Prepared for the Handbook of Labor, Human Resources and Population Economics

The Formation of Religious Beliefs and Preferences*

Jean-Paul Carvalho — *University of Oxford*
Michael McBride — *UC Irvine*

Abstract

Religion is an ideal setting for economists to study endogenous beliefs and preferences. Two approaches have been explored—the religious capital approach (Iannaccone, 1990) and the cultural transmission approach (Bisin and Verdier, 2000, 2001). These models are treated as distinct and independent: The religious capital approach is an individual-level analysis with forward-looking agents that focuses on the intensive margin, i.e. how religious an individual is over her lifetime. The cultural transmission approach is a population-level analysis with overlapping generations that focuses on the extensive margin, i.e. what type of religious beliefs/preferences an individual acquires. While differences in emphasis remain, there are deep connections between the two models that have gone unrecognized. This chapter explores these connections and constructs a unified model that combines parental socialization (extensive margin) and individual investments in religious capital (intensive margin). The result is even greater religious diversity than in the Bisin-Verdier model of cultural transmission.

October 16, 2021

JEL classification: D01, D03, Z10, Z12

Carvalho: Department of Economics, University of Oxford, Manor Road Building, Manor Road, Oxford OX1 3UQ, UK, jean-paul.carvalho@economics.ox.ac.uk *McBride*: Department of Economics, University of California, Irvine, 3151 Social Science Plaza, Irvine, CA 92697, USA, mcbride@uci.edu.

1 Introduction

Standard economics has two main limitations when it comes to modeling religion. First, preferences are assumed to be fixed. Second, beliefs are purely instrumental and formed to make optimal choices given environmental or strategic uncertainty.

Stable preferences allow the analyst to use information about a person's observed choices at one time and place to understand or predict choices at another. But there are many situations in which preferences are not stable, and may be endogenous to individual decisions, policies, and institutions (Bowles, 1998). A person may grow to like a genre of music through repeated exposure. An advertisement may cause an individual to switch products without presenting any news about the product's benefits. Peer influence might induce an increase in risky social behavior. This instability is all the more pronounced in the domain of religion, where religious switching and conversions can shape an individual's behavior across a large number of domains. An archetypal example is Paul's Damascene conversion which turned him from a persecutor of early Christians to one of the major forces behind the spread of Christianity.

The problem of endogenous preferences was taken up by Stigler and Becker (1977) in their highly influential article titled '*De gustibus non est disputandum*'. Their solution was not to abandon the decision-theoretic foundations of economics, in particular the stability of preferences, but rather to introduce meta-preferences: intertemporal choice is dictated by stable higher-level (fundamental) preferences, accounting for changes in lower-level (instrumental) preferences over time. In particular, Stigler and Becker introduced to intertemporal choice an endogenous state variable that would depend on past consumption choices. For example, exposure to classical music leads to an accumulation of 'appreciation capital' which causes an individual to consume more classical music in the future. The accumulation of 'appreciation capital' has the same structure as the accumulation of physical capital in standard growth models (e.g. Solow, 1956), thus the use of the term 'capital'. This led to the controversial literature on rational addiction in which individuals choose to consume addictive goods in full anticipation of their addictive effects (Becker and Murphy, 1988). The rational addiction approach was applied to religion by Iannaccone (1990) who makes a large number of predictions about religious behavior that are largely borne out by the data (e.g. Iannaccone,

1998).

The second limitation of standard economics is that, when it comes to religion and many other settings, what are conventionally called beliefs are not purely instrumental, but motivated. They are consumed like goods. For example, Bénabou and Tirole (2002, 2003, 2006) analyze a wide range of beliefs motivated by self esteem, self confidence, anxiety reduction, and self and social image. Most relevant to our purposes, the evolution of beliefs and preferences has been studied at the population-level using the cultural transmission framework of Bisin and Verdier (2000, 2001). In this literature, cultural beliefs are not formed in a disinterested manner through Bayesian learning. Rather, parents have preferences over the cultural beliefs and preferences their children acquire and socialize children accordingly. In particular, parents choose socialization efforts to maximize the welfare of their children, evaluated based on their own preferences. Often, this boils down to passing on their own cultural traits to their children. This has proved a fruitful approach and there is a growing body of work applying the cultural transmission model to religion, including Carvalho (2013, 2016), Verdier and Zenou (2015, 2018), Prummer and Siedlarek (2017), Chen, McBride, and Short (2019), Iyigun, Rubin, and Seror (2021), Carvalho and Sacks (2021), and Bisin, Rubin, Seror, and Verdier (2021). For a more comprehensive review of the literature, see Bisin, Carvalho, and Verdier (forthcoming).

