Love Thy Neighbor as Thyself:
Community Formation and the Church

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Abstract: The Church has played a central role in establishing and maintaining, as well as undermining, communities throughout history. We explore mechanisms through which it coordinates individual behaviors to achieve improvements in welfare, and reveal ways in which it can fail, causing communities to founder. In our model, inherently religious individuals may become trapped in a secular equilibrium that is strictly dominated by a religious equilibrium. The Church, via its teaching, clergy, and ministries, reveals the benefits, both in this world and in the world to come, of coordinated behavior and the costs of uncoordinated behavior in order to induce community members to take individually and socially beneficial actions. External forces (the state and secular society) and internal forces (doctrinal disputes, inconsistencies, and incoherence) reduce a Church’s ability to coordinate. Empirical analysis shows that the model’s core features and findings are largely consistent with recent U.S. data on Church

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Churches have long played a central role in coordinating community life. This role is sometimes writ large, such as when the head of an established Church has key governing duties nationally or internationally, or small, such as when the parish priest sees to the spiritual and temporal wellbeing of his flock. Since in the West the institutional Church has seldom been absent when communities form, grow, and die, we examine the role of Churches in community formation and establish links between the strength and quality of faith communities and social welfare. We further explore the balancing of Church and state roles in these processes, and the costs of community dissolution. We examine these phenomena in a static model of coordination with strategic complementarities. We endogenize the interactions among individuals, adding Churches as institutions that provide the spiritual and temporal incentives—the behavioral norms which act as coordinating mechanisms—for group rather than individually oriented actions.

The coordinating role can be played by Churches through ethos in which the individual places the community over the self, as can be seen in texts like Paul’s letters, the Lord’s Prayer, and the fourth century Nicene Creed. Churches, concerned with their members’ and the wider community’s welfare, become guides to individual and community betterment by providing spiritual subsidies or taxes, implicit or explicit rewards for investments in one’s spirituality and in one’s community, or penalties for failing to do so. Thus, Churches enable their members to internalize the external effects of their actions on other members, both in their faith community and society at large, and thereby induce better outcomes with higher wellbeing for all. But if Churches come into conflict with their congregations over matters of faith, or if their role is delegated to or crowded out by the state or the market, they can fail in their pastoral and community formative role.

The core findings of the model are largely mirrored in empirical analyses conducted using data on religious participation from the General Social Survey, 1972–2004, and data on religious tithing from the Consumer Expenditure Survey, 1982–1998.
1 The Church and the Community

The major monotheistic religions (Judaism, Christianity, and Islam) are all community religions. Members of these faith communities come together to worship and are bound to each other by ties of spiritual kinship. To achieve their basic communitarian goals, institutional structures—the congregation, the parish, the world Church, the universal Church—have been developed. It is these structures, their reflection in the Scriptures, the incentives used to maintain them, and their potential weaknesses that we first describe.

1.1 Importance of Community in Scripture

The centrality of community and communal interaction, and the origins for the institutions to facilitate them, can be seen in the New Testament. Christian scriptures provide a key set of models and motivations for Christians as they form communities. We examine Christian scripture, but similar dynamics operate in the Jewish and Islamic scriptures.

The core of the call to community can be found in the scriptural exhortation to love your neighbor, for this imposes a mode of behavior on all believers to treat others well (Mark 12:31). Who one’s neighbors are is not defined narrowly by faith or ethnicity (Luke 10:25–29). Further, the individual cannot choose not to respond to another’s need because, by definition, that need is now his as well. This does not make community a meaningless construct by including everyone, but it does suggest that one cannot turn one’s back on those in need just because they are not of one’s community.

The call to community brings obligations. The rich are called to see the “poor at their gate” (Luke 16:26). From a Gospel perspective, ignoring others’ needs given one’s relative wealth is both an offense against one’s community and against God (Scott, 1990). The call to compassion and action is not limited to the wealthy. Acts 4:32 reflects the communitarian ideal put before the early Christians to share all resources for the betterment of the community.

Bartchy (2002) suggests that Luke presents God as a “community-forming and community sustaining power” (p. 91). This community of believers brought together by God is one’s surrogate family, and it is this family’s welfare, rather than one’s own or one’s own kinship group’s, that is of the utmost importance. All contribute, each caring for the others, all being essential to the whole. In this way the idea of community and the admonition to put community before self is institutionalized.
But the unity of the early communities was constantly under threat. Paul’s First Letter to the Corinthians is occasioned by divisions and factions among the nascent Christian community. Paul emphasizes that more can be achieved and that all can be made better off, both in the here and now and eschatologically, by working together and caring for each other: gifts are shared (1 Cor. 12). But the Christian Church asks more by placing demands on those most able and most gifted to give more. Knowing human nature and the strength of the desire to succeed in this life, success is redefined. Spiritual wealth, through service to God and community, given its value both in this life and the next, trumps material wealth with value only in the here and now. In its earliest manifestations, the Christian Church placed the welfare of the community over the welfare of each member thereof.

1.2 Community Formation During the Patristic Period

During the first few centuries A.D. the Christian Church established itself as an institution rather than a set of largely independent congregations which were often under stress from both within (1 Cor.) and without. The reality of community required more structure than that outlined in the Scriptures. For example, baptism, the initiation into the Christian community, was supposed to bring the earliest Christians to the ultimate mystery of Christ. Yet they sought further initiations into higher mysteries, a belief pattern consistent with pagan religious experiences. To further its communitarian goals the Church had to adapt (Johnson, 1998). Persecution of Christian communities throughout the Roman Empire revealed the importance of “maintaining ecclesiastical unity, pastoral integrity, and consistent standards of membership” (Hayes, 2002, p. 155). This required a consistent, respected leadership structure, but little in the Gospels, Acts, or Paul’s letters suggested how leaders would be chosen or the extent of their power. The Church as a universal institution did not yet exist. Leaders, the bishops of the early Church, were required to guide the communities (Young, 2002), where the bishop was God’s representative on earth. As the community grew, the need to coordinate the activities of members to the common good led to the ordination of priests and the hierarchical structure of the Church, both of which conferred authority and provided a leadership structure.

1.3. The Church in Community Formation/Urbanization

At the end of late antiquity, the Roman Empire was collapsing, and the security of individuals in society was under threat. The social structure imposed by the Empire was breaking down. The Church,
Brown (1981) suggests, offered in the Western Empire a community structure, an extended family not based on kinship, which effectively replaced the State.

Lynch (2003) argues that the medieval Church, like the early Church, provided the intellectual foundation and organizational model for community life. Cities of the medieval and early modern period were characterized by high rates of mortality, large numbers of migrants, small families, and single people. There were very limited social possibilities (Knuth, 1992). While, at one level Church structures resisted the development of new forms of religious life (Peters, 1991), at another the Church provided models for support networks and the framework upon which communities were built. Community bonds were formed between the believers who made up the Church. Voluntary kinship relationships, such as godparenthood, were created. This pseudo-kinship relationship, exceptionally important in times of high mortality, was a spiritual rather than a blood relationship, and as such carried no right of inheritance. Rather it was built on mutual assistance and gift—voluntary ties that bind—rather than strategic considerations—cooperation and communitarian objectives were institutionalized.

When kinship ties were absent single women were still able to create surrogate families by the formation of residential communities. These communities were patterned after, and often associated with, monasteries. However, in contrast to female religious, these residents, beguines, were not cloistered. Yet they were religiously observant, dedicated to the ideals of chastity and charity, but worked in the market to support themselves. These were voluntary associations where individuals joined together for the betterment of all within their own community and in the broader community. The institutions of the Church were emulated by secular society.

