Exporting Christianity:

Governance and Doctrine in the Globalization of US Denominations

Gordon H. Hanson
UC San Diego and NBER

Chong Xiang
Purdue University and NBER

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Abstract. In this paper we build a model of competition between religious denominations based on Aghion and Tirole (1997) and Iannaccone (1992), in which we treat denominations akin to multinational enterprises. The model yields predictions for how a denomination's religious doctrine and organizational structure affect its ability to attract adherents, depending on country characteristics including distance from the denomination headquarters, and the availability of social services provided by the government. We test these predictions using data from the World Christian Database. We find that the denominations with a decentralized structure have larger membership and build more congregations in the countries that are farther away from the denomination headquarter and/or have less developed communication infrastructure. We also find that the denominations with a strict doctrine do better in the countries in which the government supplies less in the way of health and other social services. These findings are consistent with the predictions of our model. They also shed light on the factors that affect the rapid expansion of Protestant denominations around the globe in the past 40 years.

1. Introduction

In non-western countries, the practice of Christianity has long been dominated by the historical church or churches associated with current or former colonial powers. As recently as 1970, the Catholic, Eastern Orthodox, and Anglican Churches together accounted for 85% of affiliated Christians outside of Western Europe and North America (Barrett, Kurian, and Johnson, 2001).[1] The era of dominance by the traditional church, however, appears to be ending. Concomitant with the globalization of markets for goods and services, alternative forms of Christian worship are spreading internationally (Brouwer, Gifford, and Rose, 1996).

Leading the charge are not established Protestant denominations, most of which were created during the two hundred years following the Reformation, but newer movements associated with strict religious doctrine, including Pentecostals, charismatics, Mormons, and Jehovah's Witnesses, all of which originated in the United States during the last century and a half.[2] In Latin America, where over 80% of the region still identifies as Catholic, the share of the population affiliated with nontraditional churches grew from 8% in 1970 to 18% in 2005.[3] Over the same period in Sub-Saharan Africa, where over 30% of the population is Catholic, Orthodox, or Anglican, the share of the population affiliated with nontraditional churches grew from 18% to 30%. Even in Asia, where Christianity has never been strong, the population share associated with nontraditional churches increased from 2% to 7%. On their own, Pentecostal and related churches claimed 295 million members in 2005, accounting for 14% of all Christians, up from 4% in 1970. Yet, the success of new forms of Christianity is not universal. Nontraditional churches have a small presence in Eastern Europe and Russia, a continuing absence in the

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[1] The shares for individual religions were 63.6% for the Catholic Church, 19.6% for the Orthodox Church, and 2.1% for the Anglican Church.

[2] The success of newer religious groups in capturing market share from more established denominations is a familiar pattern in the United States over the last two centuries (Finke and Stark, 2005).

[3] Data are from http://www.worldchristiandatabase.org.

Middle East and North Africa, and a declining market share in Western Europe.

While the recent globalization of Christianity has attracted intense academic interest from other social sciences (Robbins, 2004), it has received less attention from economists. This is surprising given that the spread of Christianity has occurred through international trade in services that is largely market mediated. Freer international trade in religion affects economic development by challenging national religious elites and their political allies (Freston, 2001), injecting new ideas and organizational strategies into countries (Robbins, 2004), and altering the provision of social services (Clarke, 2006). What explains the success of new forms of Christian worship in markets long controlled by the traditional church? Are there identifiable features of denominations that account for their capacity to attract adherents internationally? Are standard tools of economic analysis suitable for answering these questions?

In this paper, we examine the factors that determine the presence of Protestant and nontraditional Christian denominations across national markets. We treat denominations akin to multinational enterprises, which choose which markets to enter based on the combined objectives of attracting members and generating revenues.[4] We focus on three attributes of a denomination that affect its membership. One is its overall attractiveness to believers, which we treat as a fixed characteristic similar to the productivity of a firm. A second is organizational structure. Some denominations, such as Lutherans and Methodists, are centralized, placing authority over pastors and church doctrine in the hands of national or international bodies (Chaves, 1993a). Others, such as Baptists and Assemblies of God, are decentralized, with individual congregations controlling the hiring and firing of pastors, religious practices, and ownership of local assets. We use an organizational model based on incomplete contracts (Grossman and Hart, 1986; Hart and Moore, 1990) and the delegation of authority (Aghion and

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[4] See Goff and Trawick (2008) on location decisions and competition among Christian churches across US counties.

Tirole, 1997) to show how the degree of centralization interacts with local market conditions to affect a denomination's performance and then test these predictions empirically. A third attribute of a denomination is its religious doctrine. Iannaccone (1994) suggests that stricter religious groups are more efficient at organizing the collective production of worship services, social activities, and other quasi-public goods. We examine empirically whether the value consumers place on strictness depends on a country's capacity to provide public goods. Data for the analysis are from the World Christian Database, which records the number of affiliated Christians by denomination and country in 1970 and 2005.

Our work brings together three bodies of literature. The first is cross-country analysis of religious behavior. Barro and McCleary (2005) identify the factors that determine which countries have state religions, finding that the likelihood of a religious monopoly is increasing the share of the population that adheres to a single religion, consistent with a Hotelling spatial competition model. In related work, McCleary and Barro (2006) find that the fraction of the population that participates in religious activities is decreasing in per capita income and government regulation of religion and is higher in countries with a state religion. Barro and Hwang (2007) relate rates of conversion to major religions in a country to religious pluralism, absence of state controls on religion, and having a more educated populace. We extend the literature by examining competition among many religious groups, which allows us to estimate the market value associated with different denominational characteristics.

In modeling competition between denominations, we borrow from recent work on organizations in international trade. In our framework, each denomination decides which national markets to enter, based on local market conditions and its own productivity, organizational structure, and religious doctrine. The broad features of a denomination's

organization and doctrine tend to change slowly over time and to be common across the locations in which it is active (Melton, 1989; Chaves, 1993b).[5] Entry into a market is subject to a fixed cost, associated with creating a national ministry, which similar to Melitz (2003) keeps low productivity denominations from entering small countries or countries subject to high entry barriers. To reach adherents in a market, a denomination must attract local pastors to manage individual congregations. Following Antràs (2003) and Antràs and Helpman (2006), we assume that transactions between a pastor (the local manager) and a denomination (the headquarters) are subject to incomplete contracts. Following Aghion and Tirole (1997), we model how the allocation of authority affects the pastor's incentives. In denominations with a decentralized structure, the pastor has greater authority, which increases his incentives to invest in building the congregation; in denominations with a centralized structure, the denominational headquarters has greater authority, which gives it more control over how congregations operate. The model predicts that in the countries where the pastor's effort strongly affects the success of a congregation, decentralized denominations tend to have higher membership and build more congregations, while in markets where inputs from the denomination headquarter contribute heavily in the congregation's success centralized denominations will tend to do better. Following the literature on hard and soft information (e.g. Stein 2002, Mian 2006), we hypothesize that the contribution of pastor effort is greater in environments where the denomination headquarters face higher costs in acquiring information about local market conditions, such as in the countries that are far away from the denomination headquarter country, and/or in the countries with less developed communication infrastructure. We test these predictions using detailed data on the organizational structure and doctrinal features of

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[5] See Chaves and Sutton (2004) on the consolidation of US denominations in the 19th and 20th centuries. See Chaves (1993b) on the shift in power from religious authorities to administrative authorities in US denominations over the course of the 20th century, which relates to the tendency for religious groups to secularize over time.

denominational families.

Protestant Christian denominations differentiate themselves according to their religious doctrine and the nature of their religious services. While all share a belief in Jesus Christ, they vary in how they translate belief into practice. Stricter denominations emphasize having a personal conversion experience, the inerrancy of the Christian Bible, the imminence of Christ's second coming, the damnation of non-believers, maintaining a high standard of moral behavior, active participation in church services, and seeking to convert others to the faith, all of which impose time costs and social constraints on an individual's lifestyle and complicate interacting not just with non-Christians but with Christians outside of the denomination. Pentecostal and charismatic denominations, in addition, make ecstatic religious practice, including speaking in tongues, an essential feature of worship, which creates further separation from outsiders. Following the logic of Iannaccone (1992), strictness raises the cost to join a congregation and allows members to signal their commitment to the group, which helps denominations overcome free riding in providing services.[6] Many of the services churches offer, including religious instruction, activities for children, and care for members who have fallen on hard times, are club goods, whose provision may be enhanced by strictness. Club goods often compete with social programs run by the government (Hungerman, 2005; Gruber and Hungerman, 2007). We examine whether demand for strictness in religious doctrine is stronger in countries where governments are weak or provision of social insurance is limited.