The cultural transmission approach has origins in evolutionary biology and ecology (Cavalli-Sforza and Feldman, 1981; Boyd and Richerson, 1988), which are very different to the economic origins of the religious capital literature. While both approaches model the formation of beliefs and preferences through deliberative choice, their origins bring differences in emphasis and perspective. The religious capital approach is an individual-level analysis with forward-looking agents that focuses on the intensive margin, i.e. how religious an individual is over her lifetime. The cultural transmission approach is a population-level analysis with overlapping generations that focuses on the extensive margin, i.e. what type of religious beliefs/preferences an individual acquires. Despite these differences, this chapter shows that there are fundamental connections between the religious capital and cultural transmission approaches that have gone unrecognized. It then present a simple model which combines the

two approaches and shows how new insights into religion can be generated by a synthesis.

The rest of this chapter is structured as follows. Section 2 reviews the two main approaches to endogenous religious beliefs and preferences, drawing distinctions and connections between them. Section 3 presents a simple unified model that combines both individual investment in religious traits and cultural transmission. The results are distinct from the standard Bisin-Verdier cultural transmission framework. Section 4 concludes.

2 Two Approaches to Modeling Religious Beliefs and Preferences

This section reviews the religious capital and cultural transmission approaches and uncovers hitherto neglected connections between them.

2.1 The Religious Capital Approach

The religious capital approach traces its roots to economic models of household production and human capital. Pioneered by Gary Becker (1964, 1965), the household production literature depicts households as allocating their time and resources among various activities to produce goods consumed by the household. Human capital plays a significant role in this endeavor because it determines the relative productivity of household members in the various pursuits. Azzi and Ehrenberg (1975) were the first to apply the household production model to religion by assuming that religious practice is another — albeit distinctive — type of productive activity. Iannaccone (1990) was subsequently the first to combine religious household production with *religious human capital* (or *religious capital* for short).

Religious capital includes an individual's characteristics and traits that affect the value of religious participation. It includes knowledge of church teachings, the strength of belief in the efficacy of religious rites, and social relationships with other church members. As with other types of physical and human capital, religious capital can depreciate over time or it can increase through investment activities. The most important investment activity is participation in private and social religious activities because these build familiarity with doctrines, reinforce beliefs in the efficacy of religious participation, and strengthen social

ties.

Two immediate features of the religious capital approach should be noted. First, the focus of attention is on a single religious consumer engaged in religious participation and production rather than on clergy and other religious specialists. A separate literature examines the choices of religious specialists engaged in market competition for adherents (McBride, 2019). Second, this framework highlights the dynamic interplay between religious preferences and religious participation. An increase in religious capital today increases one's utility from religious participation, thereby increasing participation today. In turn, increasing religious participation today increases one's religious capital in the future. Religious preferences are thus not fixed throughout life, and a forward-looking religious consumer should account for how their decisions today affect not just their current payoffs, but also their future payoffs and religious participation choices.

The simplest model of religious capital is akin to an individual-choice model of rational addiction (Becker and Murphy, 1988) in which the consumer's choice in the current period affects their marginal benefit of consuming and participating in the next period. In each period t, a consumer chooses how much effort to devote to religious participation $x_t \geq 0$. Let the consumer's utility function V be represented by

$$V = \sum_{t=1}^{T} \left(\lambda_t x_t - \frac{1}{2} c_t x_t^2 \right),$$

where λ_t represents the consumer's level of religious capital in period t and $-\frac{1}{2} c_t x_t^2$ represents the opportunity cost of religious participation in t. The religious capital parameter λ_t is flexible enough to represent the strength of belief in the value of the religion or the preference for that religion. The c_t parameter captures period-specific cost factors, e.g., it might be that the opportunity cost of religion declines during advanced adulthood. To simplify our presentation here, let $T = 2$ and assume $c_1 c_2 > 1$ so that the opportunity costs are meaningful and an interior solution is guaranteed.