Still looser ties were forged by membership in confraternal societies. These societies, often open to married and single men and women, were nonresidential religious organizations built on the premise of the importance of a community-based devotional life of mutual assistance and charity. This charity was directly given by society members to the poor. Communal links were forged via direct contact. They provided support networks and requirements of aid and assistance not hampered by ties of kinship. While they were lay organizations, a member of the clergy would generally act as chaplain. The sharp divisions between the sacred and the secular did not yet exist, but a stable communitarian model had been developed in which the Church played a central coordinating role.
De Swaan (1988) contends that parish communities as well as urban centers could not have formed without a system of poor relief, and it was the clergy who facilitated that relief. To establish a viable system it was necessary to ensure that all involved played their parts. This required a mutually agreed upon set of rules, trust that if you played by the rules you would receive your reward, and oversight and persuasion to preclude free riding. Ensuring that these requirements were met fell to the clergy. Those providing charity did so for reasons both practical—personal and economic security—and spiritual—the prayers of the recipients of their largesse. Moreover, being charitable was a duty and obligation of all Christians who would be rewarded in the next life if not in this. To the extent that charity was a public activity (which it was, since those who gave wanted to ensure that their generosity was recognized and rewarded), it was capable of being monitored. Thus, social control could be exerted.

As countries developed, the universal power and wealth of the Church diminished and cities grew. Civic duty replaced religious charity as the source of poor relief. Compulsion (taxation) replaced voluntary (if incentivized) cooperation. As a result, some argue that community cohesion has weakened (see also Abrams & Schitz, 1978).

1.4 Challenges to Church Led Community Formation Today

Today the role of the Christian Church has moved from the center to the periphery (Hester, 2002), making it harder for it to fulfill its pastoral role even for its own community. What appears to be required is a large enough community of faith, which leads to higher participation and better economic outcomes (Gruber, 2005). Although challenged to sustain themselves in a changing environment (Webster, 2002; Hester, 2002; Volf, 2002), faith communities maintain their commitment to the broader multicultural and multifaith community. When faith communities seek to help build a sustainable multicultural community they are often excluded by statutory and secular funding agencies (Smith, 2002). Perhaps this is because they have been ignored or disdained by theorists of multiculturalism whose perspective is decidedly secular and at least implicitly anti-religious (Modood, 1999). This is true even though many who are members of this multicultural community, and are the disadvantaged and socially excluded, identify themselves first by their religious affiliation (Farnell, 2001). Yet it remains that, although often marginalized, “religious communities maintain a role as a forum for social interaction, mutual support, and personal networking” (Smith, 2002, p. 168): they provide the coordinating mechanism.
2 A Model of Church and Community

In order to understand and appreciate the role of the Church in community, we develop a model similar to Cooper’s (1999) coordination games, with an institutional emphasis similar to Bowles (2004). Agents’ choices affect the payoffs, both spiritual and material, to other agents’ choices, but this external effect is not priced by the market. As a result, agents may make choices that are individually rational, but result in Pareto inferior outcomes. The problem is that without a functioning market they may be unable to coordinate their choices. Because of the nature of the interrelationship among payoffs, a market will not open, which leaves “sunspots” or “animal spirits” (Weil, 1989) or an institution—here the Church—to play the coordinating role.

In many applications of the coordination failure model, the role played by the government is as often stabilizing (Diamond & Dybvig, 1983) as destabilizing (Kydland & Prescott, 1977; Barro & Gordon, 1983). The problem is that the government must be able to commit itself and future governments to taking specific actions without having the mechanism to do so, or that information is not properly aggregated (Jeitschko & Taylor, 2001).

The early Church and its successors understood what anthropologists (Silk, 2005; Kaplan & Gurven, 2005; Smith & Bliege Bird, 2005) have now substantiated: cooperation and communitarian behavior is most often found in kinship groups. Churches recognized that kinship groups were small and exclusive. The challenge of early Church teaching was to bring physical, material, and spiritual security to all one’s neighbors, kin or not. What economists now recognize as essential, and what the Christian Church has always instinctively known, is that for people to behave cooperatively they must believe that others will also behave cooperatively, that their behavior will reflect the community’s behavioral norms.2

Churches have two channels through which they can affect cultural norms and thereby achieve coordination. First, through their foundational teaching, which provides a commitment mechanism and assesses spiritual penalties and rewards. And second, through their clergy, who have close relationships with the members of their congregations, who provide the forum for community members to promise each other that they will give as they have been given, who communicate the costs of failing to live up to their promises and the benefits of doing so,3 who monitor the members’ behavior (assessing temporal penalties and rewards while promising eschatological ones), who facilitate or even achieve coordination (Kahan, 2005).
Our paper is very much in the spirit of Iannaccone’s (1992) seminal work on sacrifice and stigma in terms of its methodology—if not its focus. Although our model is an optimizing model, we do not believe that individuals necessarily consciously choose their allocation of goods and time in an overtly optimizing manner. Rather, they respond to the norms set by society—their Church, their family, their peers, following the lead, perhaps, of those who appear happier (Bowles, 2004).

2.1 The Individual

Consider a society of \( n + 1 \) agents who have a common religious affiliation. Following Jeitschko, O’Connell, and Pecchenino (2009), each agent \( i = \{1,2,\ldots,n + 1\} \) has preferences defined over leisure time \( l \), material goods \( m \), and spirituality \( \sigma \):

\[
(1) \quad u(l,m,\sigma) = (1 - \lambda)^\sigma (m - \mu)^r \sigma,
\]

where

\[
(2) \quad \sigma(r,\tilde{d}|h) = h(1 + r)^{\gamma_T}(1 + \tilde{d})^{\gamma_M}
\]

Spirituality is defined over time spent in religious observance, \( r \), and donations made to one’s Church relative to one’s income, \( \tilde{d}. \) Their relative significance are captured by \( \gamma_T \) and \( \gamma_M. \) The multiplier \( h, \) discussed below, captures potential spiritual rewards and penalties stemming directly from theological concerns and indirectly from one’s choices. Leisure and material consumption choices depend on social comparisons with one’s peers. The amount of time spent in leisure considered “socially necessary” is denoted by \( \lambda, \) and \( \mu \) is the “socially necessary” amount of material consumption.

The constraints faced by the agent are:

\[
(3) \quad \text{Time:} \quad T \equiv 1 = l + r \quad \text{(with } \lambda < T) \\
\text{Money:} \quad M = pm + d \quad \text{(with } \mu < M)
\]

\[
(4) \quad \Leftrightarrow \quad \tilde{d} = \frac{M - pm}{M}, \quad \text{and} \quad m = \frac{M}{p} (1 - \tilde{d}),
\]

where \( p \) is the price of material goods.

We assume that labor is supplied inelastically since labor supply usually concerns labor force participation, rather than marginal adjustments to time spent at work, over which individuals have less
control (see, e.g., Blundell, Chiappori, Magnac, & Meghir, 2007). As a result, the time and money allocation problems that the individual faces can be treated separately, which we do in Sections 3 and 4, respectively.\(^6\)

The parameter restrictions are:

\[
\begin{align*}
\alpha, \beta, \gamma_T, \gamma_M &> 0 \\
\alpha, \beta &\leq 1
\end{align*}
\]

Thus, the benefit to consumption of material goods and leisure diminishes at the margin, but this need not be the case for one’s spirituality.

### 2.2 The Church

Let \( \chi(R, D, \rho) \) denote the institutional strength of the Church and index the agent by \( i \). Here

- \( R := \sum_{j \neq i} r_j \) is the amount of time devoted by the agent’s fellow religious community members;
- \( D := \sum_{j \neq i} d_j + d_s \) are the financial resources available to the congregation independently of the agent’s contributions, where \( d_s \) are funds from other sources, such as the state.
- \( \rho \) measures theological factors affecting the institutional strength of the Church, e.g., foundational teachings and Church leadership.