We find that the denominations with a decentralized structure have larger membership and build more congregations in the countries that are farther away from the denomination headquarter and/or have less developed communication infrastructure. We also find that the denominations with a strict doctrine do better in the countries in which the government supplies

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[6] See Berman (2000) for an application of these ideas to ultra-orthodox Jews in Israel.

less in the way of health and other social services. These findings are consistent with the predictions of our model.

In section 2, we discuss data on Christian denominations regarding their presence in national markets, religious doctrine and organizational structure. In section 3, we present a model of location choice by Christian denominations. In section 4, we derive the empirical specifications. In section 5, we show the empirical results from estimating the model. And in section 6, we offer concluding remarks.

2. Data and Empirical Setting

2.1 Protestant, Independent and Marginal Christians

The main data for the empirical analysis come from the World Christian Database (WCD). The WCD tracks religious affiliation for major religions and individual Christian denominations in 215 countries, providing numbers of affiliated members and numbers of congregations in 1970 and 2005. Each Christian denomination is identified by its name, tradition (e.g., Baptist, Keswick-Pentecostal, Reformed-Presbyterian), and Christian megabloc. The megablocs include Roman Catholics, Eastern Orthodox, and Anglicans, which constitute the historic or traditional church; Protestants, which constitute most organized Protestant denominations; Independents, which includes churches that have split from Protestant denominations or that are unaffiliated with international church bodies; and Marginals, which are groups outside of the Christian mainstream, the largest of which are the Church of Jesus Christ of Latter Day Saints (Mormons) and Jehovah's Witnesses.[7] Because in many countries Catholic, Orthodox, and Anglican churches were established directly or indirectly by the state (Ekelund,

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[7] Of the 32 million Christians affiliated with Marginal churches in 2005, 40% belonged to the Mormons and 46% to the Jehovah's Witnesses. Other Marginals include the Christian Scientists (3%) and the Unification Church (2%).

Herbert, and Tollison, 2006), we leave them out of the empirical analysis of location decisions by denominations and focus solely on Protestant, Independent and Marginal groups.[8]

The data show that nontraditional denominations account for most of the recent global growth of Christian churches. Table 1 gives the share of affiliated Christians in the global population by megabloc and the share of each megabloc in the total population of affiliated Christians. The share of affiliated Christians in the worldwide population has remained stable, rising only slightly from 29.1% in 1970 to 30.1% in 2005. However, this stability masks considerable churning within the religious marketplace. The share of the world population associated with Protestant, Independent, and Marginal denominations rose from 8.5% to 12.4% over the period, while the population share for Catholics, Orthodox, and Anglicans fell from 23.2% to 22.1%. In 2005, Protestants, Independents, and Marginals accounted for 40.8% of all affiliated Christians, up from 29.3% in 1970. The entries with negative values for doubly affiliated Christians account for the fact that in some countries Christians are affiliated with more than one church, typically belonging to the Catholic Church and a nontraditional group.[9]

The growth in market shares for Protestants, Independents, and Marginals has come almost entirely outside of Western Europe and North America. Table 2 provides a breakdown of the population share for megablocs by geographic region. The share of the population affiliated with the Catholic, Orthodox, or Anglican churches, which historically has been highest in Europe and Latin America, grew in only three of the seven regions. Growth in the traditional church was strongest in Eastern Europe and the Former Soviet Union, due to the resurgence of Orthodoxy following the fall of communism. For Protestants, Independents, and Marginals, which

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[8] We further exclude a handful of Protestant and Independent denominations that were created by schisms from Catholic, Orthodox or Anglican churches but have continued to be closely associated with them through their doctrine and religious practice. The global membership in these schismatic churches is small.

[9] Most doubly affiliated Christians are in Latin America, North America, or Africa. Negative values for disaffiliated Christians indicate church members but who have left the Christian faith, nearly all of whom are in Western Europe.

historically have been strongest in North America, population shares grew in every region, except North America and Western Europe. Excluding Protestants, Independents and Marginals saw their population share grow in every region of the world, highlighting the importance of new forms of worship in the global expansion of Christianity.

2.2 Denominational Families

In the raw WCD data, there are over 6,300 denominations with distinct names. However, these denominations represent a far smaller number of denominational families, which have similar organizational structures and religious doctrines and typically belong to a common international body of some kind (e.g., Baptist World Alliance, Jehovah's Witnesses, International Church of the Foursquare Gospel, Lutheran World Federation, Mennonite World Conference, World Alliance of Reformed Churches, World Assemblies of God Fellowship, World Methodist Council, General Council of Seventh-Day Adventists). To construct aggregates of denominational families, we translate denomination names into English, drop country identifiers from the denomination name, reconcile minor differences in denomination names across countries, and manually cross-check our designation for each denomination with additional information from the WCD website.[10] For a few countries in the sample, our procedure fails because the WCD does not record data on individual denominations and instead groups most of them into an aggregate category designated "union of bodies of different traditions." We drop a country from the sample if more than 20% of affiliated Christians fall into this category. The excluded countries include 6 large nations (Australia, Canada, China, Congo, Germany, and

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[10] For instance, Assemblies of God, a major Pentecostal denomination, also appears in the data as Assemblées de Dieu (French), Assemblee di Dio (Italian), Assembléias de Deus (Portuguese), and Asambleas de Dios (Spanish). The English entries appear as Assemblies of God of Fiji, Assemblies of God in Ghana, etc.

Pakistan) and 10 small ones.[11] In 2005, the excluded countries represented 13% of all affiliated Christians enumerated in the WCD. Further, some denominations have unclassifiable names or belong to unclassifiable traditions (e.g., grassroots churches, monoethnic churches, radio/TV believers, cell-based networks, healing networks, hidden believers in Christ). We also exclude these denominations and traditions, which in 2005 accounted for less than 2% of affiliated Christians worldwide. The resulting sample has 140 denominational families.

Figure 1 plots log rank of each denomination in terms of its global membership against its log number of affiliated Christians. The curvature in the relationship is distinct from the log linearity found in the firm size distribution for many manufacturing industries, which tend to exhibit a power law (Gabaix, 2009). For denominations, size increases by more than proportion to rank, indicating the global dominance of the biggest groups. Of the largest 25 denominations, 11 are mainline Protestant, six are Pentecostal or charismatic, and two are Marginals.

Protestant, Independent, and Marginal denominations have emerged from distinct religious traditions. Mainline Protestant denominations include movements brought from Europe to the United States in the 17th and 18th centuries that ultimately established a major US presence. The largest of these are the Baptists, Congregationalists, Episcopalians, Disciples of Christ, Lutherans, Methodists, and Presbyterians.[12] Mainline denominations exhibit varying degrees of internal heterogeneity in religious practice. The vast majority of mainline Methodist denominations belong to the World Methodist Council, making it a relatively homogeneous group theologically. Earlier in its history, conservative Methodists split off from other Methodists as part of the Holiness Movement, which emphasizes the doctrine of sanctification

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[11] The small excluded countries are Bahrain, the Cayman Islands, Liechtenstein, Madagascar, the Maldives, the Marshall Islands, Micronesia, Norfolk Island, Papua New Guinea, and Zambia.
[12] Smaller mainline denominations include the Quakers, Moravians, and Reformed Church. Episcopalians, another mainline group, are excluded from the sample given their global association with the Anglican Church.

(in which believers cleanse themselves of sin), and many African-Americans split to form the African Methodist Episcopalian church. Congregationalists, as their name implies, have autonomous congregations which lack ties to overarching governing bodies. Congregations in the Disciples of Christ also are self-governing. Baptists, Lutherans, and Presbyterians, over their histories, have split into sub-denominations some of which are more conservative theologically and associated with evangelical or fundamentalist Christianity (e.g., the Southern Baptist Convention, the Lutheran Church-Missouri Synod, the Presbyterian Church in America) and others of which are more liberal theologically, implying openness to ecumenism and modern ideas toward religion (e.g., American Baptist Churches, the Evangelical Lutheran Church, the Presbyterian Church (USA)) (Melton, 1989). In our sample, mainline denominations have 210 million members globally, or 40.1% of the total (excluding the United States the share is 35.2%).