Religious capital forms according to

$$\lambda_2 = (1 - d)\, \lambda_1 + x_1,$$

where $d \in [0,1]$ represents the rate of religious capital depreciation. The consumer's religious capital will thus increase from period 1 to period 2 only if there is sufficient religious participation in period 1 ($x_1 > d\lambda_1$).

Working backward, the optimal period 2 religious participation is $x_2^* = \frac{\lambda_2}{c_2}$. The consumer participates more in period 2 the higher their period 2 religious capital (i.e., the higher their religious productivity) and the lower their period 2 opportunity cost.

Substituting x_2^* and λ_2 into V results in

$$V = \lambda_1 x_1 - \frac{1}{2} c_1 x_1^2 + \frac{1}{2} \frac{\left((1-d)\,\lambda_1 + x_1\right)^2}{c_2},$$

and solving for the optimal period 1 religious participation yields

$$x_1^* = \frac{(c_2 + 1 - d)\,\lambda_1}{c_1 c_2 - 1}.$$

The optimal period 1 religious participation is increasing in the current period's religious capital λ_1, decreasing in each period's opportunity cost of participation c_1 and c_2, and decreasing in the depreciation rate d. Note the existence of a multiplied effect of a change of each of these parameters because a change in each affects not just period 1 religious participation but also period 2's religious capital and religious participation.

Neither Iannaccone's original paper nor some of the later reformulations (e.g., Stark and Finke, 2000) provided a mathematical model of religious capital formation, but they did offer intuitive predictions which match well-known empirical regularities. For example:

- Children should retain their parents' religious affiliation at high rates because of the large investment religious capital specific to their parents' religion.
- Switching from one religion to another should be less common than remaining in one's religious group because remaining in one's group allows one to enjoy the consumption benefits of religion-specific religious capital.
- If an individual switches religious groups, then that individual should be more likely to switch to a religious group that is similar to their original group because more of their religious capital will transfer to the new group when that group is similar.

- Religious switching should be more likely among young adults than among young children and older adults because young adults are more likely to have life changes that disrupt their religious capital.
- Religious participation should be higher for individuals in intra-religion marriages and partnerships than in inter-religion marriages and partnerships because the former receive higher joint consumption from religious participation in their shared group.
- Children from intra-religion marriages and partnerships should be more less likely to switch religions later in life than children from inter-religion marriages and partnerships because the former will form higher levels of religious capital.

The larger contribution of the religious capital approach is not that it predicts previously known empirical patterns but rather that "so many different findings emerge as predictions of a single model" (Iannaccone, 1990, p.313). However, the religious capital approach can also generate new predictions, especially when cast in a formal, mathematical model.

This basic model can be extended or embedded in richer settings in many ways, yet the distinctive feature remains that individuals make choices that affect their own future preferences across time within their own lifetimes rather than across generations.

2.2 The Cultural Transmission Approach

Unlike the religious capital model, the cultural transmission approach is a population-level analysis with overlapping generations. Consider now a simple version of the cultural transmission framework developed by Bisin and Verdier (2000, 2001). For a more comprehensive review of the cultural transmission model applied to religion, see Bisin, Carvalho, and Verdier (forthcoming). In Section 3, a unified model of religious capital and cultural transmission will be presented.

The population is a continuum of households, each with an adult and a child. Each agent (adult or child) has either cultural trait a or b, which can be thought of as two different types of religiosity. For example, a and b could be different religious worldviews, or they could denote religious and secular traits.

Vertical transmission. Each parent (asexually) produces one child, socializes them and then dies. With probability τ_i, a parent with trait $i \in \{a, b\}$ successfully passes on her trait to her child. For the moment, assume each τ_i is exogenous.

