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ABSTRACT

Religious Pluralism and the Transmission of Religious Values through Education*

We analyze the role of formal religious education in the intergenerational transmission of religious values. We first develop a model of school choice in which the demand for religious schooling is driven partly by the desire of parents to limit their children's exposure to the influences of competing religions. The model predicts that when a religious group's share of the local population grows, the fraction of that group's members whose children attend religious schools declines. In addition, it shows that if the motivation to preserve religious identity is sufficiently strong, the fraction of all children that attend a given denomination's school is an inverse u-shaped function of the denomination's market share. Finally, the model implies that the overall demand for religious schooling is an increasing function of both the local religiosity rate and the level of religious pluralism, as measured by a Herfindahl Index. Using both U.S. county-level data and individual data from ECLS-K and NELS:88, we find evidence strongly consistent with all of the model's predictions. Our findings also illustrate that failing to control for the local religiosity rate, as is common in previous studies, may lead a researcher to erroneously conclude that religious pluralism has a negative effect on participation.

JEL Classification: I21, Z12

Keywords: cultural transmission, school choice, religious pluralism, religious identity

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1. Introduction

Religion plays a central role in shaping human behavior. As a growing literature in the economics of religion shows, religious beliefs and participation influence a number of economic and demographic outcomes, including employment, marriage, and fertility (Lehrer (2008)). These findings underscore the importance of understanding how religion is transmitted across generations and how individuals choose optimal levels of religious activity.

According to rational choice theories of religious behavior, parents derive utility from passing their religious beliefs on to their children. The more intensive a parent's religious activity, the more she exposes her children to religious practice, thereby investing in the children's "religious capital". Because most religious capital is group-specific, adults typically adopt the religious values of the denomination to which they were exposed in their childhood (Iannaccone (1990)). However, religious socialization does not take place only inside the family. Building on a long sociological and anthropological literature, including Boyd and Richerson (1985) and Cavalli-Sforza and Feldman (1981), Bisin and Verdier (2000) modeled cultural transmission as the outcome of socialization efforts inside the family (known as "vertical socialization") and other socialization processes that operate through learning from peers and role models ("horizontal socialization").

As Bisin and Verdier (2000) argue, the long-run dynamics of the distribution of religious beliefs depend crucially on whether vertical and horizontal socialization efforts are substitutes or complements. If they are complements, so that parents have more incentive to socialize their children as their religion's market share in the local population grows, the steady state is characterized by assimilation and a religiously homogenous population. If they are instead substitutes, religious pluralism exists indefinitely, with minorities never completely assimilating.

In order to assess whether horizontal and vertical socialization are complements or substitutes, several studies have estimated the association between a religious denomination's market share and religious activity within that denomination. For example, Bisin and Verdier (2000) and Bisin et al. (2004) present evidence that, compared to cultural majorities, minority groups exercise greater efforts to prevent their children from "marrying out" of the group. Abramitzky et al. (2010) find that American Jews are more likely to celebrate Hanukkah if they live in areas with relatively low Jewish market shares, suggesting that the celebration of religious holidays is partly motivated by the desire to counteract the influence of outside religions. Similarly, Iannaccone (1991) shows that, across seventeen western countries, Protestants' religious commitment is negatively related to Protestant market shares. Not all studies support the notion that vertical and horizontal transmission efforts are substitutes, however; for example, Phillips (1998) finds greater rates of Church activity among Mormons in areas with large Mormon market shares.[1]

In spite of the recent focus on horizontal and vertical socialization efforts, the interplay between religious schooling and other types of socialization has largely been ignored. This omission is surprising in light of numerous studies documenting the importance of religious schooling as a means of preserving culture; for example, McDonald (2001) writes that "the growth and development of American Catholic schools in the nineteenth and first half of the twentieth centuries was rooted in a clear sense of purpose and

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[1] More recently, Bar-El et al. (2013) study the transmission of religious norms on the religious tastes of children, finding that horizontal and vertical socialization are complements in producing religiosity of the next generation. A novel study by Patacchini and Zenou (2014) uses an approach based on the transmission of the strength of religious beliefs rather the transmission of religious denominations. Focusing on the interplay between family and peer effects, they find that parent and peer efforts are complements.

identity. Defense of the faith, enculturation, and escape from religious and ethnic prejudice were significant factors in the creation of these schools" (p. 211).[2]

In this paper, we develop a model of school choice that focuses on the role of schooling as a tool for religious socialization. We posit that parents enroll their children in religious schools partly because of the desire to preserve religious identity by shielding their children from the influences of competing religions.[3] An important implication of this desire is that a child's likelihood of attending a religious school declines as his denomination's share of the local population grows, i.e., as the strength of competing influences in public schools diminishes. Moreover, under a weak regularity condition on the distribution of income, if the motivation to preserve religious identity is sufficiently strong, the fraction of *all* children that attend a given denomination's school is an inverse *u*-shaped function of the market share of the denomination, reaching its maximum at an interior value of that market share.

To reveal plausible ranges of the importance of preserving religious identity for each religious denomination that we study – primitives that are not pinned down by our empirical work – we pursue a calibration-estimation exercise based on minimizing the distance between actual and predicted enrollment rates among all U.S. counties. The results of this exercise show that, on average, preserving religious identity is much less important for Mainline Protestants than for Catholics and Evangelical Protestants. As a result, while the model predicts that the fraction of all children that attend a given denomination's school is an

[2] The importance of education as a socialization tool for preserving religious identity is also evident from the numerous studies that claim that the emergence of Catholic schooling in the United States at the end of the nineteenth century occurred as a response to a public education system that promoted Protestant values (La Belle and Ward, 1994; Sander, 1977; Walch, 2000; Youniss and Convey, 2000). Similarly, Tyack (1974) documents the struggle between the Protestant majority and Catholic and Jewish immigrant groups on the place of religion in public schools. Moreover, these perceptions of the importance of education have at least some grounding in reality, as studies such as Pennings et al. (2011) have found that children who attend religious schools are significantly more likely to keep their religious affiliation into adolescence and young adulthood.

[3] As such, we extend previous studies of school choice that abstract from the religious motive in private education by modeling the demand for private schooling as motivated by differences in desired school quality (see Rangazas, 1995, and Epple and Romano, 1996, among others).

inverse *u*-shaped function of the market share of the denomination, for Mainlines the relationship is much weaker and nearly linear.

Our model also has implications for a separate but related literature on the relationship between religious pluralism and religious participation. Traditionally, sociologists (cf. Berger, 1969) have argued that an increase in religious pluralism decreases participation since it undermines the plausibility of belief, causing religion to lose its power as an absolute truth. On the other hand, "rational choice" theories of religious competition suggest that pluralism increases overall religious participation by fostering competition, which makes each religious group work harder to attract adherents (Finke and Stark, 1988, 1989, 2002). Under some weak regularity conditions, our model predicts that the fraction of children who attend any denomination of religious schooling is a positive function of religious pluralism and of the share of the population that are adherents of any denomination.

To test the predictions of our model we create two novel datasets that combine data on religious school enrollments with data on denominational market shares. We use both aggregate county-level data and individual survey data from the National Educational Longitudinal Study of 1988 (NELS:88) and the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K).

We have three main substantive findings, all of which are consistent with our model's predictions. First, the fraction of Catholics who attend Catholic schools is inversely related to the share of Catholics in the population. We find a similar pattern among Evangelical Protestants and among Mainline Protestants.

Second, we find that the fraction of *all* children that attend Catholic and Evangelical schools is an inverse *u*-shaped function of Catholic and Evangelical market shares, respectively. In contrast, the fraction of all children enrolled in Mainline schools is weakly monotonically increasing in the Mainline market share.

Finally, we find that religious pluralism increases religious school attendance, as predicted by the “rational choice” theory of religious competition. To the best of our knowledge, this represents the first estimate of the effects of pluralism on the demand for religious schooling, as well as the first use of a model of school choice to inform the appropriate specification for assessing the relationship between pluralism and religious activity more generally. The estimates also demonstrate that failing to control for the local religiosity rate, as is common in previous studies, may lead a researcher to erroneously conclude that religious pluralism has a negative effect on participation.

2. A Model of Religious and Secular School Choice

2.1 Market Shares and Religious Identity

Consider an economy with a fixed population of households of measure one, with each household comprising one parent and one child. Households differ in their income level, y, and in their religious denomination, j. The parent of each household belongs to one of n+1 groups indexed by $j \in \{0,\ldots, n\}$, such that $\sum_{j=0}^{n} r_j = 1$, where r_j is the fraction of the population that belongs to group j. Groups 1,…, n are organized religious groups – we will refer to them as denominations – and group 0 includes non-religious persons. For simplicity, we assume that each parent belongs to only one denomination.[4] We allow the distribution of income to differ across denominations and denote the probability density function of household income of group j by $f_j(y)$, its cumulative density function by $F_j(y)$, its mean by $\bar{y}_j$ and its median by y_j^m.

[4] Cohen-Zada (2006) uses a variant of this model in which there are only two groups, “religious” and “non-religious.” Because this model does not include multiple denominations, it does not have any implications regarding how different denominations respond differently to changes in their market share. In addition, it does not shed any light on the relationship between religious pluralism and overall religious activity or have any dynamic implications for the long-run distribution of religions, unlike the model presented here. Finally, it does not analyze under what conditions the relationship between q_j and r_j is inverse u-shaped and under what conditions (on the primitives) it is concave.