Pentecostals, and related denominations, are the second largest group of Protestants and Independents. Within the sample, Pentecostals and charismatics account for 184 million members, or 35.2% of all Protestants, Independents, and Marginals (37.8% when excluding the United States). The movement, which began in the United States in the early 1900s, maintains a strict Christian doctrine and espouses a belief that speaking in tongues is evidence that one has been baptized spiritually. Speaking in tongues, and other ecstatic practices including healing and prophesying, are essential features of Pentecostal worship services, which make them distinct liturgically from other Protestant groups (Robbins, 2004). In terms of doctrine, Pentecostals resemble fundamentalist Christian groups, which are also conservative theologically. For the last 100 years there has been an active debate within Christianity over whether to endorse glossolalia. Groups that reject the practice often do so strongly (Melton, 1989). The 10 largest Pentecostal denominations account for 52.0% of all Pentecostal adherents, with another 39.3% of

Pentecostals belonging to independent regional churches unrelated to international bodies. The charismatic movement, which emerged in the United States in the 1960s, is composed of individuals from mainline Protestant denominations who have embraced speaking in tongues.[13]

Other notable traditions within the Christian mainstream (and their share of the sample) include fundamentalist churches and evangelical churches outside mainline denominations (3.4%), the Seventh Day Adventists (3.3%), and the Holiness Movement of conservative Methodists (2.0%). All are conservative theologically. Evangelical and fundamentalist Christians reject flexible interpretations of the Bible or the life of Christ, which led to their earlier separation from mainline Protestantism. The Holiness Movement, with its emphasis on sanctification, requires an ascetic lifestyle. Adventists, in addition to a strict doctrine, maintain a vegetarian diet and observe the Sabbath on Saturday, rather than Sunday. The two important Marginal groups, the Jehovah's Witnesses (2.5%) and Mormons, (2.4%), strongly emphasize evangelism, which has led to their having a global presence. Because each also recognizes religious teachings other than the Bible, many Christian groups see them as deviating from core Christian principles. In addition to their distinct theology, Mormons maintain a strict dietary regimen, rigid guidelines on charitable giving, and a requirement that young men provide two years of missionary service. Jehovah's Witnesses have an elaborate theology surrounding the end of the world and obligates members to go door-to-door seeking to convert non-believers. The final set of important denominational families consists of independent regional churches that do not have ties to international church bodies, most of which are in Africa (Meyer, 2004). This group accounts for 8.1% of the sample.[14] Some of the churches that fall into this category are

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[13] The neocharismatic movement, which emerged in the United States in the 1970s, is similar to charismatics in terms of practice but emerged from independent churches unaffiliated with either mainline Protestants.

[14] This group includes denominations in the Apostolic, Full Gospel, Spiritual, World Faith/Prosperity, and Zionist traditions, as well as grassroots churches and house church networks.

hard to classify, causing us to exclude them from the final sample used for estimation.[15]

2.3 Denominational Doctrine and Governance

In the production of religious services, the church is the equivalent of the factory, the pastor is the factory manager, and, given that worship is a collective activity, congregants are both workers and consumers (Iannaccone, 1998). The role of the denomination is to provide the intellectual property used in production, which includes religious doctrine and a system of governance (Chaves, 1993a). Denominations range in form from loose membership associations to rigidly hierarchical bodies. We code denominations according to the strictness of their doctrine and the nature of their organizational structure, using information from Melton (1989), Barrett, Kurian, and Johnson (2001), the World Christian Database, and denomination websites.

Congregations that belong to a denomination typically share a defined religious doctrine. The doctrine is the system of belief that is in part what attracts potential adherents to church. Christianity is organized around the life and teachings of Jesus Christ as contained in the New Testament of the Christian Bible, in which Christ is portrayed as the Son of God who offers salvation to all who believe in him. Denominations vary in religious belief and practice. Strict religious doctrine includes the following beliefs: (a) the Bible is the literal word of God and therefore infallible, (b) to become a Christian one must consciously repent one's sins and accept Christ as lord and savior (be "born again"), (c) one should actively try to convert others to Christianity, (d) Christ will return to earth soon and believers should prepare for his second coming, (e) those who have not converted are damned to a life in hell, and (f) one should dress modestly, avoid smoking or drinking, keep all sexual activity within marriage, and shun any

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[15] Non-denominational groups account for 1.4% of the sample. The remaining groups of denominational families, each of which accounts for less than 0.5% of affiliated Christians, include the Salvation Army, Mennonites, Christian Scientists, Children of God, Unification Church, Unitarian Universalists, African Independent Deliverance, Swedenborgians, Christadelphians, British-Israelites, Waldensians, and White-led Signs and Wonders.

social or cultural activities that contradict these mores. Our coding of doctrine (which adapts measures used by Hoge, 1979, Iannaccone, 1998, and Ekelund, et al., 2006) includes elements (a)-(f) above, as well as liturgical practice (e.g., Holy Communion), openness to secular teachings, degree of ecumenism, and use of religious texts in addition to the Bible. We construct a base strictness measure according to the fraction of beliefs (a)-(f) that a denomination endorses. We also construct an expanded strictness measure that includes (g) belief in sanctification and (h) emphasis on speaking in tongues or other ecstatic practices. While (a)-(f) are characteristic of denominations that are conservative theologically, many of which emerged out of US evangelical and fundamentalist movements in the 19th century (Melton, 1989), (g) and (h) are more controversial. We include them in an expanded measure of strictness because they impose additional constraints on an individual's lifestyle and social relationships.

In terms of organization, belonging to a denomination means a congregation agrees to govern itself according to a pre-specified structure. There is wide variation in the degree of centralization among denominational governance systems. In the most decentralized denominations, the congregation retains control over the hiring and firing of pastors, religious doctrine, and ownership of church property. The denomination, through national or international bodies, operates at arms' length. It provides congregations with a wide range of services, including identifying pastoral candidates, providing non-binding guidance on theology, publishing educational material for use in services, training to pastors and lay leaders, extending loans for church construction or expansion, organizing regional or national crusades to reach new converts, and raising funds to support global operations (Chaves, 1993b). In return for these services, congregations pay fees to the denomination.[16] Local churches, in effect, use the

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[16] In the US, congregations on average keep 79% of the revenues they generate, a share that has remained stable over time (Chaves, 1998).

denomination as a consulting service. Decentralized denominations include mainline Protestants (Baptists, Congregationalists, Disciples of Christ, Quakers), the Holiness Movement (Church of God (Anderson)), Pentecostals (Pentecostal Church of God, United Pentecostal Church), and Marginals (Unitarian Universalists, Christadelphians).

In centralized denominations, authority resides not in the congregation but higher up in the denominational hierarchy. Denominational bodies above the congregation screen applicants to the ministry, assign pastors to churches, discipline pastors, set religious doctrine for member churches, and control the disposition of church property. The denomination, in effect, has the power to license its brand – including the denomination name, religious doctrine, and government structure – to individual congregations and decide who will manage each congregation. The form of centralized governance structures comes in several varieties. In an episcopal or connectional structure, power resides in the bishopric. The chief authority over congregations within a region is a bishop, who ordains pastors, assigns pastors to churches, adjudicates disputes, and performs various administrative duties. A general council of bishops controls church doctrine. Episcopal denominations include mainline Protestants (Methodists, some Lutherans, Moravians), Pentecostals (International Church of the Foursquare Gospel, Pentecostal Assemblies), Holiness-Pentecostals (Church of God (Cleveland), Church of God of Prophecy), and Marginals (Mormons, Unification Church).

Somewhat less hierarchical is the presbyterian structure. Power resides in a regional governing body known as the presbytery, which consists of a pastor and an elder from each congregation, as well as other church leaders. The presbytery ordains, installs, and removes pastors; establishes and dissolves congregations; and owns church property. Above the presbytery is a general assembly, which resolves disputes at the presbytery level and settles

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issues of religious doctrine. Denominational families with a presbyterian structure include mainline Protestants (Presbyterian Church, Reformed Church), Seventh Day Adventists, the Holiness Movement (Christian and Missionary Alliance, Church of the Nazarene, Wesleyan Church), and Pentecostals (Pentecostal Holiness Church).

