An Economic Theory of Church Location

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Abstract

This paper is a contribution to the economic theory of religion by applying the neoclassical theory of firm location to church behavior.

We propose a theory of church location given religious preferences on strictness. The model is able to explain several stylized facts, without resorting to changes in preferences: (i) with religious freedom, the main church becomes less conservative in their views; (ii) in societies where the main church competes with (a) another church, the main church is fairly liberal; (b) a sect, the main church is fairly conservative.

Key words: location theory, economics of religion

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1 Introduction

The literature of economic analysis of religion is very scarce. Armed with the tools of economic theory, the economics of religion attempts to address issues that were previously confined to other social sciences: the determinants of religious belief and behavior, the nature and behavior of religious institutions, and the economic impact of religion. The recent Journal of Institutional and Theoretical Economics issue on economics of religion, edited by Schlicht (1997), is a clear evidence of a growing interest for these problems within economics. One should however distinguish economics of religion from religious economics which consists on looking at economics from a religious perspective: Kuran (1994) presents a discussion of these two different approaches.

Part of the slow start of the economics of religion is due to the 'secularization theory' which can be summarized in three stylized facts: religion must inevitably decline as (i) science and technology advance, (ii) individuals become more educated, (iii) aberrant values and faith-based claims are replaced by scientific facts. As Iannaccone (1994b, 1995c) remarks, nearly all educated people accept those statements, even though empirical research has repeatedly proved them false.

The fact that the 'secularization theory' predictions have failed constitutes the main driving force of the contemporary renewed interest in the economics of religion. The seminal paper by Azzi and Ehrenberg (1975), followed by Ehrenberg (1977), and Sullivan (1985), created the starting point for the most recent literature on this issue. This literature is typically based on Becker's theory of household production. Church attendance is seen as an insurance by which risk-averse individuals minimize the variance of the uncertain income of the afterlife. More recently, Iannaccone (1990, 1995a) and Durkin and Greeley (1991) have applied Becker's theory of human capital to discuss religious behaviour as rational addiction.

All these papers propose a rational explanation for religious preferences. They propose economic explanations for church attendance and affiliation, but they do not address the

existence of churches per se.

Two main models have been developed to explain the existence of churches. One model is based on the observation that most church members are producers and consumers of religious goods: churches are then seen as clubs. Considerations on the existence of free-riders and monitoring costs can be found in Iannaccone (1988, 1992, 1994a) and Montgomery (1996). This is not, however, the only approach that gives insights into the determinants of church formation. Whereas a club model discusses the externalities of religious production, a model of location decisions uses neoclassical theory to analyse the development of churches and sects, their organizational structure, and religious practices.

This paper is a contribution to the theory of church location by applying the neoclassical theory of firm location. We propose a theory of church location given religious preferences on strictness. We argue in this paper that neoclassical firm theory may also be of relevance to understand some well documented stylized facts like the higher religious strictness of sects with respect to existing churches.

The basic ingredients we want to focus on are religious preferences of people and church's choice of religious strictness, given these preferences. To model this, a version of the Hotelling (1929) model of horizontal product differentiation seems well suited. The church's choice of strictness depends on the preferences of the population, that is, the church responds to wishes of the population: a stricter church emerges when the population is itself stricter on average. We also define a non-church by being a dummy firm with strictness zero. It constitutes our first difference to the usual models of product differentiation. We also consider that costs of not having the most preferred variety of church strictness are asymmetric: the cost of belonging to a more strict church than the most preferred one is different from the one of joining a more lenient church. This feature is our second important departure from the standard model. The basic model is introduced in section 1. In section 2, we analyse the case of two churches. In section 3, we discuss the case of one church and one sect: we define a church as a leader and the sect as a follower, and show that the church becomes stricter when the sect threats or actually enters the market. The main

conclusions are pointed out in section 4.

2 Basic model with one church

Let us consider the usual Hottelling process of formation of a 'community' of customers around a seller, or in our case, of individuals around a church which provides a local public good.

Individuals have a preference for religious strictness x which takes a value from zero to one (maximal strictness). Religious strictness is distributed according to a density distribution function $g(x)$ with distribution function $G(x)$. The location of individuals on the strictness line represents their own preferences (or beliefs) on religion. The value of zero strictness is taken here as the choice of not having religion.[1]

Consider the case of a church's single choice. This church is going to be located at a, that is, this church is going to choose a religious strictness given by a. The church provides a local public good which yields a gain y to all those who decide to consume this good.