Households derive utility from a numeraire consumption good, *c*; from educational services, *x*; and from the probability that their children will remain in their denomination when becoming adults, *z*. The utility function of a household from group *j* is given by

$$(1) \qquad U(c,x,z) = \alpha c^{\delta} / \delta + (1-\alpha) x^{\delta} / \delta + \gamma_j z^{\beta} / \beta,$$

where $\delta < 1$, $\beta < 1$, and $\gamma_j \geq 0$. The value of γ_j, which reflects the importance that an individual from group *j* assigns to preserving the religious identity of its child, is fixed across households within the same group but potentially varies across groups.

Public education is available free of charge to all households at an exogenous uniform quality $\bar{x}$ fully funded by an exogenous proportional income tax, *t*, imposed on all households. Private schooling, both secular and religious, is available as an alternative to public schooling and can be purchased from a competitively-priced private sector at any desired quality.[5] We assume that there are *n*+2 types of schools indexed by *s*: types *s* = 0,…, *n* are private schools corresponding to the different groups in the population (so that *s* = 0 represents private non-sectarian schools and *s* = 1,…, *n* represent denominations of religious private schools), and type *s* = *g* represents public schools.

We model religious transmission as a mechanism that involves socialization at home, at school and in the society at large via imitation and learning from peers and role models. Following Bisin and Verdier (2000), we assume that children are first exposed to their family socialization efforts. Parents choose whether to vertically socialize their children only at home or to also enroll them in a religious private school of their denomination. If the direct

[5] This assumption neglects the fixed costs of education, which might limit quality choice in smaller communities. We also abstract from the possibility of privately supplementing public education.

vertical socialization efforts of the family are unsuccessful, a child is susceptible to the external influences of the population at large.[6]

When both the household and the school belong to the same denomination *j*, direct vertical socialization by parents succeeds with probability ω. However, if parents' socialization efforts do not succeed, which occurs with probability $1-\omega$, the child picks the denomination of a role model chosen randomly in the general population, implying that the child picks denomination *j* with a probability equal to the market share of denomination *j* in the population, r_j. Thus, the probability that a child from denomination *j* who attends a school of denomination *j* belongs to denomination *j* as an adult is

(2) $$\pi_{jj}\left(\omega, r_j\right) = \omega + (1-\omega) \times r_j .$$

If a child from denomination *j* does not attend a school of her own denomination, there is no coordination between the socialization efforts of the parents and the school, so direct socialization succeeds with a lower probability, $\omega - \varphi_{js}$, where $0 < \varphi_{js} < \omega \ \ \forall \ \ s \neq j$. In this case, the child picks the denomination of a role model in the general population with a higher probability, $1-\omega+\varphi_{js}$. The size of φ_{js} depends positively on the metaphorical "distance" between the denomination of the household and that of the school. Thus, the probability that a child from denomination *j* who attends a school of type $s \neq j$ remains in denomination *j* as an adult is

(3) $$\pi_{js}\left(\omega, \varphi_{js}, r_j\right) = \left(\omega - \varphi_{js}\right) + (1-\omega+\varphi_{js}) \times r_j .$$

Comparing equations (2) and (3) yields

[6] As Bisin (2000) notes, an extensive literature has documented that religious traits are usually adopted in early childhood, with family and peers playing significant roles in determining which traits are adopted and to what extent (Cornwall, 1988; Erickson, 1992; Hayes and Pittelkow, 1993). In addition, a vast literature on religious choice shows that religion-specific capital formation plays a key role in determining adherence to a particular religious group (Iannaccone, 1984, 1991, 1998; Chiswick, 1990).

(4) $\pi_{jj}(\omega, r_j) - \pi_{js}(\omega, \varphi_{js}, r_j) = \varphi_{js} \times (1 - r_j) \geq 0 \quad \forall \; s \neq j$.

Because all types of private schooling are available at any desired quality by assumption, the fact that $\pi_{jj}(\omega, r_j) - \pi_{js}(\omega, \varphi_{js}, r_j) \geq 0$ implies that each household weakly prefers enrolling its child in a religious school of its denomination to a religious school of any other denomination. Thus, the relevant choice for a household of denomination *j* is between a free public school and a private religious school of its denomination. Compared to the former option, the latter increases the probability that the child remains in the parent's denomination by $\varphi_{jg} \times (1 - r_j)$, implying that parents have a weaker motivation to send their children to private religious schools as their religion's market share r_j increases. In the limiting case in which $r_j = 1$, parents have no religious motivation to enroll their children in a religious school, regardless of the strength of their preferences.

Expression (4) implies that the motivation to send a child to a religious school also depends on the magnitude of φ_{jg} , which reflects the difference between the values promoted by denomination *j* and those promoted in the public schools. For example, numerous studies claim that the emergence of Catholic schooling in the U.S. at the end of the nineteenth century occurred as a response to an anti-Catholic bias in a public education system that strongly promoted Protestant values (La Belle and Ward 1994, Sander 1977, Walch 2000). If the public school system still tends to promote Protestant values more than Catholic values, then the motivation of Catholics to send their children to religious schooling will be stronger, for a given r_j, than the analogous motivation for Protestants.

For a child from a secular family, direct vertical socialization by parents succeeds with the highest probability when they send their children to a secular (public or private) school. Even in this case, however, the probability of successful vertical socialization may be lower than the analogous case for a religious family, as religious schools typically exercise great efforts to preserve religious identity while secular schools do not. Thus, we model the probability of successful vertical socialization for secular families as $\left(\omega-\phi_0\right)$ (compared to ω for religious families), where $0 \leq \varphi_0 \leq \omega$. As a result, the probability that a child remains secular when she attends a secular school is $\left(\omega-\phi_0\right)+(1-\omega+\phi_0)\times r_0$. However, if the child attends a religious school of denomination *s*, the probability that she will remain secular is only $\left(\omega-\varphi_{0s}\right)+(1-\omega+\varphi_{0s})\times r_0$ where $\varphi_{0s} > \varphi_0 \quad \forall \; s \neq 0, g$. Given the assumption that all types of private schooling are available at any desired quality, the relevant choice for a secular household is only between public schooling and secular private schooling, which does not involve a religious motive.

2.2 School Choice

We next consider how households choose between public, private secular, and private religious schools to maximize their utility. We focus on the optimization problem of religious households and then show how secular households represent a special case of this problem.

A household *i* that chooses public education expects to obtain free schooling of quality $\bar{x}$, so it spends all of its after-tax income on consumption: $c_i = (1-t)y_i$. Equation (1) then implies that a household whose child attends a public school has indirect utility

$$V_{jg}(\bar{x}, r_j, \omega, \varphi_{jg}, y) = \alpha\left[(1-t)y\right]^{\delta} / \delta + (1-\alpha)\bar{x}^{\delta} / \delta + \gamma_j \pi_{jg}^{\beta} / \beta, \tag{5}$$

with π_{jg} defined above as $\pi_{jg}\left(\omega, \varphi_{jg}, r_j\right) = \left(\omega-\varphi_{jg}\right)+(1-\omega+\varphi_{jg})\times r_j$. A household in group *j* that sends its child to a private school of its denomination solves

$$Max_{c,x}\, U(c,x) = \alpha c^{\delta} / \delta + (1-\alpha)x^{\delta} / \delta + \gamma_j {\pi_{jj}}^{\beta} / \beta$$
$$\text{s.t.} \quad c + x = (1-t)y$$

and has indirect utility

(6) $$V_{jj}(y,r_j,\omega)=d_0(\alpha,\delta)[(1-t)y]^{\delta}/\delta+\gamma_j\pi_{jj}^{\beta}/\beta,$$

where $d_0(\alpha,\delta)=(1-\alpha)\times\left[(\alpha/(1-\alpha))^{\frac{1}{1-\delta}}+1\right]^{1-\delta}$. Comparing (5) and (6) implies that for a given level of public school quality, there is a threshold income level,

(7) $$y_j(\bar{x},r_j,\gamma_j,\omega,\varphi_{jg})=\left[\left(\frac{1-\alpha}{d_0-\alpha}\right)\left(\frac{\bar{x}}{1-t}\right)^{\delta}+\frac{\gamma_j\delta}{\beta(d_0-\alpha)(1-t)^{\delta}}\left\{\pi_{jg}{}^{\beta}-\pi_{jj}{}^{\beta}\right\}\right]^{\frac{1}{\delta}},$$

such that children of group *j* attend their denominational school if and only if their household income exceeds y_j. The first term in brackets in expression (7) captures the school-quality motive for enrolling in private schools (note that, for example, the threshold income level is increasing in public school quality $\bar{x}$). The second term captures religious motives for private schooling, as reflected by the γ_j and π terms. As argued above, secular households have no religious motives because $\pi_{0g}=\pi_{00}$, i.e., public schools are secular. Thus, the analogous threshold income level for secular households involves only the first term:

(8) $$y_0(\bar{x})=\left[\left(\frac{1-\alpha}{d_0-\alpha}\right)\left(\frac{\bar{x}}{1-t}\right)^{\delta}\right]^{\frac{1}{\delta}}.$$

Among religious households, the share from group *j* whose children attend their denominational schools is

(9) $$\theta_j=1-F_j(y_j(\bar{x},r_j,\gamma_j,\omega,\varphi_{jg})).$$

As we show in Proposition 1, θ_j is a decreasing function of group *j*'s share of the population:

Proposition 1. If φ_{jg} and γ_j are both positive, the share of households from group *j* whose children attend religious schools, θ_j, decreases with the share of group *j* in the local population, r_j.

(Proof in Appendix A, Section A.1)

The intuition of Proposition 1 is simple: as a religious group's share in the population grows, outside influences from competing religions become less threatening. In turn, this weakens parents' religious motivation for sending their children to their denominational schools, so a fewer households from group *j* will opt to enroll their children in such schools.