We characterize the degree of centralization within a denomination along three dimensions: (i) how many levels of the global organization have authority over the congregation on matters of religious doctrine, (ii) whether pastors are appointed by an entity other than the congregation, and (iii) whether the congregation owns church property. We have also collected other information on denominational structure, as listed in Appendix B, including whether pastors need an educational degree to be ordained, whether women can be ordained as pastors, and whether the denomination operations hospitals, colleges, or schools.

It should be clear that there is not an isomorphic relationship between strictness of religious doctrine and the degree of centralization. Some strict denominations have a decentralized structure (United Pentecostal Church) and some have a centralized structure (International church of the Foursquare Gospel). Similarly, some more liberal denominations are decentralized (Quakers), while others are more centralized (Presbyterians). The governance structure of a denomination thus does not follow directly from its religious doctrine. Instead, it appears to be an outcome of the denomination's historical origins (Melton, 1989).

Out of tyhe 140 denominational families in the World Christian Database that we have identified, we have so far coded religious doctrine and organizational structure for 75. We use the data for these 75 denomination families in the rest of our paper.

2.4 Global Expansion by Denominations

Denominations typically create and maintain a presence in a country through supporting

missionaries, organizing a crusade (mass revival meetings), or some other form of global ministry (Brouwer, Gifford, and Rose, 1996). Once it has established itself in a national market, it may grow either by attracting additional members to existing congregations or by adding congregations. Figure 1 shows a plot of the log number of affiliated Christians against the log number of congregations, where each data point represents the worldwide total for a denomination. The strongly linear relationship between affiliated Christians and congregations suggests that global expansion by a denomination occurs more on the extensive margin (adding congregations) than on the intensive margin (adding members to existing congregations). For the later theoretical analysis, it appears that creating and managing congregations is important for determining the overall size of a denomination. If a denomination wishes to expand in a country, it will have to attract additional pastors to run new congregations.

To examine the intensive and extensive margins more formally, we follow Eaton, Kortum and Kramarz (2004) and use the identity, , $N_{dc} \times (M_{dc}/N_{dc}) \equiv M_c \times (M_{dc}/M_c)$, where N_{dc} is the number of congregations for denomination d in country c, M_{dc} is the number of affiliated Christians for denomination d in country c, and M_c is the total number of Christians in country c. We then estimate the following two regressions (with robust t statistics in parentheses):

$$ln\ N_{dc} \quad = \quad 0.851 \quad ln\ M_c \quad + \quad 0.798 \quad ln\ M_{dc}/M_c$$
$$\quad \quad \quad (0.005) \quad \quad \quad \quad (0.006)$$

$$ln\ M_{dc}/N_{dc} \quad = \quad 0.149 \quad ln\ M_c \quad + \quad 0.202 \quad ln\ M_{dc}/M_c$$
$$\quad \quad \quad (0.005) \quad \quad \quad \quad (0.006)$$

where the sample includes Protestant, Independent, and Marginal denominations in sample countries, for which we have 4,077 observations. By the logic of least squares, across the two regressions the constant and error terms sum to zero and the coefficients on each variable sum to one. The magnitude of the coefficients indicates how aggregate variation in market size affects

the number of congregations (the extensive margin) and affiliated Christians per congregation (the intensive margin). In response to a 10% increase in total market size in a country (M_c), the number of congregations increases by 8.5% and members per congregation by 1.5%; similarly, in response to a 10% increase in market share for a denomination in a country (M_{dc} /M_c), the number of congregations increases by 8.0% and members per congregation by 2.0%. This is further evidence most adjustment in the size of denominations occurs at the extensive margin, though adding congregations. Results are similar when we examine Protestant, Independent, and Marginal blocs separately. Because adding congregations is the primary means through which denominations expand in a market, attracting pastors is one of their fundamental tasks.

3. Theory

3.1. Model Set-up

In this section, we present a model of denomination size in which denominations compete for members in many national markets. Each country, *k*, consists of many regional markets, indexed by *m*, that vary in size. To be present in a market, a denomination must establish a congregation. The denomination headquarters (the principal) provides intellectual property (doctrine) and management services to the congregation and its pastor. The pastor (the agent) manages the activities of the congregation. Members of the congregation are both consumers and workers; they enjoy the services provided by the church and contribute money and time to support the production of religious services. In regional market *m*, a total number of O_k^m individuals choose among Christian denominations.

The project of congregation-building has a quality dimension and a price dimension. On the quality dimension, the denomination and the pastor must connect with members of the congregation (e.g. relating doctrine to the specifics of their personal lives).

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We follow Aghion and Tirole (1997) and assume that potentially, there can be many ways of making the connection. Among them, one and only one works for a given market m; across local markets, the right way of making the connection may vary. On the price dimension, the denomination and the pastor must set a price, $p_{jk}{}^m$, for congregational members, where j indexes denominations. When price is high, participation requires more resources from congregational members (e.g., in the form of volunteer work or donations). As quality and price vary there can potentially be an infinite number of ways to build the congregation. Regardless of quality or price, each congregation requires a fixed cost of f_{ck}. The denomination also incurs a fixed cost f_k to enter country k (which captures mission work XXXX).

We adopt a discrete choice framework and specify that the utility that person *i* in country *k* derives from participating in Christian denomination *j* in local market *m*, $u_{ijk}{}^m$, is

$$u_{ijk}^m = I(.) + V_{jk}^m(., p_{jk}^m) + \varepsilon_{ijk}^m, \tag{1}$$

where I(.) is an indicator variable that equals 1 if denomination j and its pastor succeed in connecting with congregation members, and 0 otherwise. In other words, the success of making the connection increases the utility by one unit for every member of the congregation. $\varepsilon_{ijk}{}^m$ is an iid extreme value error term. $\varepsilon_{ijk}{}^m$ is observable to person i and only to person i. $V_{jk}{}^m(.)$ represents the other sources of utility from church services and we motivate $V_{jk}{}^m(.)$ using the club-good model of Iannaccone (1992), where each congregation is a club and members take congregation membership as given. Each member consumes a secular good, S, whose shadow price is $\pi_{Sjk}{}^m$, and church participation R, whose price is $p_{jk}{}^m$. Members also enjoy each others' company and their utility increases with average participation, $\overline{R}$, within the congregation. Congregation members maximize the club-good utility of $u_c(S, R, \overline{R})$ subject to the budget constraint $\pi_{Sjk}{}^m S + p_{jk}{}^m R \leq 1$, where we have normalized members' income to 1, and play the non-cooperative game

where each individual takes the others' participation as given. $V_{jk}{}^m(.)$ is the members' indirect utility at the Nash equilibrium.

It is easy to show that $\partial V_{jk}{}^m/\partial p_{jk}{}^m < 0$. An increase in participation price decreases individual participation, R, for all members and so decreases average participation, $\bar{R}$; both effects tend to reduce utility. By Iannaccone (1992), $\partial V_{jk}{}^m/\partial \pi_{Sjk}{}^m > 0$. The intuition is that an increase in the price of the secular good reduces its consumption but raises church participation (when the secular good and church participation are substitutes) and so raises average participation. The gains from higher participation can more than offset the loss in real income. We show in the Appendix that in addition, $\partial^2 V_{jk}{}^m/\partial (\pi_{Sjk}{}^m)^2 > 0$.[17]

We hypothesize that in country k for denomination j, $\pi_{Sjk}{}^m = \pi_{Sk} + \pi_{Sj}$ for all markets m. The term π_{Sk} depends on state spending; it is high for the population of country k if public spending per capita is low in country k. The term π_{Sj} depends on church doctrine; it is high for the adherents of denomination j if denomination j is strict. Suppose public spending per capita in country k is low. Then π_{Sk} increases. Then indirect utility increases for all denominations in country k, strict or not (since $\partial V/\partial \pi_S > 0$). This is consistent with the findings that church-provided services compete with government-run welfare programs (Hungerman, 2005; Gruber and Hungerman 2007). In addition, the increase in indirect utility is higher for strict denominations, for which π_{Sj} is higher, since $\partial^2 V/\partial(\pi_S)^2 > 0$. In other words, strict denominations face relatively high demand if the provision of public goods by the government is weak. To imbed this club-good model into our discrete-choice framework we assume that

$$V_{jk}{}^m = M_{jk} - \beta p_{jk}{}^m, \quad M_{jk} = \alpha_j + \rho y_j + \delta y_j(1 - z_k) - \beta t_{jk} \tag{2}$$

In equation (2), $\beta > 0$ measures the elasticity of demand for church participation; a high β

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[17] See Iannaccone (1992) for the conditions under which $\partial V/\partial \pi_S > 0$ holds, and our Appendix for the conditions under which $\partial^2 V/\partial(\pi_S)^2 > 0$ hold. We assume that both sets of conditions are satisfied.

indicates demand is elastic. α_j represents the general quality of denomination j's credence goods (i.e., its religious doctrine), y_j captures the strictness of denomination j's doctrine (y_j is high if doctrine is strict), z_k captures the provision of public good by the government in country k (z_k is high if provision is strong), and ρ and δ are positive constants. t_{jk} represents trade costs.