Assume \( \chi \) is increasing at a decreasing rate in all three arguments,

\[
\chi(R, D, \rho) = R^{\kappa_1} D^{\kappa_2} \rho^{\kappa_3},
\]

with \( \kappa_k > 0, \forall k = 1, 2, 3 \), and \( \sum_k \kappa_k = 1 \). Thus, a Church that lacks a coherent belief system or has ineffective leaders (\( \rho = 0 \)), or in which none of its members devotes any time to religious practice (\( R = 0 \)), or which is devoid of resources (\( D = 0 \)), has no institutional strength.

Notice that institutional strength has both temporal and spiritual dimensions. It is through this spiritual dimension—which links actions today with eschatological rewards or punishments—that the Church provides spiritual incentives for individually and community oriented behavior.
2.3 The Community

A relationship between the Church and the individual is provided through the individual’s spirituality function \( \sigma \), and potential spiritual penalties \( h \). Thus, the institutional strength of the Church has a positive external effect on the agent’s benefit from religious activity. Hence,

**Assumption 1.** The Church strengthens the individual’s spirituality by increasing the agent’s marginal utility from time spent in religious observation and from charitable giving. Thus, for \( S=T,M \) let \( \gamma_S = \gamma_S(\chi) \) be continuous and twice differentiable, with

\[
\gamma_S(0) \geq 0, \quad \lim_{\chi \to +\infty} \gamma_S(\chi) = \infty \quad \text{and} \quad \\
\gamma_S' > 0, \quad \gamma_S'' \leq 0, \quad \forall \chi > 0, \quad S = T, M.
\]

Given this assumption, we study the indirect effect the Church has on leisure time and material consumption, given that it directly affects time spent in religious pursuits and charitable giving.

Consider the multiplier \( h \). For a large set of agent choices, we let \( h \) be a constant normalized to 1. We also include the possibility that an individual can be assessed a “精神 penalty” when adherence to minimal religious covenants is violated. If these can be represented by a minimum of religious activity, \( r_{\min}(\rho) \), or charitable giving, \( \bar{d}_{\min}(\rho) \), one can think of \( h \) as an indicator function,

\[
h(r, \bar{d}) = \begin{cases} 
1 & \text{if } f \geq r_{\min}(\rho) \land \bar{d} \geq \bar{d}_{\min}(\rho) \\
0 & \text{if } r < r_{\min}(\rho) \lor \bar{d} < \bar{d}_{\min}(\rho)
\end{cases}
\]

Here \( h \) may be equal to 0, or even negative—e.g., \( h = -1 \). Indeed, if one were to include realizations of \( h \) in the after-life, one might also consider \( h = -\infty \) or \( \bar{h} = +\infty \), to capture damnation or salvation.

See Mark 4:8, Luke 12:33-4, and Matt. 6:33 where rewards are specified, and Matt. 5:22, Mark 9:43, Luke 3:9, or Rev. 21:8, where punishments are specified. These penalties represent behavioral inducements which define the minimally acceptable behavior of an individual vis-à-vis God and as a community member. The minima depend on Church teachings, \( \rho \).
3 Time allocation

Given the model of community, consider how an agent acts within the community and how this affects himself and others. For now we consider only cases in which \( h = 1 \). Let \( v(M) \) denote the agent’s utility associated with income \( M \) when it is optimally allocated between material consumption \( m^* \) and religious contributions \( \bar{d}^* \), i.e.,

\[
(9) \quad v(M) = \frac{u(l, m^* \lambda, \lambda \bar{d}^*)}{(1-\lambda)^{\alpha}(1+r)^{\lambda r}}
\]

The agent’s time-allocation problem is given by

\[
(10) \quad v(M)(1-\lambda)^{\alpha}(1+r)^{\lambda r}
\]

\[\rightarrow \max_{l,r} \quad s.t. \quad l+r = 1 \text{ and } l, r \geq 0\]

\[\Leftrightarrow\]

\[
v(M)(1-r-\lambda)^{\alpha}(1+r)^{\lambda r}
\]

\[\rightarrow \max_r \quad s.t. \quad r \in [0,1],\]

with first-order condition:

\[
(11) \quad -\alpha v(M)(1-r-\lambda)^{\alpha-1}(1+r)^{\lambda r}
\]

\[+\gamma_r v(M)(1-r-\lambda)^{\alpha}(1+r)^{\lambda r-1}\]

\[= -\alpha(1+r) + \gamma_r(1-r-\lambda) \leq 0 \quad \text{and} \quad r \geq 0,
\]

with \( r[\gamma_r(1-r-\lambda) - \alpha(1+r)] = 0 \).

Using \( br \) to denote the “best response,” the agent’s optimally chosen time spent in religious pursuits is

\[
(12) \quad r^{br} = \max \left\{ 0, \frac{\gamma_r(1-\lambda)-\alpha}{\alpha+\gamma_r} \right\}
\]

Given assumption 1, we ascertain when agents obtain an equilibrium in which they are religiously observant, and how such an equilibrium is
affected by parameter values. However, we do not preclude the possibility that, despite agents valuing their spirituality, there are outcomes in which there is no religious activity. That is, we assume that absent a functioning Church (i.e., \( \chi = 0 \)), individuals’ marginal utility from leisure exceeds that from religious activity.

**Assumption 2.** Absent a functioning Church, the marginal rate of substitution between religious activities and leisure is less than one, i.e.,

\[
\left. \frac{\partial u}{\partial r} \right|_{\chi=0} < 1
\]

An implication of assumption 2 is that absent a functioning Church the individual will choose not to spend time in religious activity despite being religious (all proofs are in appendix A).

**Lemma 1.** (Potential for Coordination Failure). An implication of assumption 2 in conjunction with the construction of the institutional strength of the congregation (given in equation 3) is that there always trivially exist equilibrium configurations without religious activity.

While we do care about circumstances that can lead to such outcomes, we are not primarily interested in trivial coordination failures. It is therefore important to determine under what circumstances an equilibrium without religious activity is the unique outcome, rather than simply an outcome that is the result of coordination failure.

### 3.1 Secular and Religious Equilibrium

Taking \( h = 1 \) as given, even when \( \chi > 0 \) so that the Church is potentially viable, an agent may be best off without religion. In technical terms, an equilibrium in which no one participates in religious activity is remarkably stable. Thus, even (the potential for) religious dedication and (the potential for) financial dedication to one’s religious community is not sufficient to support societal outcomes with active religious participation whenever Church moral authority is weak.

**Proposition 1** (Unique Secular Equilibrium). An equilibrium in which agents sustain religious participation does not exist if the Church lacks sufficient moral authority, i.e.,
\[
(14) \quad \forall \overline{R}, \overline{D} < \infty \quad \exists \rho > 0 \quad \text{s.t.} \quad \forall \rho < \rho \quad n_{t}^{br} < \overline{R}.
\]

Hobbes described humans as innately religious, and suggested that religion provides men with behavioral norms that ensure a civil society in which both earthly and divine laws are promulgated and followed. But, since the authority of religion, the Church, depends on those who lead it, that authority can be undermined by those leaders behaving in ways contrary to their own teachings. To Hobbes this explained the expulsion of the Roman Catholic Church from England, but also the downfall of those leading the Reformation. Without the authority of the Church, man falls into a state of “war” with each individual seeking his own end without concern for others. This state describes both our trivial and our secular coordination failure equilibrium configurations. While life in these configurations will not be “solitary, nasty, brutish, and short,” (Hobbes, 1958 [1651], p. 107), they will bring individuals less happiness than the religious equilibrium.

Nevertheless, while a secular equilibrium always exists, when the Church becomes stronger, there also exists a religious equilibrium.

