are positive coefficients.

From (22), we have,

$$h_1 = BH_t^{\sigma-1}(H_t^\sigma + S_t^\sigma)^{(1/\sigma)-1}$$

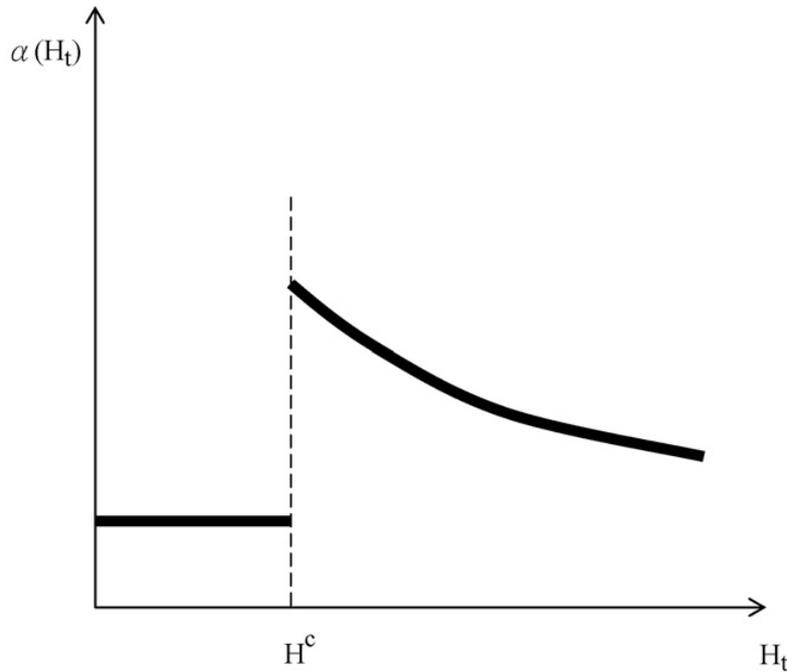


Fig. 1. The relationship between education and religious participation.

$$h_2 = BS_t^{\sigma-1}(H_t^\sigma + S_t^\sigma)^{(1/\sigma)-1}$$

$$h_{12} = B(1 - \sigma)H_t^{\sigma-1}S_t^{\sigma-1}(H_t^\sigma + S_t^\sigma)^{((1/\sigma)-2)}.$$

Clearly, $h_{12} \leq 0$ if and only if

$$\sigma \geq 1.$$

Also, if $\sigma < 1$, $hh_{12} < h_1h_2$ if and only if

$$B^2(1 - \sigma)H_t^{\sigma-1}S_t^{\sigma-1}(H_t^\sigma + S_t^\sigma)^{2((1/\sigma)-1)} < B^2H_t^{\sigma-1}S_t^{\sigma-1}(H_t^\sigma + S_t^\sigma)^{2((1/\sigma)-1)},$$

namely

$$\sigma > 0.$$

Thus, in this example, noting Proposition 2, we always have $d\alpha_t/dH_t < 0$ when $H_t > H^c$.

Moreover, the relationship between the level of an individual's religious participation and her education level can be illustrated by Fig. 1.

Fig. 1 illustrates the relationship between an individual's religious participation and her education level. An individual's level of religious participation is constant at a relatively low level when $H_t < H^c$. When $H_t > H^c$, an individual's religious participation is higher than that when $H_t < H^c$, but it decreases with her education level in this domain of H_t .

5. Long-run equilibrium

This section analyzes the long run equilibria of the dynamics of individuals' religious activities and human capital. First, the steady states of the level of religious participation and human capital of a dynasty are defined as follows:

$$\alpha_t = \alpha_{t+1} = \alpha_{t+2} = \dots$$

$$H_t = H_{t+1} = H_{t+2} = \dots$$

In this section, I focus on the study of the households whose children become skilled. Note that for the individuals whose children become unskilled, their religious activities in both long run and short run is simply determined by θ in Eq. (11). Thus, what is more interesting is the case of skilled dynasties, whose level of religious participation is influenced by the concern of the social capital for their children's human capital formation. First, I state and prove the following lemma.

Lemma 3.

(1) *If the following conditions are satisfied,*

$$\lim_{H \rightarrow \infty} h_1(H, S) = 0 \tag{23}$$

$$h(H^c, g(\alpha^u)) > H^c, \tag{24}$$

then there exists a steady state in which individuals are skilled.

(2) *If, in addition, $dH_{t+1}/dH_t > 0$ at the steady states, then at least one of the steady states is stable.*

Proof.

(1) By Lemma 2, an individual will be skilled if and only if her parental human capital, H_t , is greater than H^c . If (24) is satisfied, her human capital, H_{t+1} , will be

$$H_{t+1} = h(H_t, g(\alpha^s(H_t))) > h(H^c, g(\alpha^u)) > H^c.$$

Thus, her child will also be skilled, and so will all of her future generations. Also, from (23) and using l'Hôpital's rule, we know

$$\lim_{H \rightarrow \infty} \frac{h(H, S)}{H} = \lim_{H \rightarrow \infty} h_1(H, S) = 0.$$

Thus, there exists a H^f , which is sufficiently large, so that

$$h(H^f, g(\alpha^s)) < H^f.$$

In other words, at $H_t = H^f$, we have $H_{t+1} < H_t$. Meanwhile, (24) implies that at $H_t = H^c$, we have $H_{t+1} > H_t$. Thus, the locus of the dynamics of individuals' human capital must cross the 45° line between $H_t = H^c$ and $H_t = H^f$ at least once. In other words, there must be at least one steady state.

