Fellowship, social network externalities, and management of religious risk

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Abstract
Given the existence of religious risk, rational choice theory implies that – barring impediments – risk-averse religious actors will mitigate the effects of religious risk by constructing diversified religious portfolios and/or by purchasing relevant insurance. The absence of evidence that such portfolio diversification is a feature of monotheistic religions and the absence of markets for insuring against religious risk indicates that impediments abound. This paper proposes that social network externalities associated with religious fellowship mitigate religious risks faced by religious firms and their adherents and articulates a theory of firm location in fellowship space. The theory implies that religious firms' locations in fellowship space are determined by the quantity and type of religious risks firms and their adherents face; by their degree of aversion to these risks; by members' perception of the feasibility of mitigating religious risk via diversification and/or purchasing insurance; and by the market opportunity costs of fellowship activities relative to the market opportunity costs of private religious activities.

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Introduction

The relative success of the rational choice approach to explaining religious market behavior and outcomes (epitomized by studies such as Azzi and Ehrenberg, 1975; Ekelund et al., 2006; Iannaccone, 1992, 1995) has answered many questions but also raised several others. For example, a collateral effect of the increasing acceptance of this approach is the recognition that religious outcomes are uncertain and that religious actors (both religious firms and their customers) face religious risk. Under the reasonable presumption that religious actors are risk averse, rational choice behavior suggests that observed religious behavior and outcomes should reflect religious actors' attempts to manage the religious risk they face. As such, the existence or perception of religious risk should have implications for religious market behavior. However, the exact manner in which the risk-averse react to religious risk and the implications for religiosity and resource allocation must be derived.

Despite the fact that a substantial fraction of global resources is devoted to the pursuit of uncertain religious outcomes, very little attention has been devoted to understanding the implications of religious risk for religious market behavior. In a notable exception from this pattern, Iannaccone (1995) explains variation in the forms of religious practice (i.e. the extent to which fellowship or collective activities are emphasized as opposed to private or independent religious activities) adopted by religious denominations as a manifestation of variation in the risk-mitigation strategies adopted by rational, risk-averse religious firms to manage their religious risks and that of their customers. If the choice of religious form (i.e. congregational versus private) is primarily reflective of mutually beneficial risk management strategies adopted by religious firms and their adherents, the ability to explain why some religions adopt risk management strategies that emphasize fellowship activities while others adopt strategies in which private religious activities are dominant should be a critical element of a complete or convincing theory of the incidence of these forms of religious practice. Consequently, in noting the inability of his theory to explain "why market forces do not always drive religions towards one style of production, private or collective", Iannaccone (1995: 294) recognized a key limitation of his analysis and acknowledged the explanatory potential of a more precise specification of religious risk than is available in his analysis.

If one accepts Iannaccone's hypothesis that the incidence of congregational and private religious practice reflects differing approaches to religious risk management, variation in the types and quantity of religious risk faced by religious firms and their customers – to the extent that such variation exists – should be an obvious candidate as an explanator of variation in risk

management strategies and thereby the co-existence of congregational and private religious practice. However, since Iannaccone's analysis treats religious risk as homogeneous in the sense that no distinction is made among the types and quantities of religious risks religious firms and their customers face, his analysis precludes a role for differentials in the types and quantities of religious risks as an explanator of variation in risk-mitigation strategies and thereby the forms of religious practice adopted.

Two attributes of Iannaccone's approach provide hints about the potential source of imprecision in his specification of religious risk. Firstly, his aversion to identifying a specific motive for investment in religious activity lends an air of generality to his analysis that does not require specificity beyond merely assuming that religious activities are expected to yield a rate of return that adequately compensates the investor for the associated risk. While this approach is successful in circumventing difficulties posed by the diverse nature of the plethora of uncertain religious rewards that together comprise the overall expected return to resources devoted to religious activity, it refrains from recognizing that the representative individual's perception of the religious risk it faces is likely to be dominated by the risk characteristics of the religious product or reward that is most important to it. For example, if supernatural reward in the form of a blissful afterlife is the dominant motive for religiosity, perceptions of religious risk and return should be dominated by the risk and return associated with such supernatural rewards. This implies that abstracting from the diversity of religious output or rewards, as is done by Iannaccone (1995), precludes precise specification of religious risk.

Secondly, in Iannaccone's analysis the religious products or benefits associated with congregational forms are jointly produced by religious firms and their adherents. If such joint production is only able to deliver temporal benefits, this limits the relevance of his analysis to uncertainty or risk associated with temporal rewards. This approach is suitable under the counterfactual assumption that the perceived rewards to religious activity are primarily temporal. However, under the more plausible presumption that supernatural rewards such as a blissful afterlife are perceived to be the fundamental, perhaps dominant, return to religiosity, and that religious firms and their adherents do not have the capacity to deliver supernatural rewards, an analysis of the implications of religious risk that ignores the supernatural motive is unlikely to yield a precise delineation of religious risk.

The purpose of this paper is to articulate a more precise specification of religious risk than is available in the extant literature, and given this specification, to identify the risk management strategies that are likely to be

adopted by rational risk-averse religious actors and to evaluate the implications of these choices for the forms of religious practice that materialize. The paper incorporates two innovations that facilitate achievement of these objectives and that distinguish it from previous attempts to evaluate the implications of religious risk. Firstly, the second and third sections establish a clear and dominant motive for religiosity that incorporates desires for both temporal and supernatural rewards to religious activity. This leads to a delineation of religious production into religious products produced by supernatural beings in intangible religious markets and religious products produced by religious firms who operate in tangible religious markets. Secondly, the fourth section identifies faith intermediation services as the defining product exchanged in tangible religious markets and characterizes religious firms as faith intermediaries whose primary function is to provide faith intermediation services to their adherents or customers. These faith intermediation services are comprised of interpretation and communication of the will of supernatural beings to adherents who believe that they can favorably affect uncertain future outcomes by complying with the will of interested supernatural beings. Given this context, the fifth section demonstrates that the religious risk faced by believers is comprised of the risk associated with the probability that events and or circumstances may adversely affect their belief in supernatural beings and the risk associated with the likelihood that they may fail in their attempts to satisfy the supernatural being because of poor guidance provided by their faith intermediaries. The analysis demonstrates that increases in either of these risks may cause individuals to sever their ties with faith intermediaries or religious firms. As a consequence, religious firms face affiliation risk, which is the risk associated with the possibility of losing adherents or customers. Given this delineation of religious risk, the subsequent analysis demonstrates that there is significant variation among denominations in perceived quantities of each type of religious risk and in believers' access to risk-mitigation technologies. These differences are critical in explaining the incidence of congregational and private religious practice. However, demonstrating this requires clear criteria for classification of denominations as congregational or private.

At the most basic level, classification of a denomination as congregational or private is based on the nature (i.e. collective or private) of the religious activities its members are required to engage in. Under the assumption that any religious activity can be classified as either a collective activity requiring fellowship (or participation in a group or congregation) or as a private or independent activity for which fellowship is not required, any given denomination requires some combination of fellowship (or group) and independent (or private) activities.[1] In addition, under the plausible presumption that members of

any given denomination are allowed to substitute fellowship activities for private activities (and vice versa) within a limited range, any given denomination may be characterized as offering its members combinations of fellowship and private activities. These offerings may be represented as fellowship ratios, where a fellowship ratio is defined as the opportunity costs of time and resources members are required to devote to fellowship activities as a fraction of the opportunity costs of total time and resources members devote to religious activities. As such, the range of fellowship ratios that are feasible within a given denomination is an indicator of that denomination's reliance on fellowship activities relative to private activities. Ultimately, the theoretical analysis demonstrates that the location of any given optimizing religious firm in fellowship space (i.e. the subinterval of the population distribution of fellowship ratios) will be the location that is consistent with optimizing its objective function. Under this approach, religious denominations may be classified by the range of fellowship ratios they offer so that denominations that offer relatively high fellowship ratios may be characterized as congregational, while those on the other end of the spectrum are classified as private.[2]

The hope hypothesis

In order to ensure that human communities take the myriad costly actions that are required for long-term survival, decision makers at all levels must be confident that their current actions or choices can favorably influence uncertain future outcomes. This confidence, which I call hope, is an indispensable input in the production function whose output is long-term survival. In the interest of generality, I assume that the representative decision-making unit's planning horizon as of any given period extends beyond its expected temporal existence to include future generations of that unit and an afterlife. Given this specification of the planning horizon, the pursuit of long-term survival might be characterized as an attempt to maximize utility over an infinite planning horizon justified by a combination of intergenerational altruism and belief in an afterlife. Consequently, the contributions of hope to long-term survival potentially include both temporal and afterlife benefits.