An individual located at x less than a has a cost $t(a-x)$ to join such church and an individual located at x greater than a has a cost $t'(x-a)$. We do not impose any particular order relation between t and t'. It may be the case that $t < t'$; the cost of joining a church stricter than one favours is smaller than the cost of joining a church less strict than one favours. Alternatively, it may be the case that $t > t'$; the cost of joining a church stricter than one favours is larger than the cost of joining a church less strict than one prefers.[2] According to this characterization, an individual located to the right of a has a payoff $y - t'(x-a)$, and and individual located to the left of a has a payoff $y - t(a-x)$.

The church acts as a benevolent social planner; the objective function to be maximised is the sum of the gains minus the costs of those joining this church.[3]

[1] An empirical analysis of religious strictness can be found in Iannaccone (1994).

[2] The consideration of asymmetric transport costs constitutes a first departure from the traditional Hotelling location model.

[3] Ekelund, Hebert and Tollison (1989) propose a more selfish objective function: a church maximises

Suppose that joining the church is compulsory; everyone in this population must join this church. The church objective function is:

$$V = \int_0^a [y - t(a - x)]g(x)dx + \int_a^1 [y - t'(x - a)]g(x)dx \tag{1}$$

One uses a linear transformation of V derived from dividing it by $t + t'$, allowing us to write the church's objective function as:

$$V = \int_0^a [v - \alpha(a - x)]g(x)dx + \int_a^1 [v - (1 - \alpha)(x - a)]g(x)dx \tag{2}$$

where $v = y/[t+t']$ and $\alpha = t/[t+t']$. It is assumed that V is positively valued. A sufficient (but not necessary) condition for a positively valued objective function is obviously $v > 1$: the gain provided by the public good is greater than the cost of consuming it for all individuals.

The first-order condition is:

$$V_a = -\int_0^a \alpha g(x)dx + \int_a^1 (1 - \alpha)g(x)dx = 0 \tag{3}$$

The optimal location of this church is given by $G(a) = 1 - \alpha$. The second-order condition is trivially satisfied.

Under the assumption that $t < (>)t'$, we derive that $\alpha < (>)1/2$, and so the optimal church location is at a point to the right (left) of the median. In the particular case $t = t'$, the optimal location is the median. This accords to intuition: it locates closer to the customers who have a higher transport cost.

The optimal location is independent of the gain v because it is the same for each member and all members of society must belong to the church. The same does not apply to the cost which varies across individuals. In the particular case of a uniform distribution where $g(x)$ is one, the optimal location a^* is $1 - \alpha$.

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the revenues from rent-seeking. Of course, if we take contributions of individuals as a linear function of own-satisfaction we have exactly the same analysis. As this is not essential to our main points, the issue is not pursued further Other references for interested reader are Hull and Bold (1989), Stonebraker (1993), and Schmidtchen and Mayer (1997).

The assumption of all individuals in a society joining a church can be relaxed. It may have not been the case in the past, but currently in the Western world individuals are free to make up their own minds. In particular, they may choose to have no religion. Accordingly, let us introduce the concept of a non-church. Belonging to a non-church being agnostic is equivalent to say that individuals choose a religion with zero strictness. As a consequence, the location of the non-church is zero by definition. This non-church produces a different local public good which also valued as v, and an individual located at x joining this non-church bears a cost $t'x$.[4] The fundamental difference between a church and a non-church is their location in terms of strictness, not the value of the local public good they produce.

An individual located to the right of a always prefers the church to a non-church. However, the same does not apply to an individual located to the left of a. There is an indifferent individual i such that any individual located to the left of i prefers a non-church to a church located at a, where the indifferent individual i is defined by $i = \alpha a$.[5] The church objective function is:

$$\begin{aligned} V' &= \int_{\alpha a}^{a} [v - \alpha(a - x)] g(x)\, dx + \int_{a}^{1} [v - (1 - \alpha)(x - a)] g(x)\, dx \\ &= V - \int_{0}^{\alpha a} [v - \alpha(a - x)] g(x) dx \end{aligned}$$

The new term in the objective function of the church corresponds to the loss induced by the fact that joining the church is not compulsory. It can be seen as the maximal price that this church is willing to pay for a compulsory attendance statute.