Oblique transmission. With probability $1 - \tau_i$, the child is matched at random with an individual from her parent's generation and acquires their trait.

Let q equal the share of a types in the population. Then the transmission probabilities are as follows. The probability that a type b individual has a type a child is

$$P_{ba} = (1 - \tau_b)q.$$

The probability that a type a individual has a type b child is

$$P_{ab} = (1 - \tau_a)(1 - q).$$

In continuous time, this results in the following cultural dynamic:

$$\begin{aligned} \dot{q} &= \underbrace{(1-q)\,P_{ba}}_{inflow} - \underbrace{q\,P_{ab}}_{outflow} \\ &= (1-q)(1-\tau_b)q - q(1-\tau_a)(1-q) \\ &= (\tau_a - \tau_b)q(1-q). \end{aligned} \tag{1}$$

Generically, the cultural dynamic ends up in a *monomorphic* equilibrium. Specifically, beginning in any interior state $q \in (0, 1)$, if $\tau_a > \tau_b$, the dynamic (1) converges monotonically to $q = 1$. If $\tau_a < \tau_b$, the dynamic (1) converges monotonically to $q = 0$. Hence the result is a melting pot. But this is at odds with the persistent religious diversity that observed in the world.

Bisin and Verdier (2000, 2001) show how diversity can be produced by introducing a choice of socialization effort, which makes the transition probabilities endogenous. Costly socialization effort can take the form of (1) teaching, (2) school choice, (3) residential choice, (4) homogamy, and other costly actions.

Socialization choice requires us to specify each parent's preferences over their child's religious traits. Bisin and Verdier assume parent's have *imperfect empathy*: a parent maximizes her

child's welfare, but evaluated using her own preferences. Specifically, a parent with trait i gets a payoff of $\Delta_i \in (0,1]$ if her child acquires trait i and zero otherwise. This payoff Δ_i is time-independent and exogenous. For simplicity, let the socialization cost be $\frac{1}{2}\tau_i^2$. Then a parent with trait a in state q has payoff function:

$$U_a(q) = [\underbrace{\tau_a + (1-\tau_a)q}_{P_{aa}}]\Delta_a - \tfrac{1}{2}\tau_a^2. \tag{2}$$

Hence she chooses socialization effort $\tau_a^* = (1-q)\Delta_a$.

A parent with trait b in state q has payoff function:

$$U_b(q) = [\underbrace{\tau_b + (1-\tau_b)(1-q)}_{P_{bb}}]\Delta_b - \tfrac{1}{2}\tau_b^2. \tag{3}$$

Hence she chooses socialization effort $\tau_b^* = q\Delta_b$.

Parameter Δ_i can be interpreted as the 'religious intolerance' of i types, i.e., how much an i-type parent dislikes her child acquiring the other religious trait. From the choices of socialization effort it is seen that greater cultural intolerance means more intensive socialization. In addition, the smaller a cultural group the more it expends on socialization effort.

Population dynamics are again given by (1) except that now τ is endogenous. Substituting τ_a^* and τ_b^* into (1) yields the following dynamic:

$$\dot{q} = \left[(1-q)\Delta_a - q\Delta_b\right] q(1-q). \tag{4}$$

This leads to the following proposition:

Proposition 1. (Bisin and Verdier, 2000) *From any interior state $q \in (0,1)$, the dynamic converges to $q^* = \frac{\Delta_a}{\Delta_a+\Delta_b}$.*

Therefore, the dynamic converges to a *polymorphic* cultural distribution from almost every initial state, whenever cultural intolerance is positive for each type. The reason is that

as a trait begins to die out, parents with that trait socialize more intensively, keeping the dynamic away from the boundaries. Thus, introducing endogenous socialization effort creates persistent diversity.

2.3 Differences and Connections

Table 1 highlights several of the key conceptual and modeling distinctions between the cultural transmission and religious capital models.