**Corollary 1. (Religious Equilibrium).** A symmetric equilibrium with a high level of religious activity exists whenever \( \rho \geq \rho \). Whenever \( \rho > \rho \), there exist two symmetric Pareto-rankable religious equilibrium outcomes. The Pareto dominant one entails a higher level of religious activity and is stable, whereas the inferior one is not stable. In both cases, religious activity is implied by

\[
(15) \quad 0 < r_{i}^{eq} = r^{eq} = \frac{\gamma \gamma((n_{i}r_{i}^{eq})^{\lambda_{1},1}\lambda_{2},2\lambda_{2},3)}{\alpha + \gamma \gamma((n_{i}r_{i}^{eq})^{\lambda_{1},1}\lambda_{2},2\lambda_{2},3)}, \quad \forall i.
\]

Analogous propositions and corollaries exist that demonstrate the need (and potential sufficiency) of a minimum of religious devotion by the congregation and concerning a minimum of financial resources available in order to support a religious equilibrium. In other words, religious observation is inherently a group activity—even if we model the rewards as individualistic. Thus, even significant moral authority built on the foundational teachings of the Church and the quality of its leadership need not be sufficient for an individual to reap the benefits of religious activity independent of the financial resources of the Church.

In this model, unlike most models of moral behavior or altruism (see Laffont 1975; Hollander, 1990; Andreoni, 1990; and Brekke, Kverndokk,
& Nyborg, 2003), the public good is the community, and is, as such, intangible. While agents concerned with their spiritual growth give of what they have been given, they do not do so to enrich or strengthen the Church. However, by living their faith they do strengthen the institution which, in turn, further benefits them. This type of connection is also the finding of Munshi and Wilson (2007) who show how Churches remain in place as institutions even after their initial roles are fulfilled—suggesting, as is the case here, the stability of the religious equilibrium.

3.2 Religious Equilibrium and Its Attainment

Before studying the religious equilibrium in detail, we show how its attainment depends on how one agent’s actions are direct responses to the actions of other community members. Let \( \rho > \rho \) be given and assume that all community members—save the individual whose optimal responses we wish to analyze—chose the same level of religious activity.

From the agent’s first-order condition and assumptions 1 and 2, when the remaining community members have religious participation levels that are too low, the agent will not devote any time to religious activities. However, there exists a religious activity level, \( \bar{R} \), at which the agent is on the verge of participating in religious activity (figure 1). Formally, 
\[
\gamma_T \left( \bar{R} \kappa_1 D^\times \rho_k \right) (1 - \lambda) = \alpha.
\]

For this level, let \( \bar{r}_{-i} \) denote the (symmetric) religious activity of the other community members, that is, \( \bar{r}_{-i} := \bar{R} / n \). Then \( i \)'s first-order condition is

\[
(1) \quad r_i^{br} = \frac{\gamma_T (n \bar{r}_{-i}) \kappa_1 D^\times \rho_k \alpha}{\alpha + \gamma_T (n \bar{r}_{-i}) \kappa_1 D^\times \rho_k} = 0.
\]

Thus, despite others being involved in religious activity, the individual does not find it worthwhile to take part. However, consider how the individual optimally responds to an increase in the others’ actions. Specifically, the right-derivative is,

\[
(17) \quad \left( \frac{d}{dr_{-i}} \right)^+ r_i^{br} (r_{-i}) = \frac{\gamma_T \kappa_1 \alpha (2 - \lambda)}{r_{-i} (\alpha + \gamma_T)^2} > 0.
\]

Thus, one’s own religious activity \( r_i^{br} \) increases with religious activity in the community:

**Lemma 2 (Multiplier Effects).** An agent’s optimal choice of religious observance, \( r_i^{br} \) is increasing in others’ religious activities,
\[
(18) \quad \left(\frac{d}{dr_{-i}}\right) r_i^{br}(r_{-i}) \geq 0.
\]

At levels of \( R = nr_{-i} \) at which the agent begins to participate in religious activity, the derivative in lemma 2 is greater than one. Thus, an increase in religious activity by other community members, \( r_{-i} \), by one unit of time leads to an optimal response of the individual that is greater than one unit of time, leading to a convergence in activities, until all agents in society spend the same amount of time in religious activities, call this level \( \hat{r}_i = \hat{r}_{-i} = \hat{r} \) (see figure 1).

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{figure1}
\caption{Optimal amount of time devoted to religious observance (thick dashed line). Note the (stable) secular equilibrium in the origin, the (stable) religious equilibrium is given by \( r^* \).}
\end{figure}

Since \( \hat{r}_i \) is the optimal individual religious activity level when others are at the same level, society’s actions are not only individually optimal, but also mutually consistent, so the condition of religious equilibrium given in corollary 1 is met, i.e.,

\[
(19) \quad \hat{r} = \frac{\gamma_\tau ((n\tau)^{k_1}D^{k_2}p^{k_3})(1-\lambda)-\alpha}{\alpha + \gamma_\tau ((n\tau)^{k_1}D^{k_2}p^{k_3})}.
\]

Because the slope of an agent’s best response is still greater than unity at
this point, this equilibrium is not “stable.” If the other members increase their religious activity, the individual best responds by increasing his activity by even more. Such propagation slows once the derivative of the best-response function is less than one. However, it does not come to an end until society’s actions are again individually optimal and mutually consistent—i.e., a new equilibrium is reached, with \( r^*_i = r^*_{-i} = r^* \) (see figure 1), again with,

\[
r^* = \frac{r_F((nr^*)^k_1 D^{k_2} p^{k_3})(1-\lambda) - \alpha}{\lambda + r_F((nr^*)^k_1 D^{k_2} p^{k_3})}.
\]

This stable equilibrium is the “religious equilibrium.”

3.3 Properties of the Religious Equilibrium

The critical importance of the interrelationship between community members is now clear. Indeed, attainment of a religious equilibrium is not possible without others to interact with. This has an implication for the quality of the religious equilibrium, as well as individual members’ actions, spirituality, and wellbeing.

**Proposition 2.** In the religious equilibrium, an increase in Church membership yields higher religious participation by individual members and results in higher levels of spirituality and over-all wellbeing.

(21) \( \frac{d}{dn} r^* > 0; \quad \frac{d}{dn} \sigma > 0; \quad \frac{d}{dn} u > 0. \)

Note that this and the following results are in part represented by an increase in the \( r^*_i (r_{-i}) \) function in figure 1.

Christianity is an evangelical religion, and, as such, Christians by “living the Gospels” are supposed to convert others to their beliefs. In our model that translates into increasing \( n \). An increase in the size of the religious community increases each individual member’s spirituality by increasing the strength of the faith community and thereby the institutional strength of the Church. All, new and old community members alike, are made better off. This improved spiritual and temporal welfare is, in essence, what Pope Benedict suggests when he speaks of returning God to the public consciousness and to the center of European culture (Ratzinger, 2005) and of re-evangelizing Europe (Thavis, 2005), what the Anglican Communion dedicated its Decade of Evangelism to (Carey, 1999), and is central to the vision proclamation of
the Assemblies of God (General Council of the Assemblies of God, 2000).

Proposition 2 (and subsequent propositions) have the potential of being substantiated by empirical observations on individual behavior in

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
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<tbody>
<tr>
<td>Association between frequency of attendance of religious services and average group attendance (Proposition 2 / Lemma 2)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Average attendance</td>
</tr>
<tr>
<td>0.348</td>
</tr>
<tr>
<td>(11.53)**</td>
</tr>
<tr>
<td>Observations</td>
</tr>
<tr>
<td>R-squared</td>
</tr>
<tr>
<td>Method</td>
</tr>
</tbody>
</table>

-Robust t-statistics in parentheses.
* significant at 5%; ** significant at 1%
Controls include education, a cubic in age, marital status, number of children, state/region and group fixed effects, and a quadratic in real family income.