The first-order condition of this problem is[6]:

$$V'_a = V_a - \alpha[v - \alpha(1 - \alpha)a] g(\alpha a) + \int_{0}^{\alpha a} \alpha g(x) dx = 0 \qquad (4)$$

[4]The assumption of identical valuation v is for exposition convenience only.

[5]It trivially follows from $v - \alpha(a - x) = v - (1 - \alpha)x$.

[6]The second-order condition is assumed to be satisfied:

$$\begin{aligned} V'_{aa} &= V_{aa} + \alpha^2(2 - \alpha) g(\alpha a) \\ &\quad - \alpha^2[v - \alpha(1 - \alpha)a] g'(\alpha a) < 0 \end{aligned}$$

Note that previously the interior solution was necessarily strictly positive. Now, that is not the case. A sufficient condition for a strictly positive interior solution is $v < (1 - \alpha)/(\alpha g(0))$. Suppose the gain from consuming the church's local public good is very large. As a consequence, the church should make sure that everyone joins it. Accordingly, the optimal location must be zero: the church makes a non-church in itself.

As long as v is not very large, the optimal location is strictly to the right of the non-church. However, note from the first-order condition that is not clear whether $G(a) < 1 - \alpha$ or not. If v is small it is the case that $G(a) > 1 - \alpha$. However, if v is sufficiently large, the church moves left relatively to the previous case of inexistence of a non-church, and $G(a) < 1 - \alpha$. On one hand, the introduction of a non-church implies that the church should become stricter to minimize its member's costs: there is an incentive to move right, as the church lost members in the lowest tail of religious strictness. However, the presence of a non-church asserts that the number of believers decreases 'ceteris paribus': there is an incentive to move left to minimize the loss on the number of members choosing the non-church. The exact location of the church when a non-church is present will depend on the relative strength of these two opposing forces.

Note that now the gain v plays a key role in the determination of the optimal location. That is so because the church and the non-church compete for those individuals who have preference for small strictness.

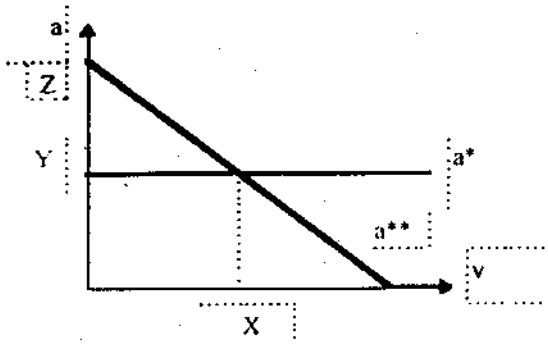
To clarify the effects at play, it is instructive to consider the case of a uniform distribution. It can be derived that the interior solution is:

$$a^{**} = \frac{1 - \alpha - v\alpha}{(1 - \alpha)(1 + (1 - \alpha)\alpha)}$$

It is clear that the new optimal location can be to left or to right of $1 - \alpha$, depending on α and v. It is easy to show that for $v > 1$, the introduction of the non-church leads to a more liberal church.

Figure 1 illustrates the value of the optimal location in both cases of absence and presence of a non-church as a religious option. It is clear to see that for low values of v, the opti-

Figure 1: Equilibrium values



mal location a^{**} is to the right of $1-\alpha$. In Figure 1, $X = (1-\alpha)\left((1-\alpha)^3 + \alpha\right)/alpha, Y = 1-\alpha$ and $Z = 1/(1+(1-\alpha)\alpha)$. However, for most values of v, a less conservative church will result. This feature of the model explains one of the stylized facts about religion evolution, even if not an usually stressed one: with religious freedom, meaning that people have the option of not belonging to a church, the main church becomes less conservative in their views in order to avoid that some people leave the church. This effect occurs even if there is no change in preferences for religious strictness, which is the usual explanation for the more liberal trend in main churches. The mere change from compulsory membership of the church to voluntary choice is able to produce this stylized fact.

3 Two churches

Consider now the case where there are two churches, one located at a (church A) and the other located at b (church B), where $b \geq a$, without loss of generality, in addition of the non-church located at zero. Both churches produce the same local public good, but differ on the strictness that they impose on their members.

An individual located at $j \in (a, b)$ is indifferent between joining a church located at a and a church located at b, where $j = (1-\alpha)a + \alpha b$.