Table 1: Comparison of Religious Capital and Cultural Transmission Approaches

	Religious Capital Approach	Cultural Transmission Approach
Focus of analysis	Individual investment	Vertical and oblique transmission
Key variable	Intensive margin religious participation	Extensive margin religious types
Level of analysis	Individual	Population
Unit of time	Period within single lifetime	Generation
Type of investment	Self socialization	Parental socialization
Frequency of investment	Multiple times during lifetime	Once during offspring's childhood
Trait space	Continuous religious capital	Discrete religious types

The different foci clearly drive differences in level of analysis, unit of time, type of investment, and more. However, despite these many differences, there are also deeper connections between the two approaches so that the differences are ones of emphasis, not fundamental distinctions. One could even move between frameworks with appropriate relabeling of variables and modeling extensions. For example, there is no real reason that religious capital cannot be accumulated through the efforts of others (e.g. peer effects), not only through one's own efforts. In this way, religious capital can be socially transmitted, breaking down one of the main distinctions between the religious capital and cultural transmission approaches.

Several recent papers have demonstrated how these distinctions can be blurred. For example: McBride (2015) considers the social production of religious capital in strict and non-strict religious groups to examine why strict religious groups devote a large amount of resources to socialization; Carvalho and Sacks (forthcoming, 2021) analyze a two-trait model in which the traits are interpreted as different levels of religiosity (intensive margin) to show under what conditions religious leaders are willing and able to create strict religious groups; Cheung and Wu (2018) analyze cultural transmission with continuous traits to reveal how cultural diversity persists under similar conditions as in the discrete Bisin-Verdier model; and Chen, McBride, and Short (2019) study the population-level transmission of religious traits when

individuals make optimal choices about their contributions toward group production and can switch groups. Thus, although the key distinction between the two approaches is individual investment and social transmission, both approaches can be used to study how individual decisions and the decisions of others interact in the formation of religious preferences. This interplay reflects an underlying common theme that preferences should be understood and studied as dynamic phenomena.

3 Toward a Unified Model

In the standard Bisin-Verdier model, parents can determine (at some cost) the likelihood that their child acquires a religious trait. However, Δ_i, an individual's payoff from acquiring trait i, is exogenous. Now assume that after an individual's religious trait is determined by cultural transmission, they can invest in religious capital and increase their own appreciation of their religion. For example, once a child acquires a religious worldview a through cultural transmission, they can then invest in their own religious capital by devoting effort in acquiring religious knowledge or developing ties within religion a.

Importantly, this individual investment has population-level effects. Due to imperfect empathy, a parent's payoff in the event that their child acquires trait i is their own payoff from acquiring trait i. Hence greater own religious capital investments by the parent lead to more intensive socialization by the parent. In other words, the more a parent likes her own religion, the more she wants her child to acquire the same religious trait.

Everything is the same as in the standard Bisin-Verdier model except that now the payoff to an individual with trait i is denoted by V_i, which is a weighted average of the baseline level of utility for an individual with trait i, $\Delta_i \in (0, 1]$, and the final religious capital $\lambda_i x_i$ associated with trait i, minus the cost of religious participation:

$$V_i = \sigma\Delta_i + (1-\sigma)\lambda_i x_i - \tfrac{1}{2}x_i^2. \tag{5}$$

The second term depends on the choice variable x_i which is specific type-i religious participation and $\lambda_i \in (0, 1]$ is type-i 's initial religious capital. Assume that religious participation x_i is chosen by a type-i individual after observing her religious trait. The final level of re-

ligious capital here is the product of initial religious capital and religious participation, i.e., $\lambda_i x_i$. To simplify, set the depreciation rate to $d = 1$. The third term is the cost of religious participation. Again, to simplify, the period-specific cost parameter is set to 1. Parameter $\sigma \in [0, 1]$ measures the degree to which the payoff to an individual with trait i is endogenously determined by religious capital. Setting $\sigma = 1$, the standard Bisin-Verdier model is recovered.

Hence the child chooses x_i to maximize V_i, making the optimal choice of religious participation

$$x_i^* = (1 - \sigma)\lambda_i. \tag{6}$$

This means that final religious capital is $(1-\sigma)\lambda_i^2$ and the equilibrium payoff to an individual with trait i is

$$V_i^* = \sigma\Delta_i + \tfrac{1}{2}(1 - \sigma)^2\lambda_i^2. \tag{7}$$

The asymptotic behavior of the cultural dynamic can be derived by following the same argument as in Section 2.2.