Average attendance is calculated as the average among all others in an observation's group.

Groups are defined as denomination*region*ethnicity.
In model (2), group average attendance is instrumented using average attendance of individuals of the same denomination in the same region but of a different ethnicity following (Gruber 2005).

relation to group behaviors. Using individual-level data on religious participation from the General Social Survey (GSS), 1972–2004, a nationally representative sample of U.S. adults, we find patterns of religious participation rates that are in line with the best responses described in proposition 2.9 To show that individual religious observance is increasing in others’ observance, we first divide the sample into groups, which we define here by denomination, U.S. Census region, and ethnicity. We then construct each group’s average attendance.10 The dependent variable in this model is the frequency of an individual’s attendance at religious services over the past year. The independent variable of interest is the average attendance of the individual’s group. Controls include education, a cubic in age, marital status, number of
children, region and group fixed effects, and a fourth-order polynomial in real family income. We include the high-order polynomial in order to allow a reasonably flexible relationship between income and attendance. Our results are not sensitive to the degree of this polynomial. In a second model, a variant of Gruber’s (2005) IV approach is used in which the average attendance of people of the same region and denomination, but of different ethnicity, is used as an instrument for the group’s average attendance. The results demonstrate that a one-unit increase in the average annual attendance of an individual’s group leads to an increase in that individual’s attendance of 0.348 times per year, according to the OLS estimate, and of 0.944 time per year, according to the IV estimate (see table 1).

Note that the role of Church doctrine, $\rho$, has been discussed as a necessary but not sufficient requirement to obtain the religious equilibrium. However, even when $\rho > \rho$ so that a religious equilibrium is attained, Church teachings and leadership quality play important roles in equilibrium. Thus,

**Proposition 3.** In the religious equilibrium, a strengthening of Church doctrine and an improvement of the quality of the Church leadership yields higher religious participation by members and results in higher levels of spirituality and over-all wellbeing.

(22) \[ \frac{d}{d\rho} r^* > 0; \quad \frac{d}{d\rho} \sigma > 0; \quad \frac{d}{d\rho} u > 0. \]

The strength and moral authority of a Church can be affected by a wide variety of things including decisions to revise foundational beliefs taken by Church leaders, behavior of Church leaders in ways inconsistent with the received teachings, or changes in society that change how Church teachings are perceived. Whatever the source of the strength or the cause of its change, Churches with stronger more coherent theologies attract adherents, and those with weaker less coherent theologies lose adherents—hence, the decline in attendance at the Roman Catholic Church as a result of Vatican II liturgical reforms (Lothian, 2000), as well as the priest sexual abuse scandals in the United States and Ireland which exposed the Church hierarchy’s protection of guilty priests rather than of innocent children (John Jay College of Law, 2005; Murphy, Buckley, & Joyce, 2005).
Figure 2 is suggestive of the relative impact of this latter crisis, as it shows a decline and divergence in Church attendance among Catholics compared to Protestants in the United States around the time that the sexual abuse scandal was widely reported in the media.\textsuperscript{11}

In addition to Church membership and teachings, the resources of the Church are also critical in affecting its mission and thus the activities and wellbeing of its members:

**Proposition 4.** In the religious equilibrium, an increase in the financial resources available to the Church yields higher religious participation by members and results in higher levels of spirituality and over-all wellbeing.

\begin{equation}
\frac{d}{dD}r^* > 0; \quad \frac{d}{dD}\sigma > 0; \quad \frac{d}{dD}u > 0.
\end{equation}

The wealth of one’s Church allows it to carry out its ministry of charity to those in need, whether members or not. This, as established in the work of Lynch (2003) and de Swaan (1988), strengthens and stabilizes communities, and thereby makes community members better off. These same communities can be weakened, and the wellbeing of their members
reduced, by decreases in the temporal wealth of the Church as a result, for example, of income taxation which reduces an individual’s ability to give. This weakening and the effects thereof are the case even if the tax revenues are used to provide the same charitable services as were previously provided by the Church. De Swaan (1988) suggests that the differential effect arises because of how the funds are provided—if by taxation they are compulsory, while if by donations they are voluntary, and because of the distancing of those providing the charity from those receiving it.12

Using average family income of a group (defined by region and denomination) as an indicator of the wealth of the congregation, an OLS model suggests that the postulated relationship of increased attendance with increased wealth of proposition 4 holds in the U.S. (see table 2). In particular, a 10 percent increase in average family income is associated with an increase in individual attendance at religious services of 1.192 times per year.

<table>
<thead>
<tr>
<th>Table 2.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Association between frequency of attendance of religious services and average group family income (financial resources, Proposition 4)</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dependent variable: frequency of attendance</th>
<th>(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average family income</td>
<td>3.85</td>
</tr>
<tr>
<td>(3.96)**</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>36093</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.11</td>
</tr>
<tr>
<td>Group definition</td>
<td>denomination x region</td>
</tr>
<tr>
<td>Method</td>
<td>OLS</td>
</tr>
</tbody>
</table>

Robust t-statistics in parentheses
* significant at 5%; ** significant at 1%
Controls include education, a cubic in age, marital status, number of children, state/region and group fixed effects, and a quadratic in real family income.

Lastly, we consider how secular society affects individual religiosity, spirituality, and overall wellbeing.
Proposition 5. In the religious equilibrium, an increase in the socially minimal ‘requirements’ on time spent at leisurely activities yields diminished religious participation by members and results in lower levels of spirituality and overall wellbeing.

\[ \frac{d}{d\lambda} r^* < 0; \quad \frac{d}{d\lambda} \sigma < 0; \quad \frac{d}{d\lambda} u < 0. \]

The difficulties inherent in turning away from this world and toward God have been recognized since Biblical times (e.g., Luke 14: 16–24). This leads to less rather than greater happiness, since all community members will respond similarly to the worldly demands by reducing religious participation, and then reducing it further in response to the lower level of participation by their peers. This is the important implication of the multiplier effects described in lemma 2.

Our data do not allow for a tracking of leisure activities. However, there is a natural corollary to proposition 5, concerning potential social pressures regarding how much one works. Thus, we use various indicators (the number of weekly hours worked by the 90th percentile of one’s group, the 75th percentile, the median, and the average hours worked) as measures of the potential social pressure to work. All models suggest that more socially required work leads to less frequent attendance; however, only the model that uses group median hours of work as a measure of normative work hours is statistically significant (see table 3).

<table>
<thead>
<tr>
<th>Table 3</th>
</tr>
</thead>
</table>

**Association between social minimum requirements on hours of work and frequency of religious attendance (Proposition 5)**

<table>
<thead>
<tr>
<th>Weekly hours of work</th>
<th>Dependent variable: frequency of attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td></td>
<td>-0.034</td>
</tr>
<tr>
<td></td>
<td>(1.44)</td>
</tr>
<tr>
<td>Observations</td>
<td>36264</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.11</td>
</tr>
<tr>
<td>Measure of work</td>
<td>90th percentile</td>
</tr>
<tr>
<td>Method</td>
<td>OLS</td>
</tr>
</tbody>
</table>

Robust t-statistics in parentheses
* significant at 5%; ** significant at 1%

Controls include education, a cubic in age, marital status, number of children, state/region and group fixed effects, and a quadratic in real family income.