Church A's objective function is:

$$\begin{aligned} V^A &= \int_{\alpha a}^{j} [v - \alpha(a - x)]g(x)dx + \int_{a}^{j} [v - (1 - \alpha)(x - a)]g(x)dx \\ &= V' - \int_{j}^{1} [v - (1 - \alpha)(x - a)]g(x)dx \end{aligned} \tag{5}$$

Let us define V'' as V' where a is replaced by b. Church B's objective function is:

$$\begin{aligned} V^B &= \int_{j}^{b} [v - \alpha(b - x)]g(x)dx + \int_{b}^{1} [v - (1 - \alpha)(x - b)]g(x)dx \\ &= V'' - \int_{0}^{j} [v - \alpha(b - x)]g(x)dx \end{aligned} \tag{6}$$

Churches compete in a Nash-Cournot environment. Therefore, the solution to the location problem is derived by solving simultaneously $V_a^A = 0$ and $V_b^B = 0$.

Church A's first-order condition is:

$$V_a^A = V_a' + (1 - \alpha)[v - (1 - \alpha)\alpha(b - a)]g(j) - \int_{j}^{1} (1 - \alpha)g(x)dx = 0 \tag{7}$$

Similarly, church B's first-order condition is:

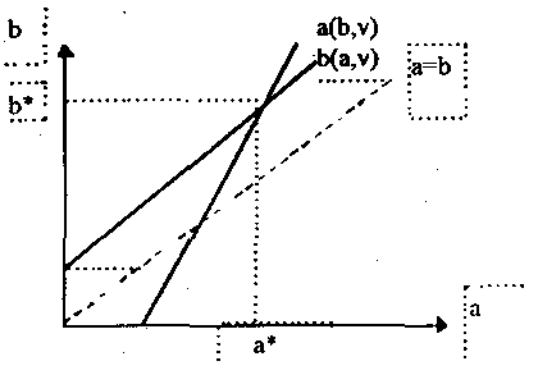
$$V_b^B = V_b'' - \alpha[v - \alpha(1 - \alpha)(b - a)]g(j) + \int_{0}^{j} \alpha g(x)dx = 0 \tag{8}$$

Solving $V_a^A = 0$ and $V_b^B = 0$, one gets reaction functions $\hat{a}(b)$ and $\hat{b}(a)$. Since second-order conditions are assumed to be satisfied, the sign of the reaction function are given by:

$$V_{ab}^A = (1 - \alpha)\alpha^2 g(j) + [v - \alpha(1 - \alpha)(b - a)](1 - \alpha)\alpha g'(j) > 0 \tag{9}$$

$$V_{ba}^B = \alpha^2(1 - \alpha)g(j) - [v - \alpha(1 - \alpha)(b - a)]\alpha(1 - \alpha)g'(j) > 0 \tag{10}$$

Figure 2: Nash-Cournot equilibrium



Solving the reaction functions for the equilibrium values of churches locations, one has $a(v)$ and $b(v)$.[7] Note that the slope of the reaction functions yields that a and b are strategic complements. Figure 2 illustrates the Nash-Cournot equilibrium.

Consider now a marginal reduction of v: one can interpret that as the value of the public good provided by the church decreases as proposed by the 'secularization theory'. One can derive the following expressions:

$$V_{av}^{A} = -\alpha g(\alpha a) + (1-\alpha)g(j)$$

$$V_{bv}^{B} = -\alpha g(\alpha b) - \alpha g(j) < 0$$

Observing V_{av}^{A} and V_{bv}^{B} we can distinguish two effects: first, there is a effect similar to the one presented in section 1 - church A becomes more liberal because it is more costly to lose people to the non-church. Since locations are strategic complements, church B also changes to a more liberal set of religious choices. At the same time, it is also more costly to lose people to the competitor, therefore there is a second effect by which the two churches converge. As a consequence, the more conservative church becomes more liberal but the same result does not apply to the more liberal church.

[7] We assume here, in the vein of Austen-Smith (1996), that deviations of church B to $b < a^*$ due to reputation effects. Otherwise, on technical grounds, it is necessary to characterize the conditions under which such deviation is non-profitable.

4 A church and a sect

One of the most well documented features about religion choices is the emergence of numerous sects, with the majority being created as a stricter dissidence from the main church religious option. In general, a church is defined as a specific branch of Christianity,[8] eventually supported by an establishment. A sect is an organised group holding stricter views on religion, usually one that has seceded from a larger body.