Note that Proposition 1 is only relevant to the extent that households assign importance to preserving religious identity $(\gamma_j > 0)$ and that public schools pose a threat to that identity $(\varphi_{jg} > 0)$. We next show that the share of group *j* households who enroll their children in their denominational schools also depends directly on γ_j and φ_{jg}:

Proposition 2. The share of households from group *j* whose children attend religious schools, θ_j, is strictly increasing in both φ_{jg} and γ_j.

(Proof in Appendix A, Section A.2)

Proposition 2 implies that there are two possible explanations for why, say, denomination *j* has a higher religious schooling rate than denomination *k*, even if those denominations have identical market shares. First, households from group *j* assign relatively more importance to preserving religious identity than do households from group *k*, i.e., $\gamma_j > \gamma_k$. Alternatively, even if households from groups *j* and *k* assign the same importance to preserving religious identity, public schools pose a bigger threat to group *j* than to group *k* in terms of reducing the probability that a child maintains her identity, i.e., $\varphi_{jg} > \varphi_{kg}$.

We now consider the fraction of *all* children in the population that attend private religious schools of denomination *s* = *j*, defined as

(10) $$q_j \equiv r_j \times \theta_j(r_j).$$

The market share of group *j*, r_j, influences this fraction in two competing ways. First, for a given share of parents from group *j* whose children attend religious schooling, θ_j, there is a linear relationship between q_j and r_j. However, as long as γ_j and φ_{jg} are both positive, θ_j declines in group *j*'s market share, inducing a non-linear relationship between q_j and r_j. Specifically, under a weak regularity condition on the distribution of income, if $\kappa_j \equiv \gamma_j \times \varphi_{jg}$ is greater than a threshold value $\bar{\kappa} \equiv \frac{[1-F_j(y_0)](d_0-\alpha)(1-t)^{\delta}}{F'_j(y_0)\times y_0^{1-\delta}}$, the relationship between the fraction of all children that attend denomination *j* schools and r_j is inverse *u*-shaped.

Proposition 3. Under the condition that $-\frac{f'(y_j)}{f(y_j)}y_j < 1-\delta+\frac{2(d_0-\alpha)(1-t)^{\delta}y_j^{\delta}}{r_j\gamma_j\varphi_{jg}} > 0,$ if $\kappa_j > \bar{\kappa}$, then the relationship between q_j and r_j is inversely *u*-shaped.

(Proof in Appendix A, Section A.3)

We make several remarks about Proposition 3 here. First, in Lemma 1, presented in the proof to this proposition, we show that the condition on the income distribution holds for every uniform income distribution, as well as for all log-normal distributions and Pareto distributions if the ratio of median to mean income is sufficiently high. In Appendix B we use a calibration-estimation exercise to gauge how strong this condition is in practice if income is log-normal. We find that it holds for every denomination in more than 99% of the counties in the U.S. Moreover, even if this condition does not hold, it is still the case that q_j reaches its maximum at an interior value of r_j when $\kappa_j > \bar{\kappa}$ (but the relationship between q_j and r_j is not necessarily single-peaked).

Second, if the condition on the income distribution holds but $0 < \kappa_j \le \bar{\kappa}$, q_j does not attain its maximum at an interior value of r_j, but is instead concave and increasing throughout the range of r_j (we show this result in the proof of Lemma 1). Third, when κ_j =

0, q_j increases linearly in r_j. This follows trivially from the proof of Proposition 3: when κ_j = 0, the protection of religious identity plays no role in the decision to send a child to a religious school because the household is either indifferent toward preserving religious identity $(\gamma_j = 0)$ or does not view public schooling as a threat $(\varphi_{jg} = 0)$. As a result, the fraction of group *j* children who attend religious schools is invariant to r_j, so the fraction of *all* children who attend group *j* schools is linear in r_j.

Finally, we note that the calibration-estimation exercise in Appendix B shows that κ_j varies substantially across religions. Specifically, preserving religious identity is much less important for Mainline Protestants than for Catholics and Evangelical Protestants. As a result, the model predicts only a weak (and nearly linear) relationship between the fraction of all children that attend Mainline schools and the Mainline market share. We return to this issue below in the context of our empirical findings.

We next consider the implications of the model for the relationship between religious pluralism and the overall enrollment rate into religious schools. For simplicity, we model q_j as quadratic in r_j for each *j*:[7]

(11) $$q_j = r_j \times \theta_j(r_j) = a_{0j}r_j + a_{1j}r_j^{\,2}.$$

As argued above, if $\kappa_j > 0$ (and if the assumption in Proposition 3 holds) then a_{1j} is negative, with the subscript *j* reflecting that denominations vary in their response to increased competition from other denominations. If, instead, $\kappa_j = 0$, then a_{1j} also equals 0.

[7] Our calibrated model predicts that $q_j(r_j)$ is almost perfectly quadratic in r_j for all groups *j* (the r^2 of a regression of simulated $q_j(r_j)$ as a quadratic function of r_j is above 0.92 for all three denominations).

Aggregating (11) across denominations, the total religious enrollment rate Q is given by

$$(12)\qquad Q \equiv \sum_{j=1}^{n} q_j = \sum_{j=1}^{n} \left(a_{0j} r_j - a_{1j} r_j^{\,2} \right).$$

Therefore, in the general case in which a_{0j} and a_{1j} vary across denomination, the religious enrollment rate is a quadratic function of the market share of each denomination. On the other hand, if and only if all religious groups have the same values of γ_j and φ_{jg} and also the same income distribution, then a_{0j} and a_{1j} do not depend on *j*, and expression (12) simplifies to the following:

$$(13)\qquad Q = a_0 \sum_{j=1}^{n} r_j - a_1 \sum_{j=1}^{n} r_j^{\,2}.$$

In other words, estimating the religious enrollment rate as a function of the overall religiosity rate, $\sum_{j=1}^{n} r_j$, and a Herfindahl index, $\sum_{j=1}^{n} r_j^{\,2}$, is justified only if γ_j, φ_{jg}, and the income distribution do not vary across denominations. Iannaccone (1991) has used a specification similar to (12) to investigate the effects of religious pluralism on religious attendance, but several subsequent studies have used more restrictive specifications similar to that given by (13) (and (14) below).[8]

Finally, note that even if a_{0j} and a_{1j} are constant across denominations, it is necessary to control for the religiosity rate when assessing the effect of pluralism on religious activity because the size of the secular group varies across localities. In the absence of a secular group, one would not need to control for the religiosity rate because $\sum_{j=1}^{n} r_j$ would

[8] Additionally, in the empirical study we undertake below, we strongly reject the restricted specifications in favor of the general one given by (12).

equal 1 in all localities, implying that the religious enrollment is a function of only the Herfindahl index:

(14) $$Q = a_0 - a_1 \sum_{j=1}^{n} r_j^{\,2} .$$

However, in the general case in which the size of the secular group varies across localities, estimation of (14) will generate biased estimates of a_1 because of the mechanical relationship between the Herfindahl Index and the religiosity rate.

Finally, in an Online Appendix we consider an alternative to the model described above.[9] In this alternative framework, the probability that a publicly-educated child remains in group *j* is a function of the share of children in public schools – rather than the share of children in the population – who belong to group *j*. Although this framework is arguably more realistic than the model presented above, disaggregated data on the religious distribution of children within public schools is not available. As a result, empirical specifications based on the alternative model must still relate religious school attendance to the population shares r_j. In order to do so, one must model the dependence of within-public school shares on population shares, adding substantial complexity to the model. The Online Appendix shows that there is little benefit to introducing these complications, in part because the model predicts that population shares are nearly identical to within-public school shares across a wide range of values of population shares (additionally, population religious shares are nearly identical to within-public school shares in the U.S. as a whole). As a result, the two models generate remarkably similar relationships between θ_j and r_j.

[9] See https://www.msu.edu/~telder/Pluralism_Appendix.pdf.

2.3 The Dynamics of the Distribution of Religions

To this point, we have described school choice decisions in only one generation and treated the market share of each religion as exogenous. However, our model also has implications for the evolution of denominational market shares across generations. Specifically, the long-run distribution of religious beliefs depend crucially on the value of φ_0, which measures how strongly secular beliefs are passed from one generation to the next relative to religious beliefs. We first consider the case in which $\varphi_0 = 0$:

Proposition 4: If $\varphi_0 = 0$, the secular group grows every generation so that eventually all religious groups disappear.

(Proof in Appendix A, Section A.4)

The underlying intuition is that if $\varphi_0 = 0$, attending a secular school preserves a secular family's (non)religious identity as effectively as attending a religious school preserves a religious family's identity. Secularism ultimately dominates because secular families have two secular schooling options – public schools and secular private schools – while religious families' relevant choice set includes one secular option (public school) and one religious one.

In contrast, religious beliefs survive in the long run when φ_0 is positive:

Proposition 5: If $\varphi_0 > 0$, the distribution of religions in the population converges to a steady state in which the population is multi-religious, with the market share of each denomination *j* implicitly defined by $\varphi_{jg}(1-\theta_j(r_j)) = \varphi_0$

(Proof in Appendix A, Section A.5)

The expression for the steady-state market shares, $\varphi_{jg}(1-\theta_j(r_j)) = \varphi_0$, has an intuitive interpretation. The larger is φ_0, i.e., the less likely that secular parents' socialization efforts are successful, the larger is each religious group's steady-state market share r_j (because

$\theta_j(r_j)$ is decreasing in r_j). Moreover, the groups with relatively large values of φ_{jg}, which are those whose norms are the least consistent with the public school environment, will have the largest shares of their children enrolled in religious schools $\theta_j(r_j)$.

Although this discussion shows that our model of school choice has implications for the long-run distribution of religious beliefs, these predictions are not readily testable because they involve the unobserved primitives φ_{jg} and φ_0. Nonetheless, empirical tests of the static implications described in section 2.2 are potentially informative about the dynamic predictions. We turn next to empirically testing these static implications.