Groups are defined as denomination x region x ethnicity.
4 Money Allocation

Having analyzed the agent’s time allocation problem, consider how money is allocated between competing desires. Again, we consider only cases in which \( h = 1 \). Let \( v(T) \) denote the agent’s utility associated with time \( T \) when it is optimally allocated between leisure \( t^* \) and religious activities \( r^* \). Then, analogously to the time allocation problem, one obtains the agent’s money allocation problem and solution,

\[
\begin{align*}
  v(T) \left( \frac{M}{p} (1 - \bar{d}) - \mu \right)^{\beta} (1 + \bar{d})^{\gamma_M} \\
  \rightarrow \max_{\bar{d}} & \quad \text{s.t.} \quad \bar{d} \in [0,1]\\
  \Rightarrow \quad \bar{d}^{br} = \max \left\{ 0, \frac{\gamma_M \left( \frac{M}{p} - \mu \right) - \beta}{\beta + \gamma_M} \right\},
\end{align*}
\]

which resembles the time allocation problem given in equation 4. Notice, however, that the marginal utility from material consumption, \( \mu \), is now weighted by (the inverse of) the real value of monetary income.

Similar to assumption 2, absent a functioning Church the marginal utility from material consumption exceeds that of charitable giving.

**Assumption 3.** Absent a functioning Church, the marginal rate of substitution between charitable giving/donations and material consumption is less than one’s real income,

\[
\left. \frac{\partial u}{\partial \bar{d}} \right|_{\chi=0} \leq \frac{M}{p}. \tag{26}
\]

The analysis of equilibrium is analogous to that of time allocation, with the Pareto-superior religious equilibrium being characterized by

\[
\bar{d}^* = \frac{\gamma_M \left( R^{\kappa_1} (n M \bar{d})^{\kappa_2} \rho^{\kappa_3} \right) \left( \frac{M}{p} - \mu \right) - \beta}{\beta + \gamma_M \left( R^{\kappa_1} (n M \bar{d})^{\kappa_2} \rho^{\kappa_3} \right)}. \tag{27}
\]

All of the results derived concerning religious activity carry over *mutatis mutandis* for the equilibrium with charitable giving. Indeed these parallels are also present in the data. Thus, the first column in Table 4 captures the relationship between others’ tithing and one’s own—
paralleling proposition 2. A one percentage point increase in the group’s average ratio of religious contributions to total consumption (tithing) is associated with a 0.311 percentage point increase in the individual’s own tithing—reflecting not only the analogue to proposition 2, but confirming the underlying multiplier effects (lemma 2) and the stability of the religious equilibrium.

<table>
<thead>
<tr>
<th>Table 4 Models of tithing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variable: tithing</strong></td>
</tr>
<tr>
<td>Mean group tithing</td>
</tr>
<tr>
<td>0.311</td>
</tr>
<tr>
<td>(2.57)*</td>
</tr>
</tbody>
</table>

| 90th percentile of | 0.001 | 0.001 |
| group total expenditure | (0.17) | (0.14) |

| Average group wealth | -0.001 |
| (1.71) |

| Observations | 18210 | 18210 | 18210 | 18210 |
| R-squared | 0.06 | 0.06 | 0.06 | 0.07 |
| Method | OLS | OLS | OLS | OLS |

Robust t-statistics in parentheses
* significant at 5%; ** significant at 1%
Controls include education, a cubic in age, marital status, number of children, state/region and group fixed effects, and a quadratic in real family income.
Groups are defined as denomination*region*non-white.

Of the other analogous results, the one most noteworthy is that concerning pressures put on the individual by secular society. Similar to proposition 5:

**Proposition 6.** In the religious equilibrium, an increase in the socially minimal requirements of material consumption yields diminished religious donations by members and results in lower levels of spirituality and overall wellbeing,

(28) \[ \frac{d \sigma}{d \mu} < 0; \quad \frac{d \sigma}{d \mu} < 0; \quad \frac{d \sigma}{d \mu} < 0. \]

The difficulties faced by the rich in getting into heaven are found throughout the synoptic Gospels: Mark 10:23–25, Matt. 13:18–23, Luke 6:24, Luke 18:18–24. They all suggest that the comforts of this life are a distraction from dedicating oneself and one’s wealth to achieving the riches of the next life. But this accumulation of goods also fails to
provide happiness in this life. In the middle ages the problem of riches was recast in terms of avarice. The problem was not wealth, but an excess of wealth not shared with those less fortunate (Newhauser, 2000), thus leading to the breakdown of the social order, as also suggested by Lynch (2003) and de Swaan (1988). This tension between glorifying oneself in this world by consuming more than one’s peers and providing for the next by higher donations relative to one’s income, appears a constant in the human condition. Nevertheless, our empirical methodology fails to establish this connection using OLS (see column 2 in table 4, which shows a very small and statistically insignificant relationship between group expenditure and tithing).

In contrast to religious activity, individual spirituality responds to charitable giving relative to one’s income, rather than absolute amounts of donations. And this difference yields some additional insights about individual wellbeing and the religious community.

Proposition 7. In the religious equilibrium, an increase in the financial resources available to the individual yields greater relative donations by members and results in higher levels of spirituality and over-all wellbeing.

\[
(29) \quad \frac{d}{dM} \delta > 0; \quad \frac{d}{dM} \sigma > 0; \quad \frac{d}{dM} u > 0.
\]

As income rises, so do donations. Further, the higher the wealth of the Church, \( D \), all else equal, and thus the better able the Church is to fulfill its pastoral missions, the better off the Church’s members—and the more members are willing to give, resulting from further multiplier effects.

However, the source of those funds does matter. Suppose, as in many European countries, individuals’ incomes are taxed, reducing \( M \), and those tax revenues are used to fund Churches. Suppose the wealth of the Church is \( \hat{D} \), and the government agrees to maintain this level of funding and that it will tax no more than is needed to maintain \( \hat{D} \). Then, because individuals’ income has fallen, they will reduce their donations, taxes will have to be increased to compensate, and this process can continue until the entire funding of the Church is provided by the state: \( D = \hat{d}_g \). Even though the wealth of the Church is maintained, members of the faith community are made worse off: their own spirituality and their personal happiness are unambiguously diminished. This mirrors Andreoni (1990), but here it is not the warm glow of giving that is lost but one’s personal investment in faith and one’s attachment to one’s faith.
community.

As with group expenditure, we fail to find evidence of a positive relationship between average group wealth and tithing (table 4, column 3). For completeness, we also report the results of a model of tithing that includes all three proposed predictors (average tithing, group expenditure, and group wealth, see table 4, column 4). In this model, we see that the large and positive relationship between group tithing and individual tithing remains with the addition of the other controls.

5 The Role of an Effective Church

As stated at the outset, the Church, compared to the state, is well-placed to provide a coordinating function, which may assure the attainment of the Pareto-superior equilibrium. It does so by providing incentives. These incentives can be positive (rewards)—the eschatological benefits of the Kingdom of God—and negative (punishments)—e.g., Matt. 13:40–42 or Mark 8:38.

Also, the Church institutes rituals, communal gatherings for prayer and reflection in which beliefs held in common are reiterated. That is, the Church reminds its members that they have obligations to their fellow men and in considering themselves they must consider all others as well. In practical terms the Church can make its members aware that their actions affect others, even others they do not know and who do not know them.

To the extent that Church leaders are able to coordinate community actions, they may even be able to induce individuals to behave specifically as community members, and thus in a socially rather than an individually optimal manner. In so doing, the Church can cause agents to each act for the greater good as “social planners,” and lead the community to a Pareto optimal outcome—the best outcome for all agents individually and communally.