   The underlying basis or source of hope may be either scientific or supernatural. Accordingly, I define an entity's confidence that it can enhance future outcomes via application or exploitation of the known laws of nature as scientific hope. In contrast, I define supernatural hope as an entity's confidence that it can favorably affect uncertain future outcomes by taking current actions that enlist the favor of a supernatural being that the entity believes has the power and willingness to ensure favorable outcomes for those who submit to its will. The hope hypothesis is the joint proposition

that hope is an indispensible requirement for long-term survival and that any given individual derives a fraction γ of his/her total hope from supernatural sources while the remaining fraction $(1 - \gamma)$ is scientific hope. For any given individual, $0 \leq \gamma \leq 1$, and γ is primarily determined by the cost of producing supernatural hope relative to the cost of producing scientific hope. Consequently, factors that affect this relative cost, such as education, the opportunity cost of time spent on hope producing activities, and perceived access to opportunity, are likely to exert important influence on γ. Given that the employment of supernatural hope to enhance prospects for long-term survival typically requires participation in religious activity, religious participation is a positive function of γ and factors that affect γ should have similar effects on religious participation.

The production of supernatural hope

I assume that individuals are endowed with a technology that allows them to combine belief in the existence of a willful supernatural being or beings (B), knowledge of supernatural will (W), and supernatural services supplied by the supernatural beings (SNS) to produce supernatural hope (SNH). More succinctly:

$$SNH = F(B, \, W, \, SNS) \tag{1}$$

Belief

To facilitate clarity, I characterize an individual's belief in any given supernatural being as that individual's subjective estimate of the probability that a being with the particular set of supernatural characteristics attributed to the supernatural being in question exists. Let $p(SNB)_{ik}$ represent the ith individual's estimate of this probability for the kth supernatural being (assume that there are N individuals and K supernatural beings so that $i = 1, 2, 3, ..., N$; $k = 1, 2, 3, ..., K$; and $N > K$). For any given individual (i) and supernatural being (k), $0 \leq p(SNB)_{ik} \leq 1$. The ith individual is defined as a believer in the kth supernatural being if $p(SNB)_{ik}$ is greater than zero and as a nonbeliever if $p(SNB)_{ik}$ is equal to zero. Similarly, I define the ith individual as an atheist if $p(SNB)_{ik} = 0$ for all $k = 1, 2, 3, ..., K$. In addition, for any given believer (i), the intensity of belief in the kth supernatural being increases as $p(SNB)_{ik}$ increases. As a general matter, I assume that this probability estimate is sensitive to stimuli such as advertising, personal experience, the testimony of others, and other real world observations. As such, intensity of belief varies across individuals and over time for any given individual.

Supernatural services

Supernatural hope is a believer's confidence that he/she can enhance his/her future welfare by aligning his/her current actions with the will of a supernatural being or supernatural beings. Assuming that the will or wishes of the supernatural being or beings are known, this definition implies that for any given supernatural being there are two dimensions along which believers must be confident if supernatural hope is to be produced. Firstly, believers must have confidence that the supernatural being will both observe and remember their behavior. Secondly, believers must be convinced that the supernatural being has the ability and willingness to reward compliance and punish deviance. However, the existence and sustainability of the implied relationship between compliance and reward or non-compliance and punishment requires monitoring, keeping records of believers' actions, and reliable delivery of appropriate rewards or punishment. For current purposes I define these monitoring, record keeping, and delivery services as supernatural services. In general, the marginal product of supernatural services in the production of supernatural hope is positive and varies among supernatural beings. This variation reflects the view that the effectiveness or marginal productivity of the supernatural services produced by a given supernatural being depends on the supernatural characteristics it is perceived to have.

Developments in the field of cognitive psychology suggest that for any given human brain, there is substantial variability in receptivity to various supernatural characteristics so that some supernatural characteristics have little chance of gaining traction, while others are very likely to be accepted.[3] Consequently, if supernatural beings are uniquely defined by the set of supernatural characteristics we attribute to them, the supernatural beings that gain widespread acceptance are likely to be those whose supernatural characteristics coincide with the set of such characteristics that the human brain is most receptive to. Since the production function only requires belief in the supernatural being, the physical existence of a supernatural being is not a necessary condition for the production of supernatural hope.[4] A given supernatural being can provide supernatural services to a particular individual if and only if the individual in question believes in the existence of that supernatural being and in its ability and willingness to affect or determine future outcomes. Evidence of widespread belief in supernatural beings suggests a thriving market for supernatural services.[5] That rational people can come to believe in the existence, power, and will of a supernatural being (or beings) that they cannot see or touch is consistent with biological explanations as provided by cognitive psychology, for example. For the purposes of this paper, I take this susceptibility as given and assume that an

individual's state of belief or subjective estimate of $p(SNB)$ at a given point in time is conditional on information available as of that point in time and is subject to revision in light of new information as might be obtained from environmental factors, such as advertising, life experiences, and social immersion. More generally, throughout this paper I assume that the individuals in the model form subjective estimates of relevant probabilities, such as $p(SNB)$, and that these prior probabilities are subject to Bayesian updating in response to new information.

Knowledge of supernatural will

Supernatural beings are typically reticent to directly communicate with believers and rely on intermediaries to communicate and interpret their will. For ease of exposition, I refer to these intermediaries as faith intermediaries and describe the interpretation and communication services they provide as faith intermediation services. Under this scenario, the average believer relies on the faith intermediation services supplied by faith intermediaries to augment their knowledge of supernatural will. Consequently, under the hope hypothesis, the provision of faith intermediation services is the raison d'être for the existence of faith intermediaries or religious firms. Under the hope hypothesis, fulfillment of believers' desires to produce supernatural hope requires that they participate in intangible religious markets where they enter into exchange relations with supernatural beings to secure supernatural services and in tangible religious markets where they transact with faith intermediaries to procure faith intermediation services.

The market for faith intermediation services

Religious institutions as faith intermediaries

Identification of the empirically observable implications of the theory advanced here requires a mapping between the theoretical notion of faith intermediaries and entities observed in the real world. To address this, I specify three observable characteristics that a real world entity must have in order to qualify as a faith intermediary. These are as follows: it must have or be perceived to have direct or privileged communication with the supernatural being in question; where necessary it must interpret such communication for the benefit of believers; and it must actually communicate the will of the supernatural being to believers. Most, if not all, organized religions claim that they have these characteristics and have followers who believe that they do. As such, most organized religions are faith intermediaries.

"The right religious product"

That the nature of the products being exchanged in markets has important implications for economic analysis of market behavior is beyond dispute. For example, characteristics such as the extent to which there are externalities associated with consumption and/or production of products and the feasibility of exclusion inform the classification of products as either public or private goods, with consequences for the economic analysis of the markets in which these products are exchanged. Similarly, significant differences in the feasibility and timing of quality verification among products led Nelson (1970) and others to classify products whose quality can be verified prior to purchase as search goods, and those whose quality can only be verified after consumption or use as experience goods. Darby and Karni (1973) define credence goods as goods for which ex-ante verification of product quality is impossible and ex-post verification requires acquisition of costly information that cannot be obtained from normal use. Building on the Darby and Karni (1973) classification, Ekelund et al. (2006) classify products for which both ex-ante and ex-post verification of product quality is impossible as meta-credence goods. The importance of recognizing these quality discovery characteristics of products for economic analysis of market activity is highlighted by Darby and Karni (1973), Emons (1997), Emons (2001), Nelson (1970), and Feddersen and Gilligan (2001), whose analyses demonstrate that these characteristics lead to important differences in behavior that are instrumental in explaining seemingly anomalous market phenomena. In addition to the foregoing, the related analyses presented by Akerlof (1970), Leland and Pyle (1977), Leland (1979), Meyers and Majluf (1984), and Stiglitz and Weiss (1981) illustrate the importance of accounting for the informational characteristics of products in credit, equity, insurance, and durables goods markets.