3. Data

Our empirical specifications are based on both county-level data and individual survey data from NELS:88 and ECLS-K. We describe each of these data sources in turn.

3.1 County-level data

We combine data from several sources. County-level data on elementary and secondary enrollment by school type were created using school-level measures from the Private School Survey of 1999-2000. For each school, this survey reports enrollment by grade, which permits distinguishing between elementary (K-8) and secondary enrollment (9-12). The survey also includes whether each private school is religious and, if so, to which denomination it belongs. It identifies twenty-eight types of religious schools, which we aggregated into four broader categories: Catholic, Mainline Protestants, Evangelical Protestants and Other Religions.[10]

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[10] The categories and the denominations included in each are as follows: *Catholic*, *Mainline Protestant* (Calvinist, Disciples of Christ, Episcopal, Friends, Evangelical Lutheran Church in America, Methodist, Presbyterian), *Evangelical Protestant* (African Methodist Episcopal, Amish, Assembly of God, Baptist, Brethren, Christian (no specific denomination), Church of Christ, Church of God, Church of God in Christ, Lutheran Church – Missouri Synod, Wisconsin Evangelical Lutheran Synod, Other Lutheran, Mennonite, Pentecostal, Seventh-Day Adventists), and *Other Religion* (Greek Orthodox, Islamic, Jewish, Latter-Day Saint, and all others not listed above).

We supplemented these enrollment data with data on elementary and secondary enrollment in public schooling taken from the Public Elementary / Secondary School Universe Survey available at http://nces.ed.gov/ccd/pubschuniv.asp. These enrollment data allow us to calculate the enrollment rate of each sector of private schooling. In order to control for the supply of each type of schooling, we used the Private School Survey of 1989-1990 (ten years prior to the period of the analysis) and constructed the density of each type of schooling by dividing the number of schools of each type in the county by the area of the county in 1990.

County data on the share of each denomination in the population were taken from Jones et al. (2002), which provides county data for the year 2000 on the market shares of each of 149 denominations. We aggregated these shares to the four broader categories mentioned above – Catholics, Evangelical Protestants, Mainline Protestants and Other Religions – and combined these data with demographic variables taken from the County and City Data Book 2000, available at www.census.gov. County data on the share of the population that lives in a rural area were taken from the STF3 files of the 2000 U.S. Census.

Table 1 presents summary statistics for the county-level demographic variables used in the analyses below. We weight each observation by the county's population to produce weighted summary statistics. The average Catholic, Evangelical, Mainline, and "Other Religions" market shares were 22.04 percent, 14.19 percent, 9.64 percent, and 4.35 percent, respectively. Similarly, the Catholic school enrollment rate was 4.81 percent, the Evangelical enrollment rate was 2.66 percent, the Mainline enrollment rate was 0.47 percent, and the non-sectarian private enrollment rate was 1.56 percent.

3.2 NELS:88 and ECLS-K

NELS:88 is a nationally representative sample of eighth graders that was initially conducted in 1988 by the US National Center for Education Statistics (NCES). This survey included 24,599 students from 1032 schools, with subsamples of these respondents resurveyed in 1990, 1992, 1994, and 2000 follow-ups. The survey provides information on household and individual backgrounds and on attendance at a Catholic school or a non-Catholic religious school (NCES aggregates all non-Catholic religious schools into an "other religious school" category). For all students included in the base-year sample, NELS:88 includes detailed Census zip code-level information on their eighth grade school, which allows for identification of the zip code in which the school is located; we treat this as the zip code of the student's home. We then merge with the county-level data described above, including county measures of the shares of the population who are Catholic, Mainline Protestant, and Evangelical. Table 2A presents summary statistics from the NELS:88 data.

We also analyze the base year of the ECLS-K survey, which includes 18,644 kindergarteners from over 1000 schools in the fall of the 1998–1999 school year. As in NELS:88, the base year survey includes information on the school's zip code, which permits merging of these data with information on the within-county religious distribution of the population and the other county-level variables described above. Table 2B presents summary statistics from the ECLS-K data.

4. Empirical Results

4.1 Specifications Based on County-level data

4.1.1 The Share of a Denomination's Children Enrolled in Religious Schools

We first test Proposition 1, which states that the share of households from group *j* whose children attend religious schools, θ_j, is decreasing in the share of group *j* in the local population, r_j. As the county-level data do not allow us to identify which individuals belong to each religious group, we use the ratio of denomination enrollment to denomination membership as a proxy for θ_j.[11] A possible approach to testing Proposition 1 would involve regressing this proxy for θ_j on r_j and then testing whether the slope parameter is negative. Using this approach, one would estimate the following equation separately for each denomination j:

$$(20) \qquad enroll_{jcs} / members_{jcs} = a_0 + a_1 r_{jcs} + \beta' X_{cs} + \gamma_s + \varepsilon_{jcs},$$

where $enroll_{jcs}$ refers to the number of students in county c in state s that are enrolled in school type j, $members_{jcs}$ refers to the number of members of denomination j in that county, r_{jcs} is defined as above as the fraction of the population that belongs to denomination j, X_{cs} refers to observed demographic controls in county c of state s, and γ_s denotes state fixed effects, which we include in order to control for state-specific factors that may influence the demand for schooling.

A potential problem with estimation of (20) stems from the fact that denominational membership appears both in the denominator of the dependent variable and in the numerator of r_{jcs}, the key regressor. Because membership is likely measured with error, OLS estimates of a_1 will typically be biased. To address this problem, we adopt an approach in the spirit of Hofrenning and Chiswick (1999), who propose proxying for a respondent's religious background with information on their ancestries when religious background is not available. In our context, religious background (at the county level) is not a missing variable but rather is possibly measured with error. We propose using county-level ancestral mix as an instrumental variable for county-level religious mix in estimating (20), which will deliver consistent estimates under the assumption that the measurement errors in ancestral mix and

[11] For example, the ratio of Catholic school enrollment to Catholic membership is equal to the share of Catholic households that sends their children to Catholic schools under the assumption that no non-Catholic households send their children to Catholic schools. This assumption holds approximately, but not strictly, in practice. Altonji et al. (2005) estimate that fewer than 0.3 percent of non-Catholic households in NELS:88 send their children to Catholic schools.

religious mix are additive and mutually orthogonal. This assumption is quite likely to hold given that the two measures come from different data sources.

Following Hofrenning and Chiswick (1999), we measure county-level ancestral mix using the 2000 decennial Census SF3 Files, which include the population shares of 66 ancestral categories by county. Table 3 lists county-level ancestral shares for the 20 most common ancestries; for example, across all counties, roughly 0.51 percent of residents are of Danish ancestry, and roughly 15.24 percent are of German ancestry.

After creating these ancestral market shares, we create predicted religious market shares based on linear county-level regressions (for each denomination) of religious market shares on all 66 ancestries, weighted by county population size. The logic of this exercise is that the share of denomination *j* in the population, r_j , equals $\sum_{k=1}^{66} a_k \times S_{kj}$, where a_k is the share of ancestry *k* in the population and S_{kj} is the share of ancestry *k* that belong to denomination *j*. Thus, the coefficients of the first stage can be interpreted as reflecting the estimated $\widehat{S_{kj}}$, with $\widehat{r_j} = \sum_{k=1}^{66} a_k \times \widehat{S_{kj}}$.

We present these first-stage estimates in Table A2 in the Appendix. As the table shows, the instruments are powerful predictors of religious market shares: the correlations between the predicted and actual values are above 0.7 for all denominations, and the first-stage *F* statistics are 191.6 for Catholics, 117.8 for Evangelicals, and 95.4 for Mainline Protestants (each implying *p*-values well below 0.01). We then use the predicted market share $\hat{r}_{jcs}$ as the key regressor in (20), separately for each denomination *j*.

Table 4 presents OLS and 2SLS estimates of a_1 from specification (20), with the upper panel of the table showing results for Catholic school enrollment. The first two columns show results for elementary schooling (grades K-8), the next two columns show results for secondary schooling (grades 9-12), and the last two columns show results for combined K-12 enrollment. Each estimate is based on a specification which includes all of the demographic controls described above, including a measure of the density of Catholic schools in 1990, which is intended to capture supply-side capacity effects.[12]

As the top panel of the table shows, the estimates of a_1 are negative in all specifications. The 2SLS estimates are slightly more negative than the corresponding OLS estimates, but the differences between the two are small and statistically insignificant in all cases. The estimates are much larger for elementary schooling than for secondary schooling, suggesting that preserving religious identity plays an especially strong role in elementary school choice. This is consistent with previous findings (discussed above) that religious traits are usually adopted in early childhood (Cornwall, 1988; Erickson, 1992).

The middle panel of the table shows the results for enrollment into Evangelical schools. The estimates of a_1 are larger in absolute value than those for Catholic enrollment in all six cases, and all are statistically significant at the 1 percent level. The estimates are again much larger for elementary schooling than for secondary schooling. The bottom panel reports the results for enrollment into Mainline Protestant schools. All the estimates are negative, and they are significant at the 5% level in five of the six cases. In sum, the findings support Proposition 1 for all three denominations.