Theorem (Pareto-Optimality). Pareto-optimality is achieved—and thus overall societal and individual well-being are maximized—at levels of religious activity and donations that exceed the (decentralized) individual optimal levels of the Pareto-superior religious equilibrium. That is,

\[
(30) \quad u(\cdot, \sigma(r^{**}, \bar{d}^{**})) > u(\cdot, \sigma(r^*, \bar{d}^*)) ,
\]

with \( r^{**} > r^* \), and \( \bar{d}^{**} < \bar{d}^* \).
where \( r^{**} \) and \( d^{**} \) are the individual levels of religious activity and donations that maximize

\[
(1 - \lambda)^{\alpha} (m - \mu)^{\beta} h'(1 + r)^{\gamma} (x(r, M, \bar{d})) (1 + \bar{d}) y_{M}(x(r, M, \bar{d})).
\]

The Church’s prescribed solution suggests that all community members should engage in a level of religious activity and donations in excess of the individually optimal levels (i.e., \( r^{**} > r^{*} \) and \( d^{**} < d^{*} \)). The Church exhorts its members to this level of activity by revealing the positive external effects of individuals’ actions, revealing what in the market would remain hidden. While individuals would like to alter their behavior, given what others are doing in the Pareto-optimal state (i.e.,

\[
r_{i}^{br}(r_{-i}^{**}) < r^{**} \text{ and } d_{i}^{br}(d_{-i}^{**}) < d^{**},
\]

they recognize that the overall effect of individual best-responses (corollary 1) is strictly dominated by following Church recommendations.

The Church can obtain this outcome through moral suasion, or it can resort to a formalization of the \( h \)-function discussed earlier, i.e.,

\[
r_{\text{min}}(\rho) = r^{**} \text{ and } d_{\text{min}}(\rho) = d^{**}.
\]

Although this threat of hell and damnation is coercive, all agree that the prescribed behavior is optimal, and would agree to the coercion. Thus, concerning donations, e.g., in the Old Testament individuals are commanded to tithe (Deut. 26:12), and in the New Testament individuals are commanded to give to God what is God’s (Mark 12:17a). These specific recommendations can be thought of as providing a level of donations great enough to insure against the coordination failure equilibrium outcome. But they may instead set a level that will lead to the Pareto optimal coordinated outcome.

The great potential of the Church, compared to the State, in modern Western societies thus becomes clear, for it is incompatible with modern views of a free society that individuals be forced to the degree possibly required to achieve the Pareto efficient outcome (especially when it comes to one’s time) by the State. Yet, rather than the State’s force, the Church’s power to use coercion is voluntary and acceptable. Yet, herein also lies the challenge to the Church in Western societies, for it is easier for the individual to free-ride within or even leave the Church than it is for him to free-ride in or leave the State.

6 Conclusion

The Church has played a central role in establishing and maintaining, as well as undermining, communities throughout history. Yet today it
finds itself on the periphery, less able to build communities of faith. In this paper we explore how the Church can coordinate individual behavior to achieve improvements in individual and social welfare, and in so doing reveal the ways in which the Church can fail, causing established communities to founder or dissolve.

Inherently religious individuals may become trapped in a secular equilibrium which is strictly dominated by a religious equilibrium in which individuals’ actions bestow positive external benefits on other community members. The Church reveals the benefits of coordinated behavior, both in this world and the next, and the costs of uncoordinated behavior (separation from God and one’s fellow man), in order to induce community members to take actions which are both individually and socially beneficial.

The power of the Church’s exhortations is diminished by doctrinal weakness, which can have its source in the doctrine itself, how that doctrine is interpreted, applied, or perceived, or how that doctrine is communicated. The rapid growth of the Evangelical and the decline of the Mainline Protestant Churches in the United States have been attributed to doctrinal strength in the former and weakness in the latter. The decline in religious practice in Europe may be attributed to issues of doctrine and to the ceding to or crowding out by the State what had once been the provenance of the Church, such as the provision of charity for the poor and other social-welfare programs for the community at large. Additionally, funding of the Church by the State, as is found in many European countries, can erode the benefits of membership in one’s faith community, and perhaps lead to the dissolution of the community (reversion to the secular equilibrium).

Churches have proven themselves to be very resilient institutions which can play a vital role in strengthening communities. Whether they can continue to do so depends on what they can offer to those struggling to meet the demands of this world, in a world in which many of their traditional ministries have been ceded to the State, and in a world in which their teachings are often perceived to be at variance with rather than the source of shared cultural beliefs. The challenge to Churches today is great, but the benefit to society of their succeeding may be greater still.

Appendix A: Proofs

Proof of Lemma 1: Given the time constraint in equation 3,
\[ T \equiv 1 = l + r, \] (with \( \lambda < T \)), the agent engages in religious activity only
if the marginal utility from doing so is greater than or equal to the marginal utility from leisure time. ■

**Proof of Proposition 1:** Assumption 2 implies that \[ \frac{y_l}{r + l} \bigg|_{x=0} < 1, \]
or
\[ (A1) \quad y_r(0) < \frac{\alpha + l}{1 - \lambda}, \quad \forall r, l. \]
By assumption 1, \( y_r \) is strictly increasing and therefore has a strictly increasing inverse, call this \( y_r^{-1} \). It follows from equation A1 that \( 0 < y_r^{-1} \left( \frac{\alpha + r}{1 - \lambda} \right) \). Moreover, since \( y_r^{-1} \) is increasing, we have
\[ (A2) \quad y_r^{-1} \left( \frac{\alpha + l}{1 - \lambda} \right) > 0. \]
Let \( \bar{R} \) and \( \bar{D} \) be given and define \( \bar{\tau} = \bar{R} / n \) as the average contribution necessary to obtain \( \bar{R} \). Now let
\[ (A3) \quad \rho \bigg|_{\bar{R}, \bar{D}} = \left( \frac{y_r^{-1} \left( \frac{\alpha + \bar{\tau}}{1 - \lambda} \right)}{\bar{R}^{1/\kappa_3} \bar{D}^{\kappa_2}} \right)^{1/\kappa_3}, \]
and note by equation A2 that \( \rho > 0 \). Note finally that for all \( \rho' < \rho_0 \), equation A3 can be rewritten as
\[ (A4) \quad \frac{y_r(\bar{R}, \bar{D}, \rho')^{(1 - \lambda) - \alpha}}{\alpha + y_r(\bar{R}, \bar{D}, \rho')} < \bar{\tau}, \]
which, by equation 16, indicates that the agents’ chosen time in religious activities is insufficient to sustain \( \bar{R} \) given \( \rho' \) so that no religious equilibrium exists for any \( \rho' < \rho_0 \), given \( \bar{R} \) and \( \bar{D} \). ■

**Proof of Corollary 1:** The unique equilibrium at \( \rho = \rho_0 \) follows directly from the proof of the proposition. The remainder is the standard proof for coordination games. See, e.g., Cooper (1999). ■

**Proof of Lemma 2:** Noting that for all \( r_{-l} < \bar{\tau}_{-l} \) the best individual response is \( x_l^{br} = 0 \), we obtain the equality of the lemma. The inequality
follows from extending equation 17 to the rest of the domain.  

**Proof of Proposition 2:**

1. Rewriting equation 20 gives the implicit equilibrium condition as

\[ G(r^*, \lambda) = \frac{\gamma_T((nr^*)^{k_1}D^{k_2} \rho^{k_3})(1-\lambda)-\alpha}{\alpha+\gamma_T((nr^*)^{k_1}D^{k_2} \rho^{k_3})} - r^* = 0. \]

2. Hence, recalling that \( \chi = (nr^*)^{k_1}D^{k_2} \rho^{k_3}, \)

\[ \frac{d}{dn} r^* = -\frac{\delta n}{\Delta r^*} = \frac{\frac{\gamma_T \chi (2-\lambda)}{n(\alpha+\gamma_T)^2}}{r^*(\alpha+\gamma_T)^2} > 0, \]

where the inequality follows, because at the stable Pareto-dominant equilibrium, the slope of the derivative of the best-response function (see equation 17) is less than 1, making the denominator positive.