Despite the economics profession's established record in incorporating the essential characteristics of products in the economic analysis of market behavior, its record of doing so for religious markets is less than satisfactory. This view is reflected by Ekelund et al. (2006) who observe that difficulties or inadequacies in defining the product that is demanded by believers and supplied by religious institutions is a substantial impediment to economic analysis of religious behavior, such as variation in religious affiliation and in religious participation. The fundamental source of this difficulty is embedded in the fact that affiliation with and participation in religious institutions yields an array of benefits that may each be treated as a separate product with economically consequential characteristics that merit describing them as meta-credence, credence, public, private, club, or joint goods.

Given that observed religious behavior is a reflection of the interaction of demand and supply in the markets for these religious products, under ideal circumstances economic analysis of religious behavior should proceed by evaluating the demand for and supply of these separate products. However, even if the unwieldiness of this approach could be overcome, using it to explain observed religious variation would still require the assignation of weights to variation arising out of the individual markets for each of the array of religious products.

Most efforts to address this difficulty in the extant economic literature proceed by assuming that there is a dominant or primary motive underlying the demand for religious activity. This dominant motive approach identifies a particular product or benefit among the array of products or benefits derived from religious activity and economic analysis of religious behavior focuses on evaluation of the demand for, and supply of, that particular product or benefit. Since this approach is tantamount to assigning negligible weights to variation in religious behavior arising out of the religious products that are held in abeyance, the implications of the consequent analysis for religious behavior is potentially very sensitive to the choice of product to emphasize. Examples of this approach include Azzi and Ehrenberg (1975), who identified the "salvation motive" as the dominant motive for religious activity, and Ekelund et al. (2006) who assume that the dominant motivation for religious affiliation and participation is the need for "assurance of eternal salvation", which is satisfied by religious firms.

The risk associated with assuming a dominant motive, as is done in the examples above, is avoided in an alternative approach best exemplified by the following description in Iannaccone (1992: 272):

> *The analysis does not presuppose any special motives for religious activity, such as Azzi and Ehrenberg's (1975) "afterlife consumption motive", but rather assumes merely that religious activities provide utility in proportion to the scarce resources devoted to them.*

Since no common dominant motive is assumed, this approach allows for the possibility of substantial variation among believers in the identity of the religious product that yields the highest utility and thereby exerts the greatest influence on religious variation. This is in sharp contrast to the dominant motive approach, which asserts a common dominant motive and thereby identifies the religious product that yields the highest utility to believers and is the defining influence on religious market behavior. As such, Iannaccone's approach circumvents but does not address the problems posed by the multi-product nature of religious production.

The hope hypothesis implies that the production of supernatural hope is the fundamental motive underlying believers' activities in both tangible and intangible religious markets. Given that knowledge of the will of supernatural beings is a critical input in the production of supernatural hope and that supernatural beings typically communicate their will via faith intermediaries, the procurement and delivery of faith intermediation services is the proximate and dominant motive underlying behavior in tangible religious markets. As such, faith intermediation services are the *raison d'être* for the existence of religious organizations and for believers' decisions to affiliate with these organizations. Consequently, the "right religious product" is faith intermediation services and the demand and supply of faith intermediation services is the *sine qua non* of all other (or ancillary) religious products.

Given that faith intermediation services is the "right religious product" produced and exchanged in tangible religious markets, I now turn to describing its defining characteristic. The market for faith intermediation services is characterized by asymmetric information problems. In particular, faith intermediaries' information about the quality or accuracy of their interpretation and transmission of the wishes of supernatural beings to believers is clearly superior to that of believers. As Akerlof (1970) so poignantly illustrated, there is a substantial risk that any market characterized by asymmetric information about product quality will disintegrate. That many markets, such as the market for used cars, durable goods, insurance, credit, and equity markets, continue to thrive despite substantial informational asymmetries between buyers and sellers in these markets is *prima facie* evidence of the existence of market mechanisms – such as certification intermediaries, warranties, and middlemen – that allow sellers to credibly signal product quality and thereby mitigate the effects of asymmetric information problems.[6] However, the efficacy of these mechanisms is critically reliant on the feasibility of ultimately verifying product quality. In contrast, neither ex-ante or ex-post verification of the quality of faith intermediation services is possible. This means that faith intermediation is – in Ekelund et al.'s (2006) nomenclature – a meta-credence good and that market devices, such as warranties, middlemen, and certification intermediaries, are not effective in mitigating the effects of asymmetric information in the market for faith intermediation services.[7] Why then do faith intermediation markets continue to thrive?

Trust without verification

This section advances the proposition that trust between faith intermediaries and believers mitigates the potentially debilitating effects of asymmetric

information problems in faith intermediation markets and, thereby, allows these markets to thrive. Under ideal circumstances this proposition would be accompanied by a precise and widely accepted definition of trust that would be instrumental in identifying the proposition's empirical content. However, Coleman (1990, chs 5 and 8) and Nooteboom (2007) clearly illustrate the absence of such a consensus definition in the literature. Fortunately, this difficulty can be circumvented by focusing on the operational characteristics of transactions that are primarily based on trust. Accordingly, I define a transaction based on trust as a transaction in which one party (the trustor) voluntarily gives another party (the trustee), whose behavior is not under its control, influence over its welfare by ceding authority over at least some of its tangible and/or intangible resources without the protections provided by an explicit or implicit enforceable contract.[8]

Positive expected gain is a necessary but not sufficient condition for rational agents to enter into transactions that are primarily based on trust. Following Coleman (1990, chs 5 and 8), I specify this necessary condition as

$$\text{Expected Gain} = P_D\, G - (1 - P_D)L > 0 \text{ or } L/G < P_D/(1 - P_D) \qquad (2)$$

where G is the perceived gain when the trustor follows the trustee's instructions and the promised reward is realized, L is the perceived loss when the trustor follows the trustee's instructions but the promised reward fails to materialize, and P_D is the probability of delivery, which is the probability that the promised reward or benefits will be realized or delivered if the trustor follows the trustee's instructions. Consequently, P_D is the probability that the realized outcome will be G and $(1 - P_D)$ the probability that the realized outcome will be L. More generally, Equation (2) is a necessary condition for a believer to enter into a trust relation or to affiliate with a faith intermediary or church.

Religious risk

A thorough understanding of religious risk is best developed within the context of the overall risks agents face. Accordingly, it is useful to dichotomize the total or overall risk any given believer faces as a combination of secular and religious risk. For the purposes of this analysis I define secular risk as the risk associated with uncertainty about which, among the many possible states of the secular world, will materialize in the future. Under the hope hypothesis the representative risk-averse believer has access to scientific and supernatural technologies to mitigate secular risk and chooses the combination of these

technologies that it deems optimal. Scientific technologies include portfolio diversification and/or the acquisition of contingent claims (i.e. insurance), while supernatural technologies are based on incurring the favor or protection of a supernatural being(s) that according to the hope hypothesis requires the production of supernatural hope and procurement of the inputs to that production process (namely, belief in the supernatural being, supernatural services, and faith intermediation services). Religious risk may be broadly characterized as the risk associated with uncertainty about the quality of the inputs required to produce supernatural hope. Consequently, believers' perception of the efficacy of the supernatural approach to mitigating secular risk is complicated by the existence of religious risk in that they are forced to contend with the knowledge that the risk-mitigating technology is itself risky.[9] Under this scenario, risk aversion and the existence of both secular and religious risks have important implications for total resources devoted to religious activity, but these implications must be derived from the conditions that would prevail when the representative optimizing risk-averse believer has chosen the combination of scientific and supernatural risk-mitigation technologies that it deems optimal. This ambitious agenda is beyond the scope of this paper, which is more narrowly focused on the implications of the joint incidence of risk-averse believers and religious risk for the fellowship ratio, defined as the opportunity costs of time and resources members are required to devote to fellowship activities as a fraction of the opportunity costs of total time and resources members devote to religious activities.