In Table A3 in the Appendix, we present estimates based on another approach to testing Proposition 1, derived from a logarithmic version of (20):

$$(21)\quad \ln\left[enroll_{jcs} / members_{jcs}\right] = b_0 + b_1 \ln\left[members_{jcs} / pop_{cs}\right] + \beta' \ln(X_{cs}) + \gamma_s + \varepsilon_{jcs}.$$

This log-log approach allows for an alternative solution to the problem of measurement error in $members_{jcs}$ because the estimating equation can be rewritten as

$$(22)\quad \ln(enroll_{jcs}) = b_0 + (b_1 + 1) \times \ln(members_{jcs}) - b_1 \ln(pop_{cs}) + \beta' \ln(X_{cs}) + \gamma_s + \varepsilon_{jcs}.$$

[12] Specifically, Catholic school enrollment levels may be constrained by the number of Catholic schools operating within a county, and including this measure is a straightforward way of controlling for these possible effects. We also estimated alternative specifications in which we include all of the demographic variables except for the density of Catholic schools. We found that controlling for density has essentially no effect on the estimates in all cases.

Proposition 1 implies that b_1 is negative, so that the coefficient on ln(*members*$_{jcs}$) is less than 1 (implying that a 1-percent increase in denominational membership causes a less than 1-percent increase in denominational enrollment). In estimating (22), we follow Burbridge et al. (1988) and MacKinnon and Magee (1990) in using the inverse hyperbolic sine, rather than the logarithm, of variables that can take on values of zero. By using the inverse hyperbolic sine, we can interpret the coefficients exactly as we would in a logarithmic model, but we retain counties with no children enrolled in denomination *j* schools.[13] We estimate (22) using 2SLS (using the number of people in the county that belong to each ancestry to predict *members*$_{jcs}$) because although the log-log specification eliminates the possibility of division bias, measurement error in *members*$_{jcs}$ could still lead to attenuation bias in estimates of (b_1 + 1). The estimates strongly support Proposition 1 for all three denominations, as the estimates of (b_1 + 1) are significantly less than 1 in 17 of the 18 cases.

4.1.2 The Share of All Children Attending a Denomination's Religious Schools

We next turn to tests of Proposition 3, which implies that under a weak regularity condition on the income distribution, if the protection of religious identity plays a sufficiently large role in school enrollment decisions, the relationship between the fraction of *all* children that attend denomination *j* schools and the market share of denomination *j* is inversely *u*-shaped. To test this prediction, we estimate the following model, again separately for each denomination *j*:

(23) $$q_{jcs} = b_0 + b_1 r_{jcs} + b_2 r_{jcs}^2 + \gamma' X_{cs} + \varepsilon_{jcs}.$$

[13] The inverse hyperbolic sine of *y*, $sinh^{-1}(y)$, equals $\ln(y + \sqrt{y^2 + 1})$, so that its derivative is arbitrarily close to $1/y$ as $y \rightarrow \infty$. Using a logarithmic model would require dropping counties with zero enrollments, which is unsatisfactory if zero enrollments are due to behavioral responses of parents, i.e., if those counties are not randomly assigned. In practice, our estimates are substantively insensitive to using logarithms versus inverse hyperbolic sines, but they are slightly less precise in the logarithmic case.

Table 5 presents weighted OLS estimates of b_1 and b_2 for all three denominations, with the top panel showing results for Catholic school enrollment. Columns (1) and (2) show estimates for elementary schools, both with and without demographic controls. The remaining columns of the table show estimates for secondary schools and overall enrollment. In each of the six specifications, the Catholic market share has a strong concave effect on the overall enrollment rate into Catholic schools. The estimates of b_1 are positive and significant (at the five percent level) in all six cases, while the estimates of b_2 are negative and significant. Moreover, in all six cases, the fraction of all children that attend denomination *j* schools reaches its maximum value at an interior value of r_j. For example, in column (1), the estimate of 0.298 for b_1 and -0.218 for b_2 implies that the maximum Catholic school enrollment rate is reached at $r_j = 0.6834$. In other words, increases in the Catholic market share beyond 68.34 percent reduce the number of children enrolling in Catholic schools because the decreased demand for Catholic schools among Catholics dominates the increased demand due to the increase in the number of Catholics.

The middle panel of the table presents analogous results for Evangelical Protestants. The results are quite similar to those for Catholics, in that Evangelical market shares have a significant inverse *u*-shape effect on the Evangelical enrollment rate in all six columns. In all cases, as Evangelical shares increase, eventually the share of all students enrolled in Evangelical schools declines, with the peak enrollment rate occurring at an interior value (roughly 28.8 percent to 35.2 percent across columns).

Finally, the bottom panel presents estimates for Mainline Protestants. In contrast to the results for Catholics and Evangelicals, we do not find evidence that enrollment into Mainline schools is a quadratic function of the Mainline market share. This finding partly reflects that Mainline enrollment rates are uniformly low; judging from the small adjusted r^2

values, Mainline enrollment rates are relatively unresponsive to all of the demographic controls, not just the denominational shares.

Overall, our estimates agree with the predictions of our calibrated model. Specifically, Proposition 3 implied that the relationship between market shares and overall enrollment rates is non-monotonic only if the protection of religious identity is a sufficiently strong factor in schooling decisions (that is, if $\kappa_j > \bar{\kappa}$). We calibrate-estimate our model of the demand for religious education in order to minimize, across all U.S. counties, the difference between actual enrollment rates and the model's predicted enrollment rates. The central goal of this exercise is to shed light on the value of $\kappa_j = \gamma_j \times \varphi_{jg}$ for each denomination j (γ_j and φ_{jg} are not separately recoverable, as they always appear multiplicatively in the relevant moments). We find that for Mainline Protestants, the magnitude of κ_j is less than one-fifth of that of Catholics and about a quarter of that of Evangelicals. Intuitively, this result stems from the overall low enrollment rates of Mainlines into religious schools; they have nearly the same aggregate market share as Evangelicals, yet only one-fifth the religious school enrollment rate.

Because our calibrated values of κ_j show that the preservation of religious identity plays only a weak role in Mainlines' schooling decisions, the implied relationship between Mainline market shares and the fraction of *all* children that attend Mainline schools is much less dramatically *u*-shaped than the analogous relationships for Evangelicals and Catholics. Appendix Figure A1 uses the calibrated values of the model to simulate these relationships graphically. The patterns shown in the figure are consistent with the estimates in Table 5, in that the relationship between overall Mainline enrollment rates and Mainline market shares is much weaker (and much less dramatically *u*-shaped to the extent that it seems almost monotonically increasing) than the analogous relationships for Catholics and Evangelicals.[14]

4.1.3 The Effects of Pluralism on the Demand for Religious Schooling

We turn next to tests of the final prediction of our model, which relates the overall demand for religious schooling to quadratic functions of the market shares of each denomination. The empirical counterpart to equation (12) is

$$(24) \qquad Q_{cs} = c_0 + \sum_{j=1}^{n} [c_{1j} r_{jcs} + c_{2j} r_{jcs}^2] + \delta' X_{cs} + \varepsilon_{jcs},$$

where Q_{cs} represents the overall enrollment rate into religious schools. As noted above, several previous researchers have estimated restricted versions of this model, such as a version that imposes equality of the c_{1j} and c_{2j} coefficients across denominations:

$$(25) \qquad Q_{cs} = c_0 + c_1 \sum_{j=1}^{n} r_{jcs} + c_2 \sum_{j=1}^{n} r_{jcs}^2 + \delta' X_{cs} + \varepsilon_{jcs}.$$

Yet another version, common in the literature on the effects of religious pluralism on religious activity, additionally imposes that the c_{1j} coefficients all equal zero:

$$(26) \qquad Q_{cs} = c_0 + c_2 \sum_{j=1}^{n} r_{jcs}^2 + \delta' X_{cs} + \varepsilon_{jcs}.$$

As argued above, equation (24) is theoretically grounded, while (25) and (26) impose additional restrictions that may or may not hold in practice.

The first column of Table 6 presents estimates of the c_{1j} and c_{2j} coefficients from specification (24). The estimates imply that the overall enrollment rate into religious elementary schools is a concave function of the Catholic and Evangelical market shares but not a concave function of the market share of Mainline Protestants. The bottom two rows of

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[14] Linear regressions that exclude the quadratic terms generally show small positive linear effects of Mainline market shares on enrollment rates; for example, the estimated effect of "percent Mainline" in the linear analog of column (1) of Table 6 is 0.017, with a standard error of 0.07.

the table, labeled "Test 1" and "Test 2", present *p*-values of the hypotheses that the c_{1j} and c_{2j} coefficients, respectively, do not vary across denominations. Both tests are rejected at the 5 percent level.

Column (2) presents estimates from a specification in which all c_{2j} terms are restricted to be equal, and column (3) additionally restricts all c_{1j} terms to be equal, representing specification (26) above. In these columns, the linear market shares (or, alternatively, their sum) positively affect the religious enrollment rate. Likewise, the negative and significant coefficients on the Herfindahl index imply that religious pluralism also increases the religious enrollment rate.[15] However, the estimate in column (4) shows the consequences of failing to control for the market shares of each denomination: the positive coefficient on the Herfindahl index incorrectly implies that religious pluralism decreases the demand for religious schooling. More generally, this example illustrates that excluding the market share terms r_j from models relating religious pluralism to religious activity may produce misleading results. In such models, the omission of the r_j terms induces omitted variables bias because of the correlation between r_j and r_j^2.

Table 7 presents the estimates from models (24)-(26) for secondary schooling. As in Table 6, the market shares have concave effects on the demand for religious schooling among Catholics and Evangelicals but not for Mainlines. Columns (2) and (3) show that the overall religious enrollment rate is positively associated with both the linear market shares and religious pluralism (as implied by the negative coefficient on the Herfindahl index). As was the case in Table 6, column (4) again shows that failing to control for the linear market shares yields estimates that incorrectly imply that pluralism *decreases* religious enrollment.