Proposition 2. *From any interior state $q \in (0, 1)$, the dynamic converges to*

$$q^{**} = \frac{V_a^*}{V_a^* + V_b^*} \tag{8}$$

$$= \frac{\sigma\Delta_a + \frac{1}{2}(1 - \sigma)^2\lambda_a^2}{\sigma(\Delta_a + \Delta_b) + \frac{1}{2}(1 - \sigma)^2(\lambda_a^2 + \lambda_b^2)} \tag{9}$$

There are several corollaries to this proposition:

First, for $\sigma = 1$, the result is the same as the standard Bisin-Verdier limiting distribution, $q^* = \frac{\Delta_a}{\Delta_a + \Delta_b}$. But this is generically not true for $\sigma < 1$. Specifically:

Corollary 1.

$$q^* \gtreqless q^{**} \quad \frac{\Delta_a}{\Delta_a + \Delta_b} \gtreqless \frac{\lambda_a^2}{\lambda_a^2 + \lambda_b^2}.$$

Hence for religious capital not to alter the long-run distribution of traits, the ratio of baseline utilities from traits a and b must equal the ratio of initial religious capital.

Corollary 2. *Suppose $\sigma \in (0,1)$ and initial religious capital is the same for a types as for b types: $\lambda_a = \lambda_b = \lambda$. Then $q^* > q^{**}$ holds if and only if $\Delta_a > \Delta_b$.*

This means that if $q^* > \frac{1}{2}$ (which occurs if $\Delta_a > \Delta_b$), then $\frac{1}{2} < q^{**} < q^*$. If $q^* < \frac{1}{2}$, $q^* < q^{**} < \frac{1}{2}$. Hence investments in religious capital increase religious diversity beyond what is produced by parental socialization.

Finally, a policymaker can spread trait i by increasing initial type-i religious capital, λ_i, by granting special economic privileges to observant i types and thereby raising the return to religious participation, for example. This alters the distribution of religious traits by increasing the payoff to i types, causing them to socialize more intensively (e.g. Hauk and Mueller, 2015). See also Verdier and Zenou (2015, 2018) on how religious leaders can generate such effects by providing religious club goods.

This is a simple step toward a unified model of religious capital formation and cultural transmission. Additional work is warranted in this area. An immediate step would be to extend the analysis to $n > 2$ traits using the approach of Montgomery (2010).

4 Summary

Research from the last two decades has gone beyond the standard assumption of fixed preferences and instrumental beliefs. Two separate literatures have emerged, each with a different focus. The religious capital approach considers forward-looking agents who are aware of how their religious choices today affect their future religious preferences. The cultural transmission approach considers actors whose preferences are determined by their parent's forward-looking socialization effort and the distribution of types in society. As discussed above, these two approaches have distinct characteristics but share a fundamental similarity in that beliefs and preferences form through the active and deliberative choices of forward-looking agents. The modest attempt herein to directly combine the two approaches revealed that the different socialization forces — self and parental — both work to increase religious and cultural diversity. This finding augments a broader argument that the two approaches are fundamentally related and each deserves credit for broadening our understanding of religious

diversity in the real world.

Future work could further unify the approaches, with several lines of inquiry deserving attention. A model that combines the two approaches could provide new insights into our understanding of conversion and religious switching, which can happen later in life and multiple times within the same lifetime. A unified model could also be used to explore the secularization process and how the religious landscape might evolve as economic development and technological change further undermine some of the traditional functions of religion. Future work should develop this synthesis.

5 Cross-References

Religion — Causes and Consequences of Religiosity

Religion — Religion and Family

Religion — Religion and Economic Preferences

Religion — Religion and the Intergenerational Transmission of Human Capital

Religion — Religious Diversity

Acknowledgement

Responsible Section Editor: Olga Popova

The article has benefitted from valuable comments of the editors and anonymous referees.

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