The conclusions in the previous section – that faith intermediation services are the defining product produced and exchanged in tangible religious markets; that ultimate verification of the quality of faith intermediation services is not feasible; and that the defining transactions between religious institutions and believers are based on trust without verification – together lead to the inescapable conclusion that both believers and religious firms encounter significant risks in tangible religious markets. In making decisions about entering into trust transactions with faith intermediaries, a believer in a given supernatural being faces two types of risk. Firstly, given the absence of tangible evidence of the existence of the supernatural being in question, the believer must form a subjective estimate of the probability that the supernatural being exists (i.e. $p(SNB)$). If his/her subjective estimate is too high the believer may incur compliance costs in the false hope of ensuring favorable treatment by the supernatural being. On the other hand, if his/her subjective estimate is too low, he/she may fail to invest in compliance activities that would have been productive in inducing favorable treatment from the supernatural being. This risk is what I previously characterized as belief risk.

In addition to belief risk, believers must also contend with intermediation risk. Given $p(SNB)$, intermediation risk is the risk that believers' subjective estimates of the probability that rewards promised by the faith intermediary will be delivered (i.e. P_D) may be incorrect. Since P_D is heavily influenced by believer's subjective estimates of the probability that a given faith intermediary is trustworthy, a subjective estimate that is too high might lead the believer to rely on incorrect or fraudulent advice about the will of the supernatural being in question and thereby fail in his/her efforts to comply with the supernatural will. Alternatively, an estimate that is too low may lead the believer to refrain from procuring the services of a credible faith intermediary and thereby fail to satisfy the supernatural being due to lack of accurate information about its will.

Understanding how the representative believer's estimate of the probability that a given faith intermediary will prove to be trustworthy is determined, requires consideration of the dimensions along which the trustee (i.e. the faith intermediary) is asking believers to trust. In this regard, faith intermediaries are asking potential trustors (believers) to trust them with respect to three assertions. These are as follows: (a) the faith intermediary has special or privileged communication with the supernatural being in which the supernatural being's will is conveyed to the faith intermediary; (b) the faith intermediary is competent to accurately interpret and transmit the will of the supernatural being to believers; and (c) the faith intermediary is well intentioned and committed in the sense that it will refrain from opportunistic behavior. In making a decision to trust or not to trust, believers form subjective estimates of the probability that the faith intermediary will prove trustworthy with respect to each of the above assertions. For precision and clarity I define four stochastic events as follows: event A occurs when the faith intermediary proves trustworthy with respect to assertion (a); event B occurs when the faith intermediary proves trustworthy with respect to assertion (b); event C occurs when the faith intermediary proves trustworthy with respect to assertion (c); and event T is the joint occurrence of events A, B, and C. In addition, let P_A, P_B, P_C, and P_T respectively represent the believer's subjective estimates of the probability of events A, B, C, and T occurring, given $p(SNB)$. Under the simplifying but probably counterfactual assumption that events A, B, and C are independent, well known probability rules imply that

$$P_T = (P_A)\,(P_B)\,(P_C) \qquad\qquad (3)$$

A believer's subjective estimate of the probability that the rewards or benefits promised by the supernatural being will be realized if the believer

follows the instructions/advice of the faith intermediary (i.e. the probability of delivery P_D), should reflect both its estimate of the probability that the supernatural being with the particular set of supernatural characteristics attributed to the supernatural being in question exists (i.e. $p(SNB)$) and P_T. To capture this, I employ the simplifying but counterfactual assumption that $p(SNB)$ and P_T are independent to assert that

$$P_D = p(SNB)(P_T) \tag{4}$$

$$P_D = p(SNB)\,(P_A)\,(P_B)\,(P_C) \tag{5}$$

It is useful to note that P_D may be interpreted as the believer's subjective estimate of the probability that following the doctrine advocated by the denomination in question will lead to the desired, typically unverifiable, supernatural outcome. In addition, the necessary condition for a believer to affiliate with or maintain membership with a given denomination implies that the magnitude of the compliance costs the believer is willing to incur will increase as P_D increases so that P_D is an indicator of willingness to pay. Since willingness to pay is a credible indicator of commitment, it is appropriate to interpret P_D as an indicator of the believer's commitment to the denomination in question.

The viability of any given faith intermediary depends on its ability to induce believers to transact with it for faith intermediation services. The probability that the necessary condition for a given individual to transact with a particular faith intermediary will be satisfied is positively correlated with P_D and negatively with L/G. As such, at any given point in time faith intermediaries face affiliation risk, which I define as the risk of losing market share due to future revisions in believers' subjective estimates of P_D (i.e. changes in commitment) and in their perceptions of L/G that lead to violations of the sufficient condition for believers to enter into trust transactions with faith intermediaries. This observation yields the behavioral prediction that religious institutions or faith intermediaries will seek to manage affiliation risk by modifying their behavior in ways that credibly signal their trustworthiness along the three dimensions identified above (i.e. favorably influence P_A, P_B, and P_C); reinforce believers subjective estimates of $p(SNB)$; and that encourage the perception among believers that the ratio of potential losses to potential gain (i.e. L/G) is appropriately low.

The preceding delineation of religious risk might be characterized as an extension of the earlier argument that faith intermediation services are the dominant product produced and exchanged in tangible religious markets and that faith intermediation services is the *sine qua non* of all other (i.e.

ancillary) religious products. As such, the industrial organization of tangible religious markets that is implicit in the analysis to follow reflects the characteristics of the dominant product produced and exchanged, which is faith intermediation. Credible codification of the will of the supernatural being into a doctrinal path requires rare attributes, such as the ability to convince a following that the entity has privileged access or communication with the supernatural being and has special expertise in interpreting the will of the supernatural being. As such, faith intermediation services are not amenable to joint production and are produced and supplied by faith intermediaries to their adherents or customers. Under this formulation, the representative member of a given denomination makes optimal choices with respect to mitigation of the belief and intermediation risk it faces, while a faith intermediary makes optimal choices with respect to mitigation of its affiliation risk. However, Equations (4) and (5) imply that the actions faith intermediaries can take to mitigate their affiliation risk will also mitigate the belief and intermediation risk faced by their members or customers.[10]

The location of religious firms in fellowship space

The interaction among like-minded believers has the potential to substantially magnify the impact of faith intermediaries' attempts to manage their affiliation risk by encouraging believers to form and maintain relatively high estimates of P_T and $p(SNB)$. This reflects the existence of social network externalities via which both the intensity of any given believer's belief in the supernatural being (as indicated by their estimate of $p(SNB)$) and the certainty with which his/her estimate of $p(SNB)$ is held are positively associated with the number of like-minded and committed believers he or she interacts with. As a consequence, for any given congregation, these network externalities increase the population mean of possible estimates of $p(SNB)$ while also reducing their dispersion. In addition, these social network externalities also affect believers' confidence in faith intermediaries. In fact, mean-increasing, dispersion-reducing effects similar to that exerted on $p(SNB)$ also influence believers' subjective estimates of P_A, P_B, and P_C and thereby P_T. To more precisely describe how these network externalities arise, it is first useful to more closely examine the representative believer's decision to affiliate with a given denomination.

The production of supernatural hope is the fundamental motive for religiosity. The production function specified in Equation (1) identifies knowledge of supernatural will as one of the indispensable inputs in the production of supernatural hope. Since believers rely in whole or in part on the faith

intermediation services supplied by religious firms or denominations to acquire knowledge of supernatural will, religious denominations or faith intermediaries codify their interpretation of supernatural will into a set of rules, practices, and rituals that together constitute a religious type or doctrine. Under this scenario, an individual who chooses to affiliate with a given denomination is choosing a supernatural being and a doctrine that he/she believes is the optimal path to securing the rewards that come with compliance. Given that both choices are made under substantial uncertainty and thereby involve risk, the religious products offered by religious firms are adequately and uniquely summarized by the combination of religious risk and expected reward they are perceived to offer. Consequently, believers in competitive religious markets choose among available combinations of religious risk and expected reward.