[15] The Herfindahl index $\sum_{j=1}^{n} r_{jcs}^2$ varies from a minimum of $1/n$, in which all religions' market shares are equal, to a maximum of 1, in which all adherents practice only one religion. As such, the index is increasing in religious concentration and decreasing in religious pluralism.

4.2 Specifications Based on Individual-level data

We next turn to using individual data from NELS:88 and ECLS-K to test the implications of our model of religious schooling. The ECLS-K does not include measures of a household's religion, making it impossible to assess Proposition 1. We therefore proceed with testing Proposition 3, that the share of all students that enrolls in schools of denomination *j* is an inverse *u*-shape function of that denomination's market share. We use the individual analog of expression (19):

$$(27)\qquad \Pr(d_i = j) = c_0 + \sum_{j=1}^{n}[c_{1j}r_{jcs} + c_{2j}r_{jcs}^2] + \delta' X_{ics} + \varepsilon_{ijcs},$$

where $d_i \in \{0,...,n\}$ measures the denomination of the school in which student *i* is enrolled, and X_{ics} includes both county-level demographics and the individual control variables listed in Tables 2, 3A, and 3B. Catholic schools are the only religious schools identified in NELS:88 and ECLS-K, so in practice (27) is a binary model of Catholic school attendance. We estimate this model via linear probability, although the substantive results are unaffected if we instead use probit or logit models.

Table 8 presents the estimates of c_{1j} and c_{2j}. For all grade levels and specifications, the Catholic market share has a significant inverse *u*-shaped effect on Catholic school attendance, with the peak enrollment rate occurring at an interior value (roughly 39.3 percent to 65.3 percent across columns).

Finally, Table 9 presents estimates of the individual-level analogs of specification (24)-(26) in order to assess whether overall religious school attendance rates are a concave function of each of the religious market shares. Again, the estimates largely agree with those based on the county-level data. Column (1) indicates that all four market shares have a concave effect on the probability of attending a religious kindergarten. Similar results are obtained for eighth grade attendance (column (5)) and for high school attendance (column (9)). However, restricted models that impose equality of the c_{2j} coefficients imply that pluralism decreases the probability of attending religious schooling in eight of the nine cases (see the coefficients on the Herfindahl index in columns (2)-(4), (6)-(8), and (10)-(12)), although the estimate is significantly different from zero in only one instance.

In sum, the results based on the individual-level data generally agree with those based on county-level data. The local Catholic market share has a significant inverse *u*-shaped effect on Catholic school attendance, and estimates of the effect of religious pluralism on religious school attendance are sensitive to the choice of specification. We emphasize, however, that the individual-level data include only a small subset of counties within the U.S. and a small subset of students within each county. As a result, the estimates based on these data are typically imprecise; note that the standard errors in Table 9 are roughly five to ten times larger than those shown in Tables 6 and 7. We therefore view the estimates based on county-level data as our preferred results.

5. Summary and Concluding Remarks

We develop a model of school choice that incorporates religious parents' desires for their children to maintain their religious identities into adulthood. We posit that religious parents enroll their children into religious schools in order to shield their children from exposure to other religions (and to secularism). The behavioral model generates two primary implications. First, the proportion of children in a given denomination who attend religious schools declines as that denomination becomes more prevalent in the population and the threat of outside influences in non-religious schools declines. In the limiting case in which the entire population belongs to the same denomination, parents have no motivation to enroll their children in a religious school.

Second, if the motivation to preserve religious identity is sufficiently strong, the fraction of *all* children that attend a given denomination's school is an inverse *u*-shaped function of the market share of the denomination, reaching its maximum at an interior value of the market share. This relationship arises due to two competing factors. On one hand, an increase in the denomination's market share increases the fraction of children attending that denomination's schools, holding the within-denomination attendance rate constant. On the other hand, the within-denomination attendance rate declines due to the aforementioned weakening of the motivation to attend religious schools. Our calibrated model shows that this relationship is inverse *u*-shaped for Catholics and Evangelicals but weak and nearly linear for Mainlines.

Finally, we analyze the dynamics of this model and characterize the conditions under which the society tends towards complete secularization relative to a steady state in which a secular group and different religious groups co-exist. We show that when multiple religious groups co-exist, the groups whose norms are the least consistent with the public school environment will have the largest shares of their children enrolled in religious schools.

Using county-level data from the U.S., supplemented with individual-level data from ECLS-K and NELS:88, we find strong support for the model's predictions. First, the within-denomination rate of religious school attendance is negatively related to denominational market shares among all denominations. Moreover, in agreement with simulations based on our calibrated model, overall attendance rates at Catholic and Evangelical schools are inverse *u*-shaped functions of their corresponding market shares, respectively. In contrast, the relationship between overall attendance rates at Mainline Protestants religious schools and market shares is sufficiently weak that it is not statistically detectable. Furthermore, our calibration sheds light on why religious school enrollments respond much more dramatically to religious market shares for Evangelicals and Catholics in comparison to Mainline Protestants. The results imply that among Mainlines, the importance of preserving religious identity – or the perceived threat to that identity posed of the public school system – is smaller than for Catholics and Evangelical Protestants.

Finally, this study is the first to provide a theoretical underpinning for empirical analyses linking religious activity to religious pluralism. We show that a commonly used empirical specification, in which religious activity is modeled as a function of religious pluralism, is a restricted version of the more general specification implied by our behavioral model. Failing to include religious market shares in such empirical models can severely bias estimates of the effect of pluralism on religious activity.

In sum, our findings imply that religious activity is endogenous to the environment in which it operates, and in particular to the religious activities of "competing" religions. The preservation of religious identity appears to play a fundamental role in the demand for private religious education, a finding which has important implications for the design of public policies, such as those regarding school vouchers. As pointed out by Cohen-Zada and Justman (2005) and Ferreyra (2007), when a voucher's monetary value is relatively small, including subsidized religious schools in a voucher program is necessary to substantially increase the demand for private schooling. First, the tendency of households to attend religious schooling is much greater than the tendency of households to attend non-sectarian private schooling. Second, low-income families typically cannot afford to attend non-religious private schools even with the help of vouchers. As a result, voucher programs that include religious schools will benefit religious households by allowing them to preserve their religious identity and to achieve better education quality. On the other hand, Bisin and Verdier (2000) argue that the preservation of identity is a key obstacle to religious (and cultural) assimilation. If so, the inclusion of religious schools in voucher programs may increase religious isolationism and impede the establishment of a "melting pot" society.

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Table 1. Summary Statistics of County-Level Variables (weighted by population size)

Variable	Obs.	Mean	Std. Dev.
Percent Hispanic in county	3139	12.55	15.07
Median income	3139	39324.51	9419.75
Average number of people per household	3139	2.61	0.23
Percent of population at school age (5 to 17)	3139	18.88	2.14
Percent African-Americans in county	3139	12.32	13.19
Percent of population living in rural areas	3138	21.15	25.63
Population density (1000 people per square mile)	3139	2.12	6.59
Expenditure per student	3118	6920.6	1587.4
Percent Catholics in county	3138	22.04	15.15
Total enrollment in Catholic schools	3139	11599.52	23072
Catholic schools per square mile	3139	0.10	0.33
Catholic members (in thousands)	3138	330.46	737.22
Catholic enrollment/Total enrollment × 100	3120	4.81	4.75
Catholic enrollment/Catholic members × 100	2985	4.26	5.32
Percent Evangelical Protestants in county	3138	14.19	12.64
Total enrollment in Evangelical schools	3139	5175.14	10366.09
Evangelical schools per square mile	3139	0.04	0.06
Evangelical protestant members (in thousands)	3138	87.47	140.51
Evangelical enrollment/Total enrollment × 100	3120	2.66	2.36
Evangelical enrollment/Evangelical members × 100	3111	5.22	4.20
Percent Mainline Protestants in county	3138	9.65	6.47
Total enrollment in Mainline schools	3139	1062.95	2079.14
Mainline schools per square mile	3139	0.01	0.03
Mainline protestant members (in thousands)	3138	63.69	86.29
Mainline enrollment/Total enrollment × 100	3120	0.47	1.17
Mainline enrollment/Mainline members × 100	3119	1.29	4.88
Non-sectarian private enrollment / Total enrollment × 100	3120	1.56	1.96
Percent Other religions in county	3138	4.35	7.27
Herfindahl index	3138	-12.83	9.23

Table 2A. Summary Statistics in NELS:88 (N=13,710)

Variable	Mean	Std. Dev.
Catholic High School Attendance	0.054	0.226
Catholic 8th Grade Attendance	0.083	0.276
Parents Reported Catholic Religion	0.340	1.727
Catholic Schools / Sq. Mile in County	0.055	0.162
Percent Catholic in County Population	0.230	0.197
Percent Catholic in County Population in 1890	0.097	0.095
Female	0.508	0.500
Asian	0.054	0.226
Hispanic	0.122	0.327
Black	0.099	0.299
HH composition		
Both Parents in HH	0.701	0.458
Mother + another adult	0.105	0.306
Father + another adult	0.021	0.142
Mother only	0.143	0.350
Father only	0.023	0.151
HH composition missing	0.008	0.090
Parents' Marital Status		
Married	0.781	0.413
Divorced	0.108	0.311
Widowed	0.025	0.155
Separated	0.032	0.176
Never Married	0.022	0.146
Marriage-Like Long-term Relationship	0.016	0.127
Marital Status missing	0.015	0.123
Father's Education	12.455	4.184
Mother's Education	12.913	2.640
Log(Family Income)	9.814	2.136
County Percent Rural	26.222	27.036

Table 2B. Summary Statistics in ECLS-K (N=10,549)