2. The agent’s spirituality \( \sigma \) is increasing in the number of active congregants \( n \), because \( \sigma \) is increasing in both \( \gamma_T \) (which is increasing in \( n \)—see assumption 1 in conjunction with equation 6 and the definition of \( R \)), and in \( r_{1i}^* \), which was just shown to be increasing in \( n \).

3. Due to multiplier effects (lemma 2), an exogenous increase in \( \chi \) due to an increase in \( n \) increases the agent’s utility at his initial choice of \( r_i \). His utility is then further increased by re-optimizing his religious activity.  

**Proof of Proposition 3:** Using equation A5, similar to the proof of proposition 2 one has

\[ \text{sign} \left( \frac{d}{d \rho} r^* \right) = \text{sign}(G_\rho) = \text{sign} \left( \frac{\gamma_T \chi \alpha (2-\lambda)}{\rho(\alpha+\gamma_T)^2} \right) > 0. \]

The other arguments follow as in the proof to proposition 3.  

**Proof of Proposition 4:** The proof follows *mutatis mutandis* from the proofs of propositions 2 and 3.  

**Proof of Proposition 5:** Similar to the previous proofs,
(A8) \[ \text{sign} \left( \frac{d}{d\lambda} r^* \right) = \text{sign}(G_{\lambda}) = \text{sign} \left( \frac{-y_r}{\alpha + y_r} \right) < 0. \]

**Proof of Proposition 6:** The proof follows along the lines of the proof to proposition 5.

**Proof of Proposition 7:** The proof is analogous to those of propositions 3 and 4.

**Proof of Theorem** The theorem is an implication of multiplier effects and the proof follows readily.

**Appendix B: Data and Empirical Methods**

Data on religious participation come from the General Social Survey (GSS), 1972–2004, which is a nationally representative sample of U.S. adults. The GSS has, in every survey since 1972, collected information on the frequency of attendance at religious services. We convert the categorical response to this question (never, less than once per year, about once or twice a year, several times a year, about once a month, two to three times a month, nearly every week; every week, and several times a week) to a continuous variable measured in frequency of attendance per year. The GSS also contains information on region of residence, religious denomination, and ethnicity as well as a large set of demographic variables and family income.

Data on religious tithing come from the Consumer Expenditure Survey (CEX), which was developed to provide information on consumer behavior. We use data from the 1982 through 1998 panels of the CEX. The CEX is a nationally representative survey of roughly 5,000 households per year, is the basic source of data for the construction of the items and weights in the market basket of consumer purchases to be priced for the Consumer Price Index, and is widely regarded as the best source of U.S. consumption expenditure data. It contains information on the income and demographic characteristics of the household as well as detailed household-level information on expenditures. Each household is interviewed up to four times at three-month intervals and three months of expenditure data are collected retrospectively at each quarterly interview. Income over the past 12 months is asked in the first and last interviews. In the last interview, data on five types of contributions over the past year are collected. These are contributions to religious, charitable, political, and educational organizations, and miscellaneous contributions. Our measure of total
consumption is based on the expenditure data reported in the CEX; consumption of goods provided in-kind is not measured in the Consumer Expenditure Survey and is therefore excluded from our measure of consumption. Our measure of tithing is the ratio of contributions to religious organizations to total consumption.

There are several limitations to directly employing the CEX data to address all of the empirical implications directly related to our model. For example, the CEX does not ask questions relating to religious denomination or ethnicity.

Our models are of the following form:

\[
Y_i = a + b\bar{Y}_i + XB + \sum \gamma_j Region_j + \sum \varphi_k Denomination_k + e_i,
\]

where \(Y_i\) is the individual’s own religious attendance; \(\bar{Y}_i\) is the average attendance of the individual’s group; \(X\) is a set of demographic and family income variables including controls for ethnicity, marital status, number of children, real family income, age, and education; Region is a set of regional indicator variables; and Denomination is a set of denomination indicator variables.

We estimate equation B1 by OLS and by instrumental variables using the instrument suggested by Gruber (2005)—the average attendance of people in the same region and denomination but of different ethnicities.

For the CEX analyses, we also estimate equation B1 by OLS, except that \(Y_i\) represents the household’s tithing, \(\bar{Y}_i\) represents the group’s average tithing (where groups are defined by state of residence and race, and controls for race are used instead of ethnicity, controls for denomination are not included as they are not available, and controls for state are included in place of region).

**Endnotes**

1. It is worth noting that Iannacone (1992) presents a formalization of these ideas by modeling religious doctrine as a means to prevent free-riding in groups with positive network externalities.
2. For recent experimental evidence in support of this, see Ruffle and Sosis (2006).
3. Ellingsen and Johannesson (2004) show that cooperation is greatly improved by individuals having the opportunity to
make nonbinding promises to cooperate rather than nonbinding threats to withhold cooperation should others fail to cooperate. Thus, by standing by one’s neighbors in Church and stating one’s joint belief, one positively signals a commitment to cooperate.

4. This normalization of donations follows from Mark 12:41–44 in which the poor widow’s generosity is contrasted with the miserliness of the crowd.

5. That individuals gauge their happiness not by what they have but by how what they have compares with what their peers have, has been studied by Bowles and Park (2005), Frey and Stutzer (2002), Sen (1983), and Easterlin (1974), among others, and empirical evidence for social comparison based preferences has been found by Blanchflower and Oswald (2004) and Luttmer (2005). See Frank (1997) and Clark and Oswald (1996) for summaries of the empirical literature. In our specification social norms result in increased optimal choices and imply a minimum level of consumption/leisure.

6. Separability also greatly facilitates the empirical analysis because the data for the analysis of attendance come from a different source (the General Social Survey) than do the data on tithing (the Consumer Expenditure Survey). Allowing expenditures to depend on time allocation would be a challenge, but in any case we do not think out data are sufficient for such an undertaking.

7. Conversely, if any agent spends less than \( \hat{p} \) in religious activity, all others best respond by reducing their activity levels, and as this is self-perpetuating, society collapses back onto the secular equilibrium given in proposition 1.

8. Our result is consistent with Lipford (1995) who finds that an increase in the size of a congregation does not induce free riding.

9. Appendix B discusses the data and methods used in this and the subsequent empirical analyses.

10. We exclude each individual’s own attendance when
constructing the average for the group.

11. A Nexis search conducted by the authors on U.S. newspapers and wire articles containing the words “Catholic AND priest AND scandal AND sexual AND abuse” found no articles prior to 1984, an average of 10 articles per year between 1984 and 1992, and over 50 articles per year beginning in 1993.

12. Interestingly, Scheve and Stasavage (2006) find that across societies religiosity is a substitute for secular social insurance.

13. All results concerning tithing are estimated with OLS only, since the data that include information on tithing (the CEX) do not record ethnicity, which precludes following Gruber’s (2005) IV approach.

14. Brams and Kilgour (2002) find that a certain day of reckoning, no matter how far in the future, induces good behavior today. Hull and Bold (1989) consider the eschatological rewards and punishments as enforcement mechanisms. We consider them, instead, as incentives for and indicators of ideal behavior.

15. Ruffle and Sosis (2007) present experimental evidence on the role of organized religion in the Jewish faith. They demonstrate that in contrast to members of secular kibbutzim, those of religious kibbutzim display greater levels of cooperation in game settings. In theoretical work, Levy and Razin (2007) demonstrate how religious ritual can serve as a coordinating device in a variation of the prisoner’s dilemma game with complementarities in actions.


17. We choose 1998 as the end date of our analysis of the CEX because the religious contributions question on the CEX was changed after the late 1990s, and thus made the pre-
change responses incomparable to post-change ones.

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