To the extent that the representative believer recognizes deity uncertainty and uncertainty about doctrinal efficacy, any event or condition that reduces perceived uncertainty will enhance utility by reducing the utility costs of bearing the associated risk. Under this scenario, a decision by one additional individual to join a given denomination reinforces existing members' beliefs and thereby encourages them to increase and/or fortify their estimates of $p(SNB)$, P_T, and expected supernatural rewards. To the extent that the combination of religious risk and expected reward a denomination is perceived to offer uniquely identifies its product, the aforementioned changes in risk and expected reward alters its product in ways that enhance utility for all its members. As such, the individual captures only a fraction of the total utility gain generated by his/her decision to join, so that significant external benefits accrue to existing members. These external benefits are a significant part of the return to proselytizing activities and their existence explains why existing members will be motivated to proselytize. Moreover, cross-denominational variation in the magnitude of these external benefits should be instrumental in explaining variation in proselytism across denominations.

In addition to direct social network externalities, important indirect social network externalities (see Arturo and Gaytan, 2009; Calvo-Armengol and Jackson, 2009; Jackson, 2011; Jackson and Yariv, 2011; Roberts and Urban, 1988) also play an important role in religious denominations. The operation of these indirect social network externalities is best illustrated by considering the experience of new affiliates. Immediately prior to joining a denomination, a new member's prior probabilities (i.e. their subjective estimates of P_T (recall that $P_T = (P_A) (P_B) (P_c)$) and $p(SNB)$ will be conditional on their pre-conversion information set. Upon becoming a member, interaction with other members via participation in fellowship activities exposes the representative new member to new information that is acquired via direct observation and word-of-mouth testimonials. This new information is incorporated

into the member's decision-making process, via Bayesian updating of his/her subjective prior probabilities, into subjective posterior probabilities. While absorption of this new information could lead to higher or lower posterior probabilities, there is good reason to expect that the influence of new information that becomes available via participation in fellowship activities will be heavily skewed towards generating posterior probabilities that exceed the prior probabilities. In particular, the necessary condition for affiliation (i.e. Equation (2)) is unlikely to be satisfied for potential members with prior probabilities or subjective estimates of P_D that are low, and will be violated for members whose posterior probabilities fall significantly below their prior probabilities. In addition, religious firms' interest in mitigating affiliation risk should lead them to adopt membership criteria that limit membership to those whose behavior and commitment (as indicated by P_D) encourage new members to form high estimates of the relevant probabilities.

Given Equation (5), the foregoing observations suggest that in the steady state, social network externalities will reduce the probability of adverse revisions in P_D that lead to violation of the necessary condition for affiliation specified in Equation (2), and thereby mitigate affiliation risk. As such, risk-averse religious firms have an incentive to adopt religious practices that encourage interaction among their members. However, their ability and willingness to do so is determined in part by the constraints and opportunities implicit in their operating environment.

In free religious markets, the adoption of religious practices by firms, and their members' acquiescence, is an outcome that materializes only if both parties to the implied exchange (i.e. religious firms and their customers) perceive that it improves their welfare. Consequently, while the foregoing observations explain why religious firms may wish to adopt forms of religious practice that encourage interaction or fellowship, a complete theoretical explanation must explain why their customers would prefer this form of religious practice to other potentially less demanding forms. In what follows I argue that impediments to risk mitigation via portfolio diversification and/or the acquisition of relevant contingent claims forces believers to rely on the risk-mitigating effects of fellowship to manage their religious risk (i.e. both belief and intermediation risk). The analysis demonstrates that the level of fellowship deemed optimal by any given believer is heavily dependent on his/her perception of prevailing constraints on his/her ability to mitigate the impact of religious risk via diversification and/or the acquisition of contingent claims.[11]

Constraints on belief risk mitigation

At the theoretical level, believers can independently secure the risk-mitigating   effects   of   diversification   to   reduce   their   belief

risk by choosing a portfolio of gods. Unfortunately, casual observation suggests that impediments to such self-diversification of belief risk abound. For example, since monotheism is characterized by belief in one true God, choosing a portfolio of gods is incompatible with mono-theistic beliefs. Consequently, a monotheist who insists on having a diversified portfolio of gods would have to abandon monotheism in favor of polytheism. However, as discussed below, such theistic conversions are likely to be very costly. In contrast to monotheism, poly-theism not only allows for a portfolio of gods but marginal additions to a believer's portfolio of gods are expected and are relatively less costly.

The limitations and opportunities inherent in monotheism and poly-theism may be magnified by the need for significant human capital to practice religious faith. For example, at the onset of life children are typi-cally endowed with the theistic beliefs of their parents and subjected to additional schooling in these beliefs as their lives evolve. Consequently, by the time they are cognitively capable of making informed choices with respect to theistic tradition, they have acquired substantial human capital in the theistic tradition they were exposed to at birth but very little, if any, human capital that is applicable to other theistic traditions. This dearth of human capital that is relevant for other theistic traditions implies that the cost of modifying the portfolio of gods one inherits may be very high. As such, believers' ability to independently mitigate their belief risk by mod-ifying the portfolio of gods they inherit may be severely constrained. As alluded to above, the level of belief risk mitigation via portfolio diversi-fication available to individuals who inherit or are born into monotheism is zero. Accordingly, if we define α_{BM} as the fraction of total belief risk that remains after accounting for the inherited diversification of belief risk under monotheism, the foregoing observations imply that $\alpha_{BM} = 1$. In contrast, polytheism allows for belief in many gods and thereby is per-missive of a diversified portfolio of gods and of portfolio modifications. As a consequence, the level of belief risk mitigation via portfolio diver-sification available to individuals who inherit or are born into polytheism is greater than zero. If α_{BP} is defined as the fraction of total belief risk that remains after accounting for both inherited diversification and self-diver-sification of belief risk under polytheism, the forgoing observations imply that $0 < \alpha_{BP} \leq 1$.

Constraints on mitigation of intermediation risk

Monotheistic religions are based on belief in the existence of a willful supernatural being or God that rewards compliance with its will and pun-ishes deviance. Religious denominations or faith intermediaries codify

their interpretation of supernatural will into a set of rules, practices, and rituals that together constitute a religious type or doctrine. Under this scenario, an individual who chooses to affiliate with a given denomination may be characterized as choosing a doctrine that he/she believes is the correct path to securing the rewards that come with compliance. However, uncertainty about the optimality or correctness of any given doctrine implies that there is inter-mediation risk associated with this choice, and rational choice behavior suggests that, in the absence of impediments, individuals will seek to mitigate this intermediation risk in part by choosing a portfolio of faith intermediaries.

However, believers do not typically have a completely free hand in choosing their portfolio of faith intermediaries. In particular, under the hope hypothesis, production of supernatural hope requires minimum levels of human capital in the form of the believer's stock of knowledge about the will of the relevant supernatural being. Children typically acquire their first installment of religious human capital from the instructions and example of their parents and add to their stock via participation in religious activities (i.e. learning by doing). Consequently, by the time they are cognitively capable of making informed choices with respect to their portfolio of faith inter-mediaries, they have acquired substantial religious human capital. However, this religious human capital is specialized in the sense that its efficacy as an input in the production of supernatural hope is greatest when applied within the context of the portfolio of religious denominations they were born into. Under these conditions, portfolio modifications (i.e. adding, subtracting, or substituting faith intermediaries) leads to obsolescence of at least some of their religious human capital and/or requires acquisition of new religious capital. The magnitude of these portfolio modification costs is a positive function of the extent to which the newly adopted religious denomination differs from the initial denomination and may constitute a barrier or impediment to portfolio modification. Consequently, any given individual is likely to perceive that he/she is not entirely free to diversify their intermediation risk by choosing the portfolio of faith intermediaries that is optimal in terms of mitigation of intermediation risk. As such, these idiosyncratic portfolio modification costs may be interpreted as an appropriate proxy for perceived opportunities to self-diversify faith intermediation risk.