Variable	Mean	Std. Dev.
Catholic Kindergarten Attendance	0.128	0.334
Parents Reported Catholic Religion	N/A	N/A
Catholic Schools / Sq. Mile in County	0.053	0.129
Percent Catholic in County Population	0.218	0.173
Female	0.492	0.500
Asian	0.055	0.227
Hispanic	0.169	0.375
Black	0.146	0.353
HH composition		
Both Parents in HH	0.711	0.453
Mother + another adult	0.069	0.254
Father + another adult	0.007	0.082
Mother only	0.190	0.392
Father only	0.015	0.122
HH composition missing	0.008	0.090
Parents' Marital Status		
Married	0.669	0.471
Divorced	0.084	0.278
Widowed	0.009	0.093
Separated	0.045	0.206
Never Married	0.141	0.348
Marriage-Like Long-term Relationship		
Marital Status missing	0.053	0.224
Father's Education	12.737	3.881
Mother's Education	12.988	3.100
Log(Family Income)	10.506	0.986
County Percent Rural	28.386	31.115

Table 3. Summary Statistics of Selected County-Level Ancestry Variables

Variable	Obs.	Mean	Std. Dev.
Danish	3139	0.51	0.86
Dutch	3139	1.61	1.93
English	3139	8.71	4.13
European	3139	0.70	0.41
French (except Basque)	3139	2.95	2.75
French Canadian	3139	0.84	1.52
German	3139	15.24	10.16
Hungarian	3139	0.50	0.58
Irish	3139	10.85	4.82
Italian	3139	5.58	5.54
Norwegian	3139	1.59	3.50
Polish	3139	3.19	3.39
Russian	3139	0.94	0.97
Scotch-Irish	3139	1.54	0.79
Scottish	3139	1.74	0.86
Sub-Saharan African	3139	0.63	0.62
Swedish	3139	1.42	1.77
United States American	3139	7.33	5.64
Welsh	3139	0.62	0.49
West Indian Non-Hispanic	3139	0.66	1.69

Table 4. Tests of Proposition 1: Denomination-Specific Enrollment Rates into Religious Schools – Linear

	Elementary		Secondary		Overall	
Variables	OLS	2SLS	OLS	2SLS	OLS	2SLS
			Catholic school enrollment			
% Catholic	-0.026***	-0.031**	-0.002	-0.006	-0.028**	-0.037**
	(0.010)	(0.014)	(0.004)	(0.005)	(0.014)	(0.018)
R-Squared	0.121	0.121	0.247	0.248	0.174	0.175
Observations	2,970	2,970	2,970	2,970	2,970	2,970
			Evangelical school enrollment			
% Evangelical	-0.086***	-0.133***	-0.019***	-0.027***	-0.104***	-0.159***
	(0.015)	(0.025)	(0.003)	(0.007)	(0.017)	(0.027)
R-Squared	0.371	0.376	0.189	0.189	0.358	0.362
Observations	3,093	3,093	3,093	3,093	3,093	3,093
			Mainline school enrollment			
% Mainline	-0.016**	-0.026*	-0.012**	-0.021**	-0.028**	-0.047**
	(0.009)	(0.016)	(0.007)	(0.011)	(0.015)	(0.027)
R-Squared	0.100	0.100	0.028	0.029	0.055	0.055
Observations	3,100	3,100	3,100	3,100	3,100	3,100

Notes:

1) Standard errors, in parentheses, are robust to clustering at the state level.
2) Demographic controls include median income, density of population, percent of population at school-age, percent African–Americans in the population, percent Hispanics in the population, population, percent of population that lives in a rural area, average number of people per household, public expenditure per student and pupil to teacher ratio, , as well as their square terms.
3) Estimates marked with "*" are significantly lower from zero at the ten percent level, "**"at the five percent level, and "***"at the one percent level.

Table 5. Tests of Proposition 3: Enrollment Rates into Religious Schools as a Quadratic Function of Denomination Market Share

	Elementary		Secondary		Overall	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Catholic school enrollment					
% Catholic	0.298***	0.358***	0.287***	0.119***	0.294***	0.330***
	(0.072)	(0.052)	(0.057)	(0.023)	(0.067)	(0.047)
% Catholic squared / 100	-0.218*	-0.298***	-0.216**	-0.051*	-0.216**	-0.273***
	(0.109)	(0.093)	(0.087)	(0.030)	(0.100)	(0.083)
Adjusted R-Squared	0.345	0.701	0.281	0.319	0.349	0.714
	Evangelical school enrollment					
% Evangelical	0.190***	0.160***	0.140***	0.090***	0.176***	0.138***
	(0.034)	(0.047)	(0.020)	(0.025)	(0.029)	(0.039)
% Evangelical squared / 100	-0.330***	-0.235***	-0.221***	-0.128***	-0.299***	-0.202***
	(0.055)	(0.063)	(0.027)	(0.031)	(0.046)	(0.052)
Adjusted R-Squared	0.097	0.253	0.079	0.187	0.101	0.257
	Mainline school enrollment					
% Mainline	0.004	0.003	0.025	0.002	0.010	0.003
	(0.018)	(0.013)	(0.021)	(0.016)	(0.018)	(0.014)
% Mainline squared / 100	-0.008	0.028	-0.037	0.021	-0.017	0.026
	(0.046)	(0.040)	(0.052)	(0.044)	(0.047)	(0.041)
Demographic controls	N	Y	N	Y	N	Y
Adjusted R-Squared	0.000	0.117	0.004	0.074	0.001	0.101
Observations	3,120	3,118	3,107	3,105	3,120	3,118

Notes:
1) Standard errors, in parentheses, are robust to clustering at the state level.
2) Demographic controls include median income, density of population, percent of population at school-age, percent African–Americans in the population, percent Hispanics in the population, population, percent of population that lives in a rural area, average number of people per household and public expenditure per student, as well as their square terms.
3) Estimates marked with "*" are significantly different from zero at the ten percent level, "**"at the five percent level, and "***"at the one percent level.

Table 6. Overall Enrollment Rates in Religious Elementary Schools as a Quadratic Function of Religious Market Shares

Variable	(1)	(2)	(3)	(4)
% Catholic	0.386***	0.339***		
	(0.062)	(0.044)		
% Catholic squared / 100	-0.353***			
	(0.108)			
% Evangelical	0.270***	0.210***		
	(0.070)	(0.051)		
% Evangelical squared / 100	-0.381***			
	(0.097)			
% Mainline	0.086	0.171***		
	(0.070)	(0.038)		
% Mainline squared / 100	-0.107			
	(0.122)			
% Other	0.025	0.182***		
	(0.067)	(0.052)		
% Other squared / 100	-0.024			
	(0.086)			
Sum of Religions			0.230***	
			(0.038)	
Herfindahl Index / 100		-0.280***	-0.239***	0.054
		(0.063)	(0.060)	(0.033)
Adjusted R-Squared	0.581	0.575	0.541	0.502
Observations	3,118	3,118	3,118	3,118
Test 1	0.002			
Test 2	0.027			

Notes:
1) Standard errors, in parentheses, are robust to clustering at the state level.
2) Demographic controls are identical to those listed in Table 5.
3) Estimates marked with "*" are significantly different from zero at the ten percent level, "**"at the five percent level, and "***"at the one percent level.
4) For the two F tests, the value reported is the relevant p-value. In "Test 1", the null hypothesis is that the coefficients on all market shares are equal. In "Test 2", the null hypothesis is that the coefficients on all squared market shares are equal.

Table 7. Overall Enrollment Rates in Religious Secondary Schools as a Quadratic Function of Religious Market Shares

Variable	(1)	(2)	(3)	(4)
% Catholic	0.245***	0.227***		
	(0.049)	(0.028)		
% Catholic squared / 100	-0.169**			
	(0.077)			
% Evangelical	0.112**	0.114***		
	(0.052)	(0.034)		
% Evangelical squared / 100	-0.125*			
	(0.071)			
% Mainline	-0.001	0.045		
	(0.079)	(0.035)		
% Mainline squared / 100	-0.019			
	(0.129)			
% Other	0.096	0.092**		
	(0.091)	(0.038)		
% Other squared / 100	-0.146			
	(0.126)			
Sum of Religions			0.111***	
			(0.031)	
Herfindahl Index / 100		-0.137***	-0.076	0.066***
		(0.037)	(0.047)	(0.024)
Adjusted R-Squared	0.533	0.532	0.502	0.493
Observations	3,105	3,105	3,105	3,105
Test 1	0.030			
Test 2	0.578			

Notes:
1) Standard errors, in parentheses, are robust to clustering at the state level.
2) Demographic controls are identical to those listed in Table 5.
3) Estimates marked with "*" are significantly different from zero at the ten percent level, "**"at the five percent level, and "***"at the one percent level.
4) For the two F tests, the value reported is the relevant p-value. In "Test 1", the null hypothesis is that the coefficients on all market shares are equal. In "Test 2", the null hypothesis is that the coefficients on all squared market shares are equal.

Table 8. Test of Proposition 3: Catholic School Enrollment as a Quadratic Function of Catholic Market Shares, NELS:88 and ECLS-K

	Kindergarten		*Eighth Grade*		*High School*	
Variable	(1)	(2)	(3)	(4)	(5)	(6)
% Catholic	0.532***	0.605***	0.987***	0.614***	0.827***	0.322***
	(0.184)	(0.180)	(0.140)	(0.127)	(0.088)	(0.083)
% Catholic squared/100	-0.657***	-0.770***	-0.756***	-0.665***	-0.722***	-0.302***
	(0.292)	(0.298)	(0.164)	(0.171)	(0.089)	(0.113)
Demographic Controls?	N	Y	N	Y	N	Y

Notes:
1) Standard errors, in parentheses, are robust to clustering at the county level.
2) N = 15,205 in the “High School” and “Eighth Grade” specifications involving NELS:88, and N = 10,549 in the “Kindergarten” specifications involving ECLS-K.
3) Estimates marked with “*” are significantly different from zero at the ten percent level, “**”at the five percent level, and “***”at the one percent level.