For the denomination and the local pastor, there is no uncertainty involved in setting the price p_{jk}^m. However, neither the denomination nor the pastor knows the right way to connect with congregation members prior to building the congregation. We assume that the denomination is exogenously endowed with hard information about connecting with members in country k, which may come from past experiences in the home country (the country in which the denomination is headquartered), missionary work embedded in the fixed entry cost f_k, or other sources. In every local market m in country k, the denomination can use its hard information itself, or costlessly transmit it to the local pastor; either way, the hard information brings probability E_{jk} of successfully choosing the right preaching style. We assume that E_{jk} is invariant across local markets m. On the other hand, the pastor in a given market m can gather soft information about connecting with members. The soft information is only useful in market m, and it cannot be transmitted to the other pastors of denomination j or to the denomination itself. In order to have probability e_{jk}^m of success, the pastor must incur effort cost,

$$c(e_{jk}{}^m) = \frac{h}{2}(e_{jk}^m)^2,\qquad(3)$$

to gather soft information *per* member of the congregation,[18] where $h > 0$ measures the cost of pastor effort. (Results are similar if $c(.)$ is convex and $c(0)=0$.)

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[18] We have effort cost as increasing in congregation membership because we have already assumed that the benefit of effort increases in membership (recall that the success of making the connection increases utility for every congregation member). Suppose, instead, that effort cost does not depend on membership. Then average effort cost decreases with membership and we have increasing returns. This additional effect adds no insight to our model.

The pastor values both the number of congregation members, with weight γ, and the monetary income from serving the congregation. Likewise, a denomination values the number of believers it attracts, with weight θ, as well as the monetary income associated with the enterprise in a given country. We treat these weights as common across denominations and countries. There is also a variable cost g_k for serving each member of the congregation.

Timing is as follows. (i) The denomination decides whether or not to enter country k and market m. (ii) Price and effort levels, p_{jk}^m and e_{jk}^m, are chosen, and they determine congregation membership. Neither price nor effort can be changed after stage (ii) (e.g., pastor effort includes investing in relationships with church members, and the price is pre-announced to prospective members). (iii) The denomination and pastor then bargain over the monetary surplus they produce in market m. Bargaining results from incomplete contracts, as no contract can be written at stage (ii) to govern trade at stage (iii). For now, we assume that both parties' outside options are 0 and each gets half the surplus. (Results are unchanged if we relate outside options to which party owns church property.)

3.2 Authority and Pastor Incentives

We classify the organizational structure of a denomination as decentralized (D) or centralized (C), which is chosen by the denomination at an earlier time and taken as given. To facilitate comparison between the C and D structures, we assume $\theta = \gamma$ (i.e., the pastor and the denomination place equal value on attracting members).

Under the D structure, the local pastor has formal authority in choosing a way to connect with congregation members. The pastor uses his soft information if he is informed; if not, the pastor uses the hard information that the denomination transmits to him (in which case the

denomination has real authority). This implies the success probability of $e_{jk}^m + (1 - e_{jk}^m)E_{jk}$. We assume that the consumers are risk neutral. For person i in market m, the expected utility from denomination j is

$$U_{ijk}^m = E_{jk} + \alpha_{jk} e_{jk}^m + V_{jk}^m + \varepsilon_{ijk}^m, \alpha_{jk} = 1 - E_{jk}, \qquad (4)$$

where $V_{jk}^m(.)$ is given by equation (2). $\alpha_{jk} > 0$ captures the marginal impact of pastor effort on demand. Intuitively, α_{jk} is higher when the denomination has limited hard information and the pastor's soft information is important in connecting with congregation members. Following Anderson, de Palma and Thisse (1992) and Feenstra (2004), the total number of individuals who participate in denomination *j* is

$$X_{jk}^m = \mu_{jk}^m O_k^m, \mu_{jk}^m = \frac{\exp[\alpha_{jk} e_{jk}^m + V_{jk}^m + E_{jk}]}{P_k^m}$$

$$P_k^m = \sum_j \exp[\alpha_{jk} e_{jk}^m + V_{jk}^m + E_{jk}], \alpha_{jk} = 1 - E_{jk}. \qquad (5)$$

where μ_{jk}^m is the market share of denomination *j* in regional market *m* and P_k^m measures the competitiveness of local market *m*. (While we focus on Christian denominations, other religious groups are implicitly captured in the term P_k^m, which we control for in the estimation using country fixed effects.)

Under the D structure, the local pastor also has formal authority in setting price.[19] Since the joint monetary surplus from the congregation is $X_{jk}^m(p_{jk}^m - g_k)$, the pastor receives utility $X_{jk}^m\gamma + 0.5X_{jk}^m(p_{jk}^m - g_k) - f_{ck} - X_{jk}^m c(e_{jk}^m)$ from building the congregation.[20] The first order conditions for effort and price are,

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[19] There is no uncertainty about price and so there is no distinction between formal and real authority over price.
[20] In our setting the allocation of formal authority has no impact on bargaining power. To relax this assumption, suppose formal authority increases bargaining power. Then under the D structure the pastor has even stronger incentives since he gets more than half the surplus. This strengthens our results. In other words, our results hold up as long as formal authority does not decrease bargaining power too much.

$$c'(e_k^D) = he_k^D = \alpha_{jk}[\gamma + \frac{1}{2}(p_k^D - g_k) - c(e_k^D)] \quad (6)$$

$$p_k^D = \frac{1}{\beta} + g_k + 2[c(e_k^D) - \gamma], \quad (7)$$

Due to the logit demand equation (5), indirect utility, $V_{jk}{}^m$, quality of hard information, E_{jk}, and market competitiveness, $P_k{}^m$, do not affect price or effort, though they do affect the number of adherents (we therefore drop denomination subscript j and regional superscript m on price and effort). Equation (6) says that a higher price provides the pastor with stronger incentives to exert effort. Likewise, the pastor has strong incentives when his effort has large impact on demand (α_{jk} is high) or when effort cost, h, is low. Equation (7) says that an incremental increase in effort cost, $c(e)$, leads to a more than one-for-one increase in price. This is due to the hold-up problem under incomplete contracts. Since the pastor captures only half of the monetary surplus, he is not fully compensated for his effort. To alleviate the hold-up problem, he over-compensates his effort in pricing. In (7), the pastor does not internalize the non-monetary benefit to the denomination from attracting believers, θ. The other terms in (7) say that price is high if variable cost, g, is high, or demand is inelastic (β is low). From (6) and (7),

$$e_k^D = \frac{\alpha_{jk}}{2\beta h}. \quad (8)$$

Equation (8) says that pastor effort is high when effort has a large marginal contribution to demand (α_{0k} is high) or when effort cost, h, is low.