Welfare implications of portfolio modification costs

To capture the potential welfare implications of the preceding constraints on believers' ability to self-diversify religious risk, I assume that the representative believer is endowed with a theistic tradition and with faith inter-mediaries that it perceives as allowing it to achieve a limited level of

independent risk mitigation or self-diversification. Let Φ_i represent the total utility costs the representative believer in the *i*th theistic tradition (for $i = M$ for monotheism and P for polytheism) incurs from bearing religious risk that it is unable to diversify away on its own. In general, Φ_i is given by

$$\Phi_i = \beta\,(\alpha_{Bi}\varphi_{Bi} + \alpha_{Ii}\varphi_{Ii}) \text{ for } i = M,\ P \tag{6}$$

where β is the cost of a unit of religious risk measured in terms of utility and φ_{Ii} and φ_{Bi} are, respectively, the total quantity of intermediation and belief risk under the *i*th theistic tradition. α_{Ii} and α_{Bi} are, respectively, the fraction of total intermediation and belief risk that the individual is unable to diversify via his or her portfolio choices under the *i*th theistic tradition. For any given individual, let c_{Ti} represent the perceived cost of modifying the portfolio of gods under the *i*th theistic tradition. Given the choice of theistic tradition, let c_{Ii} represent the cost the individual perceives he/she would incur from modifying the portfolio of faith intermediaries he/she is affiliated with. Under the reasonable assumptions that these portfolio modification costs (i.e. the c_{Ti}'s and c_{Ii}'s) are appropriate proxies for perceived impediments to self-diversification of belief and intermediation risk and that α_{Bi}'s and α_{Ii}'s are primarily and respectively determined by the perceived state of opportunities to self-diversify belief and intermediation risk, they may be represented as

$$\alpha_{Bi} = \alpha_{Bi}\,(c_{Ti}) \text{ with } \alpha_{Bi}{}'\,(c_{Ti}) > 0 \text{ for } i = M,\ P \tag{7a}$$

$$\alpha_{Ii} = \alpha_{Ii}\,(c_{Ii}) \text{ with } \alpha_{Ii}{}'\,(c_{Ii}) > 0 \text{ for } i = M,\ P \tag{7b}$$

Equation (6) implies that the utility costs of the fraction of total religious risk that the representative believer in the *i*th theistic tradition is unable to diversify or mitigate on his or her own (i.e. Φ_i) is a positive function of the α_{Bi}'s and α_{Ii}'s. Therefore, Equations (7a) and (7b) imply that the fraction of total religious risk (i.e. the sum of belief and intermediation risk) that can potentially be mitigated via believers' association and/or interaction with faith intermediaries rises with the believers' perceived costs of modifying their portfolio of gods and of faith intermediaries (i.e. c_{Ti} and c_{Ii}).

Optimization in fellowship space

To more precisely measure the level of fellowship, I employ the reasonable presumption that any given denomination requires some combination of fellowship (or group) and independent (or private) activities. For example, a

denomination may require group activities, such as participation in church services in the form of testimonials, while also requiring private prayer and study of religious literature. In addition, under the assumption that members of any given denomination are allowed to substitute fellowship activities for private activities (and vice versa) within a limited range, any given denomination may be characterized as offering its members combinations of fellowship and private activities. These offerings may be represented as fellowship ratios, where a fellowship ratio is defined as the opportunity costs of time and resources members are required to devote to fellowship activities as a fraction of the opportunity costs of total time and resources members devote to religious activities. As such, the range of fellowship ratios that are feasible within a given denomination is an indicator of that denomination's reliance on fellowship activities relative to private activities. This fellowship ratio is positively correlated with factors such as the frequency and duration of fellowship activities, the degree to which members are required to actively participate in such activities (for example, provide testimony as opposed to mere attendance), and the extent to which these activities infringe upon or limit secular or non-church activity. Let η represent this fellowship ratio. The preceding characterization and definition of η implies that $0 \leq \eta \leq 1$ and that the range of fellowship ratios offered by denominations will be subsets of the unit interval, such as $0 \leq \eta \leq 0.5$, $0.5 \leq \eta \leq 1$, or $0.2 \leq \eta \leq 0.5$, and so on.

The risk-mitigating implications of the social network externalities associated with fellowship activities imply that belief and intermediation risk may be represented as follows:

$$\varphi_{Bi} = \varphi_{Bi}(\eta, \ldots) \text{ with } \varphi_{Bi}{}'(\eta, \ldots) < 0 \text{ for } i = M, P \qquad (8)$$

$$\varphi_{Ii} = \varphi_{Ii}(\eta, \ldots) \text{ with } \varphi_{Ii}{}'(\eta, \ldots) < 0 \text{ for } i = M, P \qquad (9)$$

The derivatives $\varphi_{Bi}{}'(\eta, \ldots)$ and $\varphi_{Ii}{}'(\eta, \ldots)$ measure the believer's perception of the effectiveness of fellowship as a mitigator of belief and intermediation risk and as such may be interpreted as indicators of the perceived responsiveness of belief and intermediation risk to fellowship activities.

The utility cost of a unit of religious risk (i.e. β) depends on the individual's degree of aversion to risk as follows:

$$\beta = \beta(\mu) \text{ with } \beta_\mu > 0 \qquad (10)$$

μ is a measure of the individual's degree of aversion to religious risk and β_μ is the first derivative of β with respect to μ.

Using Equations (7)–(10) to rewrite Equation (6) yields

$$\Phi_i = \beta\,(\mu)[\alpha_{Bi}\,(c_{Ti})\,\varphi_{Bi}(\eta, \ldots) + \alpha_{Ii}\,(c_{Ii})\,\varphi_{Ii}\,(\eta, \ldots)] \text{ for } i = M, P \quad (11)$$

As noted earlier, fellowship reduces belief and intermediation risk faced by a believer that subscribes to the *i*th theistic tradition and thereby reduces the utility costs (i.e. Φ_i) imposed by these risks. Consequently, the marginal benefit of fellowship measured in terms of utility is the amount by which a marginal increase in the fellowship ratio reduces the total utility costs of these risks. Thus, an expression for the marginal benefit of fellowship may be obtained by differentiating Φ_i with respect to η. Letting $\Phi_{i\eta}$ represent that derivative, differentiating Equation (11) with respect to η, yields

$$\Phi_{i\eta} = \beta\,(\mu)[\alpha_{Bi}\,(c_{Ti})\,\varphi_{Bi}`(\eta, \ldots) + \alpha_{Ii}\,(c_{Ii})\,\varphi_{Ii}`(\eta, \ldots)\,] < 0 \quad (12)$$

where $\varphi_{Bi}`(\eta, \ldots)$ and $\varphi_{Ii}`(\eta, \ldots)$ are the partial derivatives of φ_{Bi}, and φ_{Ii} with respect to η. Equation (12) suggests that the effect of a marginal increase in the fellowship ratio on the utility loss imposed by religious risk is equal to $\Phi_{i\eta} < 0$. As such, it implies that the marginal benefit of fellowship is equal to $-\Phi_{i\eta} > 0$ units of utility.

Let λ_i represent the total utility loss a believer in the *i*th theistic tradition (i.e. monotheism or polytheism) incurs due to participation in fellowship activities. This utility loss increases with the intensity and time spent on fellowship activities and with the per unit market opportunity costs of time spent on fellowship activities relative to the per unit market opportunity costs of time spent on other religious activities (ω). These observations allow us to specify λ_i as

$$\lambda_i = \lambda_i\,(\eta,\,\omega) \text{ with } \lambda_{i\eta} > 0 \text{ and } \lambda_{i\omega} > 0 \text{ for } i = M, P \quad (13)$$

$\lambda_{i\eta}$ is the derivative of λ_i with respect to η and, as such, is the marginal utility loss associated with fellowship or the marginal cost of fellowship measured in terms of utility. Given our earlier specification of the marginal benefit of fellowship, the member's optimal fellowship ratio is the level of η at which $-\Phi_{i\eta} = \lambda_{i\eta}$ (i.e. marginal benefit is equal to marginal cost). Consequently, for any utility maximizing member of a given denomination, the optimal fellowship ratio (i.e. η) is the ratio at which the following condition holds:

$$-\Phi_{i\eta} = -\beta\,(\mu)[\alpha_{Bi}\,(c_{Ti})\,\varphi_{Bi}`(\eta, \ldots) + \alpha_{IM}\,(c_{Ii})\,\varphi_{Ii}`(\eta, \ldots)] = \lambda_{i\eta}\,(\eta,\,\omega) \quad (14)$$

Equation (14) is consistent with the following propositions.