We define a church as a Stackelberg leader, and a sect as a follower. Therefore, church A and sect B do not play a Nash-Cournot game, but a Stackelberg game.

We study the case where the sect, sect B, considers an optimal location b to the right of a; a sect is much stricter than a church. Sect B's optimization problem is similar to the one solved by church B on the previous section; it takes a as given. Church A is a Stackelberg leader, and therefore anticipates the sect's location problem. The first-order condition of the optimization problem is:

$$V_a^{A'} = V_a^A + V_b^A b_a = 0 \tag{11}$$

where V_b^A is V^A with b replaced by the sect's reaction function $\hat{b}(a)$.

It is clear from equation (5) that V_b^A is positive; the stricter is the sect, the better for the church. We know already that $\hat{b}_a > 0$. Therefore, it must be the case that a is larger when the church is a Stackelberg leader rather than a Nash-Cournot player. In the equilibrium location, church and sect are more conservative than the chosen locations of two churches.

In summary, the model reproduces the following stylized fact: in societies where the main church competes with another church, we expect the main church to be fairly liberal (United Kingdom, Scandinavia); in societies where the main church competes with sects, we expect the main church to be fairly conservative (South Europe, Brazil), ceteris paribus.

[8] Of course, other examples based on different religions can be put forward.

Using the results presented previously, we can now address the following question: assuming that there is one church and a non-church, when and where should we expect entry by a sect in this market? That is, is the sect more liberal or stricter in religions terms than the main church?

The established church is located at a^* such that equation (4) is satisfied. From equation (9), we know that if the entrant moves to the right of a^*, the established church will move in that direction. From equation (10), we know that if the entrant moves to the left of a^*, the established church will move in that direction. The entrant acts like a follower, its decision being characterized by equation (11).

In a sense the solution to the problem depends on the relative value of the gain from consuming the local public good in terms of transport costs. If v is very large, we know that a^{**} is close to (eventually is) zero. An entrant with no entry costs will always find profitable to enter to the right of the established church. For some range of parameter values, the model also reproduces the observed fact that sects (entrants) have less followers than the main church in equilibrium. If v is sufficiently small and α is such that a^{**} is to the right of $1-\alpha$, then an entrant may find that an entry to the left of $1-\alpha$ is profitable. The existence of a non-church conditions not only the location of an established church, but also the entry game.

With no competition, a church will be more or less liberal, depending on the optimal solution to the trade-off between getting more members and satisfying the more conservative members. With competition of another church or sect, a church will become more conservative if the entrant is conservative, or more liberal if the entrant is liberal.

5 Concluding remarks

In this paper we propose an economic theory of church behavior given the religious preferences of the population. A church chooses its religious strictness to maximize its objective function taking into account the distribution of preferences across population, the value of

the religious good it produces (a local public good) and the existence of a rival church, a sect or a non-church, that is, the possibility of individuals being agnostic. We have distinguished a church from a sect by arguing that a church behaves like a Stackelberg leader whereas a sect behaves like a Stackelberg follower. We show that the potential entry of sects induces an incumbent church to become more conservative whereas the possibility of being agnostic has an ambiguous effect: on one hand, the church may become more liberal to compete with this non-church; on the other hand, it may become more conservative because its members are more conservative since the liberals become agnostic.

Within this model one propose an interpretation for the recent growth of sects. According to the 'secularization theory', the cost of being a member of a community more conservative than one favours has increased. As a consequence, the relative value of the local public good offered by the church has decreased. At the same time the established church has become increasingly more liberal to compete with a non-church, i.e. to avoid people giving up on religion. The models tells us that an entry to the right of the established church (a stricter religious organization) has become more valuable. Thus, entry by sects is more likely. As a consequence, the established church may has had to halt its liberalisation path and eventually become conservative. In a sense, an established church faces pressure on both sides: there is more competition from the non-church because it become more attractive, given that a religious good is less valuable, and from a rival sect. In particular, a time pattern where more religious freedom leads first to a movement towards a more liberal stance, which in turn facilitates entry by sects that are more strict. Then, to cope with this entry, the main church may halt or even reverse the tendency towards a more liberal church. This description seems to fit well real-world phenomena, although a full rigorous test of the several trade-offs above-mentioned is called for.

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