Under the C structure, the denomination has both formal and real authority in choosing how to connect with congregation members if it is informed; if not, the denomination optimally gives the pastor real authority in doing so. This implies the success probability of $E_{jk} + (1 - E_{jk})e_{jk}{}^m$, which is the same as under the D structure. The intuition is that there is no disagreement

between the denomination and the pastor about how to connect with members since there is only one right way to make the connection. As a result, equations (4) and (5) also hold under the C structure. On the other hand, under the C structure, price-setting authority rests with the denomination, which receives the payoff $\theta X_{jk}{}^m + X_{jk}{}^m(p_{jk}{}^m - g_k)/2 - f_{ck}$ in local market m,[21] and chooses the price

$$p_k^C = \frac{1}{\beta} + g_k - 2\theta.$$ (9)

Equation (9) says that the denomination does not internalize the non-monetary benefit to the pastor from attracting believers, γ. In addition, (7) and (9) imply that price is lower under the C structure than under the D structure: $p_k^C < p_k^D$. This is because the cost of pastor effort does not enter into the denomination's utility, leading the denomination to ignore the effort cost in pricing. The first order condition for pastor effort is still equation (6), except that price is p_k^C. Plugging (9) into (6) we obtain

$$he_k^C = \frac{\alpha_{jk}}{2\beta} - \frac{\alpha_{jk}h}{2}(e_k^C)^2, \text{ and } e_k^C = \sqrt{\frac{1}{\alpha_{jk}^2} + \frac{1}{\beta h}} - 1.$$ (10)

Equation (10) says that the effort level is lower under the C structure than the D structure: $e_k^C < e_k^D$. Under the C structure, price-setting authority rests with the denomination, which ignores the effort cost in its pricing decision. For the pastor, lack of authority under the C structure aggravates the hold-up problem, creating weak incentives to invest in effort.

To summarize, the denomination and the pastor have perfect congruence over how to connect with congregation members, which is the quality dimension of congregation-building. However, they disagree about pricing; the denomination prefers p_k^C (as defined equation (9)) but

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[21] We choose to have the denomination bear the church fixed cost, f_{ck}, in order to simplify the expressions for the entry threshold and the number of churches and believers. Who bears f_{ck} has no effect on the first order conditions.

the pastor prefers p_k^D (as defined equation (7)). Relative to the C structure, the D structure provides stronger incentives to the pastor by allocating formal authority to him; this results in high effort level but also high price. We now examine this trade-off between price and effort level more closely.

3.3 Main Results

To compare the numbers of believers and congregations in country k between the C and D structures we aggregate across religious markets m within country k for a given denomination. We first derive results under the D structure; results for the C structure are analogous. Under the D structure, the denomination is active in markets where pastor utility is non-negative. Plugging (7) and (8) into pastor utility, the denomination enters local market m if and only if

$$X_{jk}^D B \geq f_{ck}, B = \frac{1}{2\beta} - \gamma \tag{11}$$

where X_{jk}^D is given by (5) with price and effort level equal to p_k^D and e_k^D. Intuitively, the denomination enters larger markets and markets with lower entry and variable trade costs. We rewrite the population in local market m as $O_k^m = O_k s_m$, where s_m is the size of local market m, with cdf $G_k(.)$ and pdf $g_k(.)$, and O_k is a shifter reflecting the total population of country k. It follows that $X_{jk}^D = \mu_{jk}^D O_k s_m$, where μ_{jk}^D is given by (5) with price p_k^D and effort e_k^D. We assume that μ_{jk}^D, the market share of denomination j, is invariant across markets in k where i is present. Equation (11) gives the threshold market size for entry:

$$\underline{s}_k^D = \frac{f_{ck}}{BO_k \mu_{jk}^D}, B = \frac{1}{2\beta} - \gamma, \tag{12}$$

Equation (12) says that the denomination enters more markets the lower the fixed cost, the larger country k, or the higher the denomination's market share. The denomination, then, has $n_{jk}^D =$

$\int_{S_k^D}^{\infty} g(s_k^m) ds_k^m = 1 - G_k(s_k^D)$ congregations and $X_{jk}^D = \mu_{jk}^D O_k \int_{S_k^D}^{\infty} s_k^m g(s_k^m) ds_k^m$ adherents in country k.

Following the urban economics literature, we assume that the distribution $G_k(.)$ is Pareto with lower bound b and shape parameter a; i.e., $G_k(s) = 1 - (b/s)^a$. We can show that[22]

$$\ln \mu_{jk}^D = \alpha_{jk} e_k^D - \beta p_k^D + a(\ln O_k - \ln P_k) + M_{jk} - \ln P_k,$$

$$\ln n_{jk}^D = a \ln \frac{Bb}{f_{ck}} + a \ln O_k + a \ln \mu_{jk}^D$$

$$\ln X_{jk}^D = \ln \frac{ab^a}{(a-1)(f_{ck})^{a-1}} + (a-1)\ln B + a \ln O_k + a \ln \mu_{jk}^D, \quad B = \frac{1}{2\beta} - \gamma \qquad (13)$$

where M_{jk} is given by equation (2). Equation (13) implies that the intensive margin, $\dfrac{X_{jk}^D}{n_{jk}^D}$, does

not depend on the market size or market share ($\dfrac{X_{jk}^D}{n_{jk}^D} = \dfrac{f_{ck} a}{B(a-1)}$) and that all the adjustment of

X_{jk}^D is through the extensive margin, n_{jk}^D, consistent with the empirical findings in section 2. Such predictions are typical of models with firm heterogeneity (Melitz, 2003). To determine the condition under which the denomination enters country k, note the denomination derives variable

profits $0.5X_{jk}^m(p_{jk}^m - g_k)$ from local market m and total variable profit $\int_{S_k^D}^{\infty} \frac{1}{2}(p_k^D - g_k) X_{jk}^m dG(s_k^m) =$

$\frac{1}{2}(p_k^D - g_k)X_{jk}^D$ from country k. Using the expression for X_{jk}^D in (14), we show that

denomination j enters country k if

$$\ln[\frac{1}{2}(p_k^D - g_k)] + \ln \frac{ab^a}{(a-1)(f_{ck})^{a-1}} + (a-1)\ln B + a \ln O_k + a \ln \mu_{jk}^D \geq \ln f_k. \qquad (14)$$

Under the C structure, we can derive the entry threshold, market share, and total number of congregations and adherents analogously:

$$s_k^C = \frac{f_{ck}}{BO_k\mu_{jk}^C}, B = \frac{1}{2\beta} - \theta,$$

$$\ln \mu_{jk}^C = \alpha_{jk}e_k^C - \beta p_k^C + a(\ln O_k - \ln P_k) + M_{jk} - \ln P_k,$$

$$\ln n_{jk}^C = a\ln\frac{Bb}{f_{ck}} + a\ln O_k + a\ln \mu_{jk}^C$$

$$\ln X_{jk}^C = \ln\frac{ab^a}{(a-1)(f_{ck})^{a-1}} + (a-1)\ln B + a\ln O_k + a\ln \mu_{jk}^C \tag{15}$$

Under the C structure, denomination j enters country k if

$$\ln[\frac{1}{2}(p_k^C - g_k) - \frac{B(a-1)}{ab^a}] + \ln\frac{ab^a}{(a-1)(f_{ck})^{a-1}} + (a-1)\ln B + a\ln O_k + a\ln \mu_{jk}^C \geq \ln f_k \tag{16}$$

To compare the market share and total numbers of congregation and believers under the

C and D structures, we use equations (13) and (15) to show that

$$\ln\frac{\mu_{jk}^D}{\mu_{jk}^C} = \alpha_{jk}(\frac{e_k^D}{2} - e_k^C) + (M_{jk}^D - M_{jk}^C)$$

$$\ln\frac{n_{jk}^D}{n_{jk}^C} = \ln\frac{X_{jk}^D}{X_{jk}^C} = a\ln\frac{\mu_{jk}^D}{\mu_{jk}^C}. \tag{17}$$

Therefore,

<u>Proposition 1.</u> The decentralized (D) structure has higher market share, more congregations and

more adherents than the centralized (C) structure if $M_{jk}^D > M_{jk}^C$ and $e_k^D > 2e_k^C$, where $e_k^D =$

$\frac{\alpha_{jk}}{2\beta h}$ and $e_k^C = \sqrt{\frac{1}{\alpha_{jk}^2} + \frac{1}{\beta h}} - 1$. $e_k^D > 2e_k^C$ is more likely if pastor effort has a larger marginal

contribution to demand (α_{0k} is high), effort is less costly (h is low), or demand is in-elastic (β is

low).

The intuition for Proposition 1 is that under the C structure, both price and effort are lower than

under the D structure. While low price tends to increase demand, low effort tends to decrease it.