> **Proposition 1:** *Religious firms operating in competitive religious markets will adopt locations in fellowship space that are mutually beneficial in the sense that they allow members to realize their optimal levels of fellowship while allowing risk-averse religious firms to optimally manage their affiliation risk. Given heterogeneity among the religious with respect to preferences for risk, with respect to perceived opportunities to self-diversify belief and intermediation risks, and with respect to the relative market opportunity costs of time and resources expended on fellowship activities (i.e. ω), there will be substantial variation in optimal or desired levels of fellowship among the religious and thereby in the location of religious firms in fellowship space.*

Given heterogeneity among believers, Equation (14) implies that there will be substantial variation in optimal or desired fellowship ratios. To capture this, I assume that the population of optimal ηs is uniformly distributed over the continuous interval [0, 1]. In addition, I assume that religious firms operate in competitive markets and that they optimize their objective functions subject in part to the constraints and opportunities presented by the population distribution of preferences for fellowship and the degree and nature of competition for customers. Under these conditions, any given optimizing religious firm offers the range of fellowship ratios within the subinterval of the population distribution of optimal ηs (the subinterval [0, 0.5] for example) that is consistent with optimizing its objective function. Given prevailing competition for members, variation in the ranges of fellowship ratios offered across denominations reflects their strategic responses to variation in individual preferences or demand for fellowship.[12] Consequently, as a summary of the factors that determine optimal ηs and thereby both cross-sectional and time series variation in optimal ηs, Equation (14) is key to understanding variation in the ranges of fellowship ratios offered across denominations.

> **Proposition 2:** *Holding all else constant, the fellowship ratio that is optimal for a utility maximizing church member increases as that member's degree of aversion to religious risk (i.e. μ) increases. Consequently, holding all else constant, religious firms whose membership ranks are dominated by individuals with relative high degrees of aversion to religious risk are more likely to offer ranges of η near the upper end of the distribution of fellowship ratios.*

Equation (10) implies that the utility price the representative member of a given denomination is willing to pay to avoid a unit of religious risk is

positively correlated with the member's degree of aversion to religious risk. As members' degree of aversion to religious risk (i.e. μ) increases, the utility cost of a unit of religious risk also increases. Given two individuals with identical marginal costs of fellowship but different degrees of aversion to religious risk, the risk-mitigating benefits of fellowship imply that the marginal benefit of fellowship for the more risk-averse individual will be greater, and the optimality condition (i.e. Equation (14)) implies that his/her optimal or desired fellowship ratio will also be greater. Consequently, the theory implies that holding all else constant, including members' perception of available opportunities to self-diversify religious risk, the extent to which religious denominations adopt practices that emphasize fellowship will be positively correlated with the degree of aversion to religious risk of their desired membership.

> **Proposition 3:** *Holding theistic tradition constant, denominations whose adherents believe that the only true path to desired religious rewards is that advocated by their denomination or church are more likely to offer high fellowship ratios and thereby adopt congregational practice.*

Many monotheistic religions and their members believe that their religion is the only true religion. This is tantamount to the belief that the doctrine or path to desired religious rewards advocated by the religion or denomination in question is the only viable path. This kind of exclusivity is consistent with the perception that the costs of modifying believers' portfolios of faith intermediaries (i.e. c_{Ii}) are relatively high so that perceived impediments to self-diversification of intermediation risk are substantial, if not prohibitive. This implies that for believers in exclusive religions, the perception of the costs of expanding their portfolio of faith intermediaries (i.e. c_{Ii}) will be high relative to that perceived by members of denominations that do not advocate exclusivity. As such, the impact of exclusivity on the marginal benefits of fellowship and, thereby, believers' demand for fellowship, can be evaluated by differentiating the left-hand side of Equation (14) with respect to c_{Ii}. This yields

$$-\beta\,(\mu)[\alpha_{Ii}{'}(c_{Ii})\ \varphi_{Ii}{'}(\eta, \ldots)] > 0 \qquad (15)$$

which implies that the marginal benefit of fellowship will be relatively higher for those who believe in exclusive religions, and that their optimal fellowship ratios will be higher. Proposition 1 then implies that the range of fellowship ratios offered by denominations that advocate that their doctrine is the only true path to desired religious rewards will be in the upper end of the unit interval. As noted

earlier, such denominations may be appropriately characterized as adopting congregational practice. This prediction is broadly consistent with available empiricism. For example, while Protestant Christianity is located towards the congregational end of the spectrum, Iannaccone (1995) notes that Protestant religions that emphasize exclusivity typically adopt a more intensely congregational approach (i.e. locate in the upper extreme of fellowship space), as indicated by factors such as the degree of within-group interaction and lack of involvement in non-congregational activities and organizations.

> **Proposition 4:** *Compared to polytheistic faiths, monotheistic faiths are more likely to adopt congregational practice and polytheistic faiths are more likely to adopt independent or private practice.*

Monotheistic denominations and their members believe that there is one true God. As such, an individual who is initially affiliated with a monotheistic faith will perceive that the costs of modifying his/her portfolio of gods (i.e. c_{TM}) is very high, perhaps prohibitively so. In contrast, while believers in polytheistic faiths are likely to perceive that modifying or expanding their portfolio of gods is costly (i.e. $c_{TP} > 0$), since such portfolio modifications are consistent with their initial beliefs their estimate of these costs should be substantially lower than similar estimates for monotheistic believers, so that $c_{TM} > c_{TP}$. Under the reasonable assumption that $\alpha_{BM}(c_{TM})$ and $\alpha_{BP}(c_{TP})$ are equivalent monotonic functional forms, $c_{TM} > c_{TP}$ implies that $\alpha_{BM}(c_{TM}) > \alpha_{BP}(c_{TP})$. Plugging this result into the left-hand side of Equation (14) for $i = M$ and P leads to the conclusion that, holding all else constant, the marginal benefit of fellowship to monotheistic believers is greater than the marginal benefit to believers in polytheistic faiths (i.e. $-\Phi_{M\eta} > -\Phi_{P\eta}$). Consequently, for given marginal costs of fellowship, the optimal fellowship ratios desired by believers in monotheistic faiths will exceed that desired by believers in polytheistic faiths. The application of Proposition 1 then leads to the conclusion that monotheistic denominations' location in fellowship space is more likely to be at the upper end of the population distribution of fellowship ratios, which is equivalent to saying that they are more likely to adopt congregational forms of religious practice.

Proposition 4 is instrumental in explaining important differences in the incidence of congregational and independent practice such as exists between monotheistic and polytheistic religions and between Asian and Western religions. For example, Iannaccone's (1995) comparison of Greco-Roman Paganism to Judeo-Christian Monotheism led him to conclude that the latter adopted congregational practice, while the former tended towards private or independent practice. Given the early dominance of polytheism in

the historical evolution of theistic traditions and the subsequent rise of the monotheistic traditions of Judaism, Christianity, and Islam, Proposition 4 predicts that the rise of monotheism should have been accompanied by the emergence of congregationalism. This prediction is well supported by Stark (2011), who documents the tendency of new religious movements that advocated monotheistic beliefs and exclusivity to adopt congregational forms of religious practice. Finally, conservative estimates of the fraction of the world's population that practice polytheism is approximately 27 percent.[13] As such, Proposition 4 implies that approximately 27 percent of the world's population choose or prefer relatively low levels of fellowship.