Moreover, since α_t^s is a function of H_t only, α_t^s will also reach a steady state when H_t reaches a steady state.

(2) Note that at the first intersection between the locus of the dynamics of individuals' human capital and the 45° line, the locus crosses the 45° line from above. If in addition $dH_{t+1}/dH_t > 0$ at the steady state, then the slope of the locus at that intersection point must be less than one and greater than 0, which implies that the steady state is stable. □

Let α^s and H^s denote a steady state level of religious participation and human capital of the skilled dynasties. In the following, I will show under what conditions $\alpha^s > 0$. This goal can be achieved by demonstrating the conditions for “ $\alpha^s = 0$ ” that cannot satisfy the first order condition.

If $\alpha^s = 0$, the first order condition (13) becomes

$$-1 + \theta + \frac{\eta h_2(H^s, g(0))g'(0)}{h(H^s, g(0))} \leq 0. \quad (25)$$

Meanwhile, that H^s is the steady state level of human capital implies

$$H^s = h(H^s, g(0)). \quad (26)$$

Plugging (26) into (25), I get

$$-1 + \theta + \frac{\eta h_2(H^s, g(0))g'(0)}{H^s} \leq 0,$$

namely

$$g'(0)h_2 \leq \frac{H^s(1 - \theta)}{\eta}. \quad (27)$$

Clearly, (25) or (27) will not be satisfied if $g'(0)$ and h_2 are sufficiently large. In other words, if $g'(0)$ and h_2 are sufficiently large, $\alpha^s = 0$ cannot be the optimal solution in the steady state. Thus, the following proposition is obtained.

Proposition 3. *At the steady state, for any θ ,*

$$\alpha^s > 0$$

if $g'(0)$ and $h_2(H_t, g(0))$ are sufficiently large.

This proposition shows that even if θ becomes very small or negative, that is, individuals obtain no utility or negative utility from religious participation, religion can still perpetuate due to its positive role in children's human capital formation. Thus, the model provides an explanation of why many religions can persist in the long run, despite the advance of science and technology that may make many people become less religious and more skeptical of faith-based claims. Moreover, this result has interesting growth implications since human capital is a crucial determinant of economic development.¹²

In the received literature, [Bisin and Verdier \(1998, 2000\)](#) examine the models in which parents get more utility if their children adopt their religion/culture. They demonstrate that cultural and religious traits can be transmitted from one generation to the next because of parents' imperfect empathy. [Cozzi](#) provides a model in which culture and religion is a bubble. He shows that culture and religion can perpetuate because individuals have incentives to purchase them due to the self-fulfilling expectation of an ever-increasing price of this immaterial asset over its market fundamental. This paper complements the existing literature by providing a model in which religion is everlasting because of intergenerational altruism and the value of religious/cultural capital in children's human capital formation.

6. Conclusion

This paper attempts to achieve two purposes by linking religion and education. First, it provides an alternative model of religious participation that adds to the economic literature of religion.

¹² For example, [Guiso et al. \(2003\)](#) show that religious beliefs are associated with the economic attitudes that are conducive to higher per capita income and growth.

Second, it complements the human capital models based on social interactions by analyzing a framework in which social capital, such as religion, affects children's education, *a la* Coleman. Based on sociologists' research as well as the existing economic literature, I build a model in which people's religious participation are determined by the concern for their children's human capital accumulation as well as their religious beliefs. Because religious capital is conducive to children's education and moral development, a household's religious participation not only increases its members' utility from religious pursuit *per se* but also enhances the social capital for the creation of the children's human capital. In other words, religion has a value of investment (in children's human capital) as well as a value of consumption.

In an overlapping generations framework, this model generates several interesting implications. It suggests that there is a close relationship between an individual's education attainment and the level of her religious participation. Moreover, by assuming that parental human capital and social capital are substitutes in a child's human capital formation, the model provides an explanation for an important stylized fact revealed by Sacerdote and Glaeser that in the United States, while religious attendance rises sharply with education across individuals, it declines sharply with education across denominations. Further, this paper analyzes the long-run equilibrium of individuals' human capital and religious activities, which helps to explain why seemingly unproductive religions can be everlasting.

In future research, the model can be extended in several ways. For example, for simplicity, this model assumes that parents obtain utility only from children's human capital and future income. If we add that parents (particularly at old age) also obtain utility from the "services" from children, as emphasized by Bernheim et al. (1985), then people would have more motivation to provide their children with religious education because many religions emphasize that children should always honor and revere their parents. Also, this paper can be extended to study endogenous social interactions among different households in the context of endogenous religious/cultural participation.

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