The effect of effort dominates if the effort level is sufficiently high (the net effect is $\alpha_{jk}e - \beta p$).

Using equations (2), (13) and (15) we can also show that

$$\frac{\partial \ln X_{jk}^{O}}{\partial(1 - z_k)} = \frac{\partial \ln n_{jk}^{O}}{\partial(1 - z_k)} = a\frac{\partial \ln \mu_{jk}^{O}}{\partial(1 - z_k)} = \delta y_j > 0. \tag{18}$$

Therefore,

<u>Proposition 2</u> Weaker government provision of social services (lower z_k) raises the market share, number of adherents and congregations more for strict denominations (y_j high) than less strict ones.

3.4 Extensions

We can also extend our analysis to incorporate ownership of church property. We assume that ownership and authority rest with the same party; i.e., under the de-centralized (D) structure the local congregation owns the church, but under the centralized (C) structure the denomination owns the church (in practice, under a congregational polity, the congregation owns church buildings, while under episcopal or presbyterian polities, the denomination typically controls the disposition of church property). In our analysis, as in Grossman and Hart (1986), ownership affects the pastor's incentives by changing his outside option should bargaining fail. Under the D structure, the denomination's outside option remains *0*, but the pastor owns the church and should bargaining fail the pastor converts the church into an independent entity, in which case the denomination input no longer affects demand and the pastor collects the fraction ϕd_{jk}^{D} of the monetary surplus, where $d_{jk}^{D} = 1/exp(M_{jk}) < 1$ and $\phi < 1$. The denomination then gets the fraction $(1 - \phi d_{jk}^{D})/2$ of the monetary surplus in bargaining, while the pastor receives the fraction $(1 + \phi d_{jk}^{D})/2$. Under the C structure, the denomination owns the church. Should

bargaining fail, pastor effort no longer affects demand and the denomination collects $X_{0k}{}^{m}(p_{jk}{}^{m} -$
$g_k)$, where $X_{0k}{}^{m} = X_{jk}{}^{m}/exp(\alpha_{0k}e_{jk}{}^{m})$ and is independent of effort level e. The pastor, on the other
hand, has outside option 0. Let $d_k{}^{C} = 1/exp(\alpha_{0k}e_k{}^{C})$, where $e_k{}^{C}$ is the pastor's optimal effort level
under the C structure. The denomination then gets the fraction $(1 + \phi d_k{}^{C})/2$ of the monetary
surplus in bargaining and the pastor gets the fraction $(1 - \phi d_k{}^{C})/2$. In unreported results, we show
that Proposition 1 holds.

To summarize, our model generates the following three predictions, which we take to the
data: (1) <u>Entry and extensive margin</u>: An increase in membership in a country is associated with
an increase in the number of congregations (denominations grow by expanding the number of
congregations rather than by expanding adherents per congregation); (2) <u>Organization</u>: An
increase in the marginal value of pastor effort raises the numbers of adherents and congregations
more for a decentralized denomination than a centralized one (Proposition 1); and (3) <u>Doctrine</u>:
Weaker government provision of social services raises the number of adherents and
congregations more for strict denominations than less strict ones (Proposition 2).

4. Empirical Specifications

To take these predictions to the data we model trade costs as,

$$t_{jk} = \tau_k + d_{jk} + \eta_{jk}, \tag{19}$$

where τ captures variable trade costs common to all denominations in country k, d captures trade
costs in k specific to denomination j (e.g., distance to denomination headquarters), and η is an iid
random cost (which allows the ranking of denominations across countries to differ). We then use
equations (2), (13) and (15) to show that

$$\ln X_{jk}^{g} = f^{g}(\alpha_{0k}) + a[\alpha_j + \rho y_j + \delta y_j(1 - z_k) - \beta t_{jk} + \ln O_k - \ln P_k] + c_1,$$

$$\ln n_{jk}^{g} = f^{g}(\alpha_{0k}) + a[\alpha_{j} + \rho y_{j} + \delta y_{j}(1 - z_{k}) - \beta t_{jk} + \ln O_{k} - \ln P_{k}] + c_{2}, \tag{20}$$

where c_1 and c_2 are constants. In equation (20), superscript g represents the governance structure, $g = \{Decentralized, Centralized\}$. $X_{jk}{}^{g}$ and $n_{jk}{}^{g}$ are, respectively, the numbers of adherents and congregations denomination j has in country k, α_{0k} is the marginal value of pastor effort in country k, $f^{g}(.)$ is an increasing function, and c_1 and c_2 are constants. The prediction for organizational structure implies that $\partial f^{P}/\partial\alpha_{0k} > \partial f^{C}/\partial\alpha_{0k}$ (i.e., increases in the marginal product of pastor effort have a larger positive impact on decentralized denominations than on centralized ones). We approximate $f^{g}(.)$ by $\eta_0 SOFT_{jk} + \eta_1 SOFT_{jk}DEC_j$, where $SOFT_{jk}$ measures the importance of soft information in country k for denomination j and DEC_j measures the decentralization of denomination j. The theoretical prediction is that $\eta_1 > 0$. Similar to Mian's (2006) analysis of expansion by multinational banks, we assume that the contribution of pastor effort is greater in environments where the denomination headquarters faces higher costs in acquiring information about local market conditions. The interaction term $\delta(1 - z_k)y_j$ captures how denominations with stricter religious doctrines are more exposed to competition from the government provision of social services, which we implement by the term $\eta_2 PUB_k STRC_j$, where PUB_k measures the provision of public goods by the government of country k and $STRC_j$ measures the strictness of doctrine for denomination j. The theoretical prediction is that $\eta_2 < 0$. Equation (17) implies the following pair of regressions

$$lnX_{jk} = b_0 + \eta_0 SOFT_{jk} + \eta_1 SOFT_{jk}DEC_j + \eta_2 PUB_k STRC_j + \lambda_1 Y_{jk} + \lambda_2 Z_j + \lambda_3 Z_k + u_{jk}$$

$$lnn_{jk} = b_0 + \eta_0 SOFT_{jk} + \eta_1 SOFT_{jk}DEC_j + \eta_2 PUB_k STRC_j + \lambda_1 Y_{jk} + \lambda_2 Z_j + \lambda_3 Z_k + v_{jk} \tag{21}$$

We estimate regression (21) using data for 2005. The dependent variables, X_{jk} and n_{jk}, are the numbers of believers and congregations denomination j has in country k for 2005, where u_{jk} and v_{jk} are error terms capturing unobserved trade costs (assumed uncorrelated with the regressors).

From (17), $\mathbf{Y}_{jk}$ includes trade costs for denomination j in country k, $\mathbf{Z}_j$ includes denomination credence goods (α_j) and doctrinal strictness (y_j), and $\mathbf{Z}_k$ includes country market size (O_k) and competitiveness (P_k).

In preliminary empirical analysis, we implement regression (21) by adopting two measures for $SOFT_{jk}$, the geographic distance between country k and the headquarter country of denomination j ($SOFT_{jk}$ is high if distance is large) and the quality of communications infrastructure (e.g. numbers of phone lines, mobile phone subscribers and computers per capita) in country k ($SOFT_{jk}$ is high if communications infrastructure is poor). We measure PUB_k using indicators of government provision of public goods related to health, education, and social welfare. In future work, we will expand the measures of the marginal product of pastor effort and government social services. The measures for decentralization, DEC_j, and strictness, $STRC_j$, are explained in section 2. We control for trade costs ($\mathbf{Y}_{jk}$) using standard gravity variables: the geographic distance between denomination headquarters and country k, linguistic similarity between the headquarters country and the country k, and colonial history between the headquarters country and country k. We control for denomination ($\mathbf{Z}_j$) and country ($\mathbf{Z}_k$) characteristics by including denomination and country fixed effects, though we also experiment with excluding fixed effects and including observable denomination and country characteristics, instead.