Summary

Given the existence of religious risk, rational choice theory implies that – in the absence of impediments – the representative risk-averse religious actor will attempt to diversify religious risk by committing to diversified portfolios of gods and of faith intermediaries and/or seek to transfer religious risk by purchasing contingent claims (i.e. insurance). However, the almost total absence of evidence that such portfolio diversification is a feature of mono-theistic religions suggests that there are substantial impediments to portfolio diversification of religious risk. In addition, departures from standard conditions for risk pooling, such as the impossibility of ultimate verification of otherworldly outcomes, precludes the supply of the aforementioned contingent claims. This paper advances the proposition that social network externalities associated with collective religious activities have the potential to mitigate religious risks faced by religious firms and their adherents and thereby serve as a viable alternative to portfolio diversification and/or the purchase of contingent claims. To facilitate articulation, the fellowship ratio is defined as the total opportunity costs of time and resources members of a religious denomination are required to devote to collective or fellowship activities relative to the opportunity costs of total time and resources members devote to religious activities. Any given religious denomination offers its members a range of fellowship ratios by allowing limited substitution between fellowship and private activities. Under this scenario, the paper articulates a theory of firm location in fellowship space in which religious firms' location in fellowship space reflects desires for mutually beneficial mitigation of religious risk. More particularly, the theory implies that religious firms' locations in fellowship space is determined by the quantity and type of religious risk religious firms and their adherents face; by their degree of aversion to these risks; by members perception of their opportunities to independently mitigate religious risk via diversification and/or the acquisition of contingent claims;

and by the per unit market opportunity costs of fellowship activities relative to the per unit market opportunity costs of other religious activities. Importantly, the available evidence described by Iannaccone (1994, 1995) is strongly consistent with the theory's empirical implications.

The analysis in this paper is in part a reaction to Iannaccone's assessment that his theory was unable to explain "why market forces do not always drive religions towards one style of production, private or collective" Iannaccone (1995: 294)) and his acknowledgement of the explanatory potential of a more precise specification of religious risk than is available in his analysis. Unlike Iannaccone (1995), whose analysis de-emphasizes the supernatural element of religiosity, this paper explicitly incorporates a supernatural motive for religiosity, which leads to a delineation of religious risk into belief and intermediation risk that permits a more precise assessment of the constraints and opportunities religious actors face in their attempts to mitigate religious risk. The resulting analysis identifies the factors that determine optimal fellowship ratios and thereby the location of religious denominations in fellowship space. As such, the analysis addresses the primary self-identified limitation of Iannaccone's analysis in that it explains variation in adoption of congregational practice and the joint incidence of congregational and private practice.

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Notes

1. For example, a denomination may require collective activities, such as participation in church services in the form of testimonials, while also requiring private prayer and private study of religious literature.
2. Iannaccone's (1995) analysis identifies the production of a conflated religious product as the set of activities that determine any given religion's classification as congregational or private. In concurrence with this specification, he assumes that this conflated religious product is produced by religious firms and their adherents and characterizes congregational religious forms as religions

in which religious output is jointly produced and private religious forms as religions in which production is independent or private and consumption is diversified. While this approach to defining congregational and private religious forms is not inconsistent with the fellowship space approach employed in this paper, it is best interpreted as a special case of the more general fellowship space approach.

3. See Boyer (2001) for an excellent explanation of this phenomenon based on cognitive psychology.

4. This allows for the possibility that marketing/public relations tools could be used to encourage belief in a non-existent entity that is endowed with supernatural characteristics that are both palatable to the human brain and appropriate for efficient production of supernatural services. These observations highlight the importance of the characteristics that are attributed to supernatural beings for the efficient production of supernatural hope while de-emphasizing the significance of one's view of the origin of supernatural beings for understanding the production of supernatural hope.

5. Gallup polls conducted in the United States at five-year intervals from 1945 to 1995 reveal the following beliefs:

    (i)   an average of 96 percent of Americans responded "yes" when asked "Do you believe in the existence of God or a universal spirit?";
    (ii) an average of 78 percent of Americans reported belief in life after death;
    (iii) on average 71 percent of Americans responded "yes" when asked "Do you believe there is a heaven where people who have led good lives are eternally rewarded?";
    (iv) on average 56 percent of Americans expressed belief in the existence of hell.

6. For more in-depth analysis and discussion of mechanisms that alleviate asymmetric information problems in equity markets, see Meyers and Majluf (1984) and Leland and Pyle (1977). Also see Biglaiser (1993) on the role of middlemen and Lizzeri (1999) on certification intermediaries.

7. For example, appliance manufacturers use warranties to convey privately held information about the probability of product failure. This signal is credible only if potential buyers believe that issuance of the warranty will lead to loss of profitability for the manufacturer if appliance failure rates are high. However, such loss of profitability materializes only if failure can be verified or documented. If it is not possible to prove or document failure, the manufacturer never pays, and the warranty is an empty promise which fails to alleviate the informational asymmetry. A middleman cannot invest in quality verification skills if verification is not possible and sellers cannot develop a reputation for delivering high quality if quality cannot be ascertained. Similar arguments apply to certification intermediaries that alleviate asymmetric information problems by discovering private information held by agents on one side of a transaction and subsequently revealing that information to uninformed agents on the other

side of the transaction. Ultimately, the quality of search and experience goods can be verified. As such, the devices discussed above are effective in mitigating asymmetric information problems in the markets for these types of goods. In contrast, since the quality of meta-credence goods cannot be verified either before or after purchase, market devices that require ultimate verification are not effective in alleviating asymmetric information problems in meta-credence goods markets.

8. Most transactions involve some degree of trust between the transacting parties. However, when the quality of the goods or services being exchanged is verifiable, it is possible to construct enforceable contracts that allow the parties to trust but verify. In contrast, when the quality of goods and services being exchanged is not verifiable, as is the case with faith intermediation, contract enforcement is not feasible and the parties to such exchanges trust without verification.

9. An analogous situation exists with insurance. An individual who transfers risk by buying a contingent claim, such as health insurance, must still contend with the risk that the insurer may not be in a position to make payments should the dreaded contingency arise.

10. This approach represents a significant departure from the understandable tendency in the extant literature to treat religious organizations as clubs. This tendency is a reflection of the impact of Iannaccone's (1992) highly influential paper in which he modeled religious organizations as clubs engaged in joint production of religious products that he classified as club goods. However, Iannaccone refrained from specifying a supernatural motive for religiosity so his analysis is focused on ancillary religious products and excludes faith intermediation. In contrast, the analysis in this paper recognizes that most ancillary religious products are club goods, but asserts that faith intermediation is the dominant product that defines the industrial organization of tangible religious markets.

11. Given the theoretical infeasibility of a market for claims that are contingent on religious outcomes and the lack of evidence that such markets exist, the ensuing discussion of the constraints on religious risk-mitigation behavior focuses on constraints on self-diversification of religious risk.

12. This approach is consistent with Stark and Bainbridge (1985, 1987) and Finke and Stark (1988, 1992), who recognize heterogeneous preferences among believers and characterize religious firms as optimizing agents who are intent on securing market share in competitive religious markets by appealing to desired market niches. In a more precise application of this approach, Barros and Garoupa (2002) use a spatial-location model to argue that optimizing churches maximize their objective function in part by picking an optimal location in strictness space. Similarly, Miller (2002) relies on strategic management principles to argue that choices, such as the degree of strictness employed by any given denomination, are a result of that denomination's strategic response to the constraints and opportunities implicit in its environment.

13. The CIA (see cia.gov) estimates that 13.78 and 7.13 percent of the world population, respectively, subscribe to the polytheistic faiths of Hinduism and

Buddhism. According to some estimates an additional 6.0 percent subscribe to polytheistic Chinese Folk Religions. This means that approximately 27 percent of the world population subscribe to polytheistic faiths. While there is some validity to the frequently encountered characterization of Hinduism as a "one god religion" in which god has many manifestations, if gods are uniquely identified by the characteristics that are attributed to them, one could argue that each manifestation is in fact a god and that Hindus have ample opportunity to mitigate belief risk by choosing a diversified portfolio of these manifestations. As such, Hinduism exhibits a defining characteristic of polytheistic religions in that the cost of modifying their portfolio of gods is relatively low. Consequently, Proposition 4 implies that compared to monotheistic religions (such as Christianity and Judaism), Hinduism is likely to adopt forms of religious practice that require relatively fewer fellowship activities.

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