Regression (21) can be estimated only if a given denomination is present in a country. Denominations are present in only about 20% of the denomination-country observations in the data. Only the US and UK have more than 100 denominational families represented. Outside of these countries, India has the most, with 60, South Africa is second with 58, and the Philippines are third with 53. Small countries have as few as two denominations present. The fact that many

denominations are not present in many countries creates concerns about selection bias in estimating (18) using OLS. Entry in a country by a denomination is not random, as denominations are more likely to be present in countries in which they can attract a larger number of adherents, as indicated by equation (9). We address the issue in two ways. One is by using a standard Heckman (1979) correction procedure, in which we specify an equation for whether a denomination is present in a country in 2005 as a function of the regressors in (18) plus an indicator variable for whether the denomination was present in the country in 1970. The identifying assumption is that denomination presence in a country in 1970 affects denomination membership in 2005 only through its impact on presence in 2005. A similar identification strategy underlies recent empirical work on the location decisions of multinational firms (e.g., Becker and Muendler, 2009). One unattractive feature of the Heckman correction is that it requires the assumption that regression errors are normally distributed. To relax this assumption, we will also correct for selection using a nonparametric approach, as suggested by Das, Newey, and Vella (2003) in future work.

5. Preliminary Results

In Tables 3 and 4, we present preliminary results for estimating (21). In these results, we adopt a Heckman correction procedure to address sample selection (the selectivity hazard, which is not shown, enters negatively and very significantly in all regressions). All regressions include controls for denomination and region fixed effects. We focus on the core theoretical predictions; to conserve space, we suppress results for other variables and the first stage Probit results predicting which denominations are present in which countries. In Table 3, we find a positive coefficient on the interaction between a denomination having a congregational polity and country distance to denomination headquarters. This means that, all else constant, decentralized

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denominations have more congregations and more adherents in countries that are farther away from the denomination headquarters, where presumably pastor effort to obtain information about local market conditions is relatively more important. This is preliminary evidence consistent with the prediction in Proposition 1 that increases in the marginal product of pastor effort have larger effects for more decentralized denominations.

Further evidence on the importance of denomination organization structure and the productivity of pastor effort is in Table 4, which shows regressions with log adherents as the dependent variable and the interaction between having a congregational polity and measures of country communications infrastructure as regressors (again, with other regressors suppressed). The idea is that in countries in which communications infrastructure is worse the denomination headquarters is more reliant on pastors to reach out to potential adherents. We see in Table 2b that the interaction is negative, indicating that more decentralized denominations attract more adherents in countries with worse communications infrastructure. We take this as additional preliminary evidence in favor of Proposition 1.

In unreported results, we find that stricter denominations do better in countries in which the government supplies less in the way of health and other social services, consistent with Iannaccone's (1992) framework that we will embed within our theoretical model. In future work, we will expand the data set to include all denominational families, collect additional indicators of the marginal productivity of pastor effort and government provision of public goods, and implement non-parametric corrections for sample selectivity. With the estimation results for equation (18) in hand, we will examine which factors have been most important in explaining the success of Christian denominations in expanding in non-Western countries, both for mainline denominations and newer forms of Christian worship.

6. Final Discussion

[To be written…]

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Table 1: Share of affiliated Christians in the world population

Megabloc	Share of population		Share of affiliated Christians	
	1970	2005	1970	2005
Roman Catholics	0.181	0.170	0.621	0.564
Orthodox	0.038	0.039	0.130	0.131
Anglicans	0.013	0.012	0.044	0.041
Subtotal	0.232	0.221	0.795	0.736
Protestants	0.057	0.058	0.197	0.191
Independents	0.025	0.061	0.086	0.201
Marginals	0.003	0.005	0.010	0.016
Subtotal	0.085	0.124	0.293	0.408
Doubly affiliated Christians	(0.009)	(0.022)	(0.030)	(0.072)
Disaffiliated Christians	(0.017)	(0.022)	(0.058)	(0.073)
Total	0.291	0.301	1.00	1.00

Table 2: Affiliated Christians by megabloc and region

		Share of population	
Region	Megabloc	1970	2005
North America	Protestants, Independents, Marginals	0.459	0.434
	Catholics, Orthodox, Anglicans	0.301	0.281
Western Europe	Protestants, Independents, Marginals	0.224	0.173
	Catholics, Orthodox, Anglicans	0.673	0.617
Eastern Europe, FSU	Protestants, Independents, Marginals	0.048	0.061
	Catholics, Orthodox, Anglicans	0.471	0.631
Asia, Pacific	Protestants, Independents, Marginals	0.022	0.067
	Catholics, Orthodox, Anglicans	0.031	0.038
Latin America, Caribbean	Protestants, Independents, Marginals	0.080	0.184
	Catholics, Orthodox, Anglicans	0.885	0.831
Sub-Saharan Africa	Protestants, Independents, Marginals	0.178	0.300
	Catholics, Orthodox, Anglicans	0.239	0.308
Middle East, North Africa	Protestants, Independents, Marginals	0.004	0.010
	Catholics, Orthodox, Anglicans	0.055	0.050

Table 3: Preliminary regression results for organizational structure

Dependent variable	log congregations	log adherents
Congregational polity * log distance to HQ	0.173**	0.225**
	(0.080)	(0.096)
Cluster SEs by country	Yes	Yes
Denomination, region fixed effects	Yes	Yes
Observations	5989	5989

Standard errors in parentheses. ** indicates significance at 5% level.

Table 4: Preliminary regression results for organizational structure

	Phone lines	Mobile and fixed line subscribers	Computers
Congregational polity * log	-0.165*	-0.198**	-0.253**
communications infrastruct. per capita	(0.083)	(0.087)	(0.094)
Cluster SEs by country	Yes	Yes	Yes
Denomination, region fixed effects	Yes	Yes	Yes
Observations	5989	5989	5877

Standard errors in parentheses. * (**) indicates significance at 10% (5%) level.

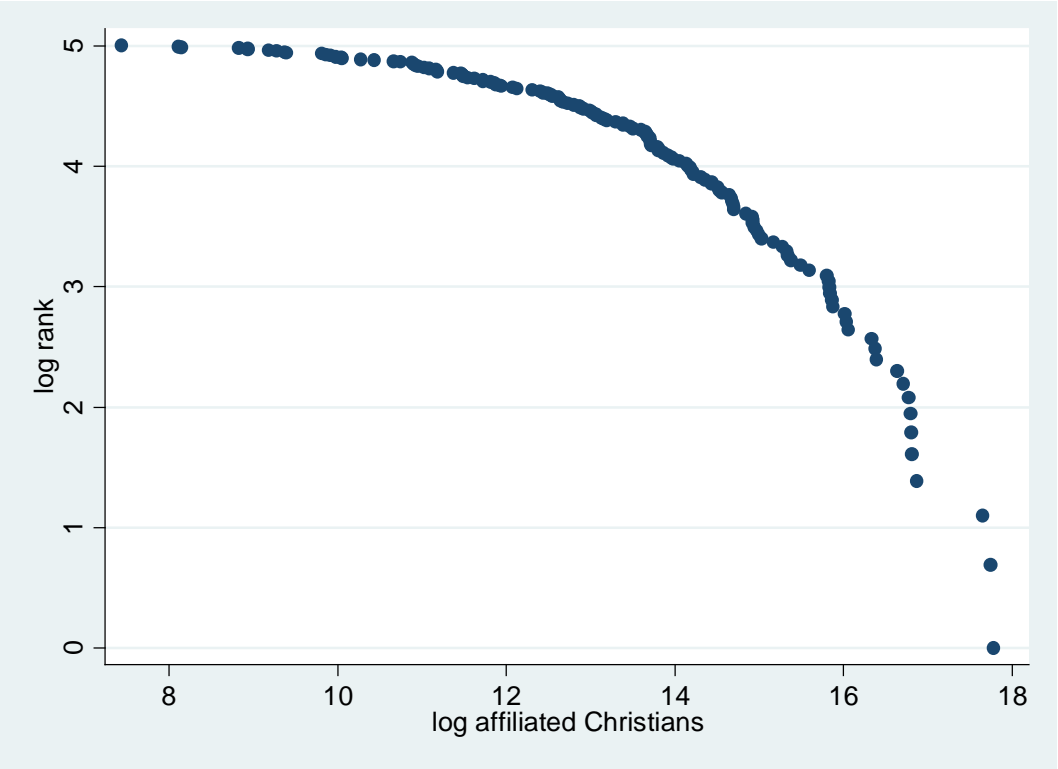**Figure 1: Rank-Size relationship for denominations**

Figure 2: Global number of members and congregations by denomination