Table 9. Overall Religious Enrollment Rates as a Quadratic Function of Religious Market Shares, NELS:88 and ECLS-K

	Kindergarten				*Eighth Grade*				*High School*			
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
% Catholic	0.716*	0.427*			0.626*	0.064			0.374*	-0.058		
	(0.287)	(0.191)			(0.201)	(0.136)			(0.171)	(0.100)		
% Catholic squared / 100	-0.804				-0.696*				-0.412*			
	(0.428)				(0.214)				(0.181)			
% Evangelical	0.160	0.017			0.245	0.323			0.295	-0.226		
	(0.414)	(0.234)			(0.388)	(0.206)			(0.332)	(0.173)		
% Evangelical squared / 100	-0.152				-0.376				-0.458			
	(0.616)				(0.559)				(0.479)			
% Mainline	1.067*	0.397			1.077*	0.067			0.660	-0.127		
	(0.501)	(0.241)			(0.381)	(0.180)			(0.321)	(0.156)		
% Mainline squared / 100	-1.978				-2.343*				-1.506*			
	(1.015)				(0.830)				(0.641)			
% Other	0.812	0.420			0.620	0.029			0.716	0.001		
	(0.705)	(0.305)			(0.595)	(0.338)			(0.500)	(0.282)		
% Other squared / 100	-1.205				-0.712				-0.870			
	(1.113)				(0.699)				(0.590)			
Sum of Religions			-0.319				-0.181				-0.124	
			(0.111)				(0.113)				(0.096)	
Herfindahl Index / 100		-0.318	0.390*	0.073		0.161	0.132	0.058		0.294	0.129	0.146
		(0.318)	(0.168)	(0.089)		(0.272)	(0.153)	(0.080)		(0.320)	(0.231)	(0.125)
Demographic controls?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Test 1	0.053				0.107				0.103			
Test 2	0.115				0.127				0.139			

Appendix A: Proofs of Propositions 1-5

A.1 Proof of Proposition 1

From expression (9) in the text,

$$\frac{\partial \theta_j(r_j)}{\partial r_j} = -F'_j(y_j(\bar{x}, r_j, \gamma_j, \omega, \varphi_{jg}))\frac{\partial y_j(\bar{x}, r_j, \gamma_j, \omega, \varphi_{jg})}{\partial r_j}$$

(A1) $$= -F'_j(y_j(\bar{x}, r_j, \gamma_j, \omega, \varphi_{jg})) \times y_j^{1-\delta} \frac{\gamma_j}{(d_0-\alpha)(1-t)^{\delta}}\left[\frac{1-\omega+\varphi_{jg}}{\pi_{jg}^{1-\beta}} - \frac{1-\omega}{\pi_{jj}^{1-\beta}}\right].$$

Note that $\left[\frac{1-\omega+\varphi_{jg}}{\pi_{jg}^{1-\beta}} - \frac{1-\omega}{\pi_{jj}^{1-\beta}}\right]$ is always positive because $\varphi_{jg} > 0$ and $\pi_{jg} < \pi_{jj}$. Because $y_0 = \left(\frac{1-\alpha}{d_0-\alpha}\right)^{\frac{1}{\delta}}\frac{\bar{x}}{1-t}$, $d_0 - \alpha = (1-\alpha)\left(\frac{\bar{x}}{y_0(1-t)}\right)^{\delta}$, which is positive because $\bar{x}$ and y_0 are positive and because $0 < \alpha < 1$ and $0 < t < 1$. Because γ_j is positive, $\frac{\gamma_j}{(d_0-\alpha)(1-t)^{\delta}} > 0$. Finally, $F'_j(\cdot)$,and $y_j(\cdot)$ are also positive, implying that $\frac{\partial \theta_j(r_j)}{\partial r_j} < 0$.

Q.E.D.

A.2 Proof of Proposition 2

In order to show that the share of households from group *j* >0 whose children attend religious schools, θ_j, increases with both φ_{jg} and γ_j, we first consider $\frac{\partial \theta_j}{\partial \gamma_j}$:

$$\frac{\partial \theta_j}{\partial \gamma_j} = -F'_j(y_j(\bar{x}, r_j, \gamma_j, \omega, \varphi_{jg}))\frac{\partial y_j(\bar{x}, r_j, \gamma_j, \omega, \varphi_{jg})}{\partial \gamma_j}$$

$$= F'_j(y_j(\bar{x}, r_j, \gamma_j, \omega, \varphi_{jg})) \times y_j^{1-\delta}\frac{1}{\beta(d_0-\alpha)(1-t)^{\delta}}\left(\pi_{jj}^{\beta} - \pi_{jg}^{\beta}\right).$$

As shown above, $d_0 - \alpha > 0$. Because $r > 0, 0 < t < 1$, and $\pi_{jj} > \pi_{jg}$, $\frac{\partial \theta_j}{\partial \gamma_j} > 0$.

Similarly,

$$\frac{\partial \theta_j}{\partial \varphi_{jg}} = F'_j(y_j(\bar{x}, r_j, \gamma_j, \omega, \varphi_{jg})) \times y_j^{1-\delta}\frac{\gamma_j}{(d_0-\alpha)(1-t)^{\delta}}\pi_{jg}^{\beta-1}(1-r_j) > 0.$$

Q.E.D.

A.3 Proof of Proposition 3

We first show that $\frac{\partial q_j}{\partial r_j} > 0$ when $r_j = 0$ and then show that, as long as

$\kappa_j < \bar{\kappa} \equiv \frac{[1-F(y_0)](d_0-\alpha)(1-t)^\delta}{F'(y_0)\times y_0^{1-\delta}}$, $\frac{\partial q_j}{\partial r_j} < 0$ when $r_j = 1$. From expressions (2) and (3) in the text, $\pi_{jg} = \omega - \varphi_{jg}$ and $\pi_{jj} = \omega$ when $r_j = 0$. Substituting these expressions into (7) yields $y_j = \left[y_0^{\delta} + \frac{\gamma_j \delta}{\beta(d_0-\alpha)(1-t)^\delta}\left((\omega-\phi_{jg})^{\beta} - \omega^{\beta}\right)\right]^{\frac{1}{\delta}}$, which is finite. Therefore, the derivative of θ_j with respect to r_j, given by expression (A1), is also finite. Because $\frac{\partial q_j}{\partial r_j} = \theta_j + r_j \times \frac{\partial \theta_j}{\partial r_j}$, then $\left.\frac{\partial q_j}{\partial r_j}\right|_{r_j=0} = \theta_j = 1 - F_j(y_j) > 0$, implying that q_j initially increases in r_j.

Similarly, from expressions (2) and (3), when $r_j = 1$, both π_{jg} and $\pi_{jj} = 1$, so expression (7) implies that $y_j = y_0$ and $\theta_j = 1 - F_j(y_0)$ when $r_j = 1$. Substituting all these values into (A1) yields

$$\left.\frac{\partial \theta_j(r_j)}{\partial r_j}\right|_{r_j=1} = -F_j'(y_0)\times y_0^{1-\delta}\,\frac{\kappa_j}{(d_0-\alpha)(1-t)^\delta} \; .$$

Because $\frac{\partial q_j}{\partial r_j} = \theta_j + r_j \times \frac{\partial \theta_j}{\partial r_j}$,

$$\left.\frac{\partial q_j}{\partial r_j}\right|_{r_j=1} = \theta_j + \left.\frac{\partial \theta_j(r_j)}{\partial r_j}\right|_{r_j=1} = 1 - F_j(y_0) - F_j'(y_0)\times y_0^{1-\delta}\,\frac{\kappa_j}{(d_0-\alpha)(1-t)^\delta} \, ,$$

which is negative if and only if $\kappa_j > \frac{[1-F_j(y_0)](d_0-\alpha)(1-t)^\delta}{F'_j(y_0)\times y_0^{1-\delta}} \equiv \bar{\kappa}$.

Q.E.D.

We next state a lemma which characterizes the conditions under which Proposition 3 guarantees that q_j is an inverse *u*-shaped function of r_j.

Lemma 1. When $\beta = 1$, q_j is concave in r_j for every r_j if and only if

(A2) $$-\frac{\partial f_j(y_j)/\partial r_j}{f_j(y_j)} y_j < 1 - \delta + \frac{2(d_0 - \alpha)(1-t)^\delta y_j^\delta}{r_j \gamma_j \varphi_{jg}}.$$

Proof. The enrollment rate in schools of denomination *j*, q_j, is concave in r_j if and only if the second derivative with respect to r_j is negative. Because $q_j \equiv r_j \times \theta_j(r_j)$, it is straightforward to show that this condition holds if and only if

(A3) $$\theta_j'' < -2\theta_j'/r_j.$$

Differentiating θ_j with respect to r_j, using equation (9), yields

(A4) $$\theta_j' = -f(y_j) \times y_j'$$

and

(A5) $$\theta_j'' = -f'(y_j) \times (y_j')^2 - f(y_j) \times y_j'',$$

where y_j' and y_j'' refer to the first and second derivatives of y_j with respect to r_j, respectively. Substituting (A5) and (A4) into (A3) and rearranging yields

(A6) $$-f'(y_j)/f(y_j) < \frac{y_j'' + 2/r_j \times y_j'}{(y_j')^2}.$$

Assuming that $\beta = 1$, expression (7) shows that the expression for the threshold income simplifies to

(A7) $$y_j = \left[y_0(\bar{x})^\delta + D_j \delta(r_j - 1)\right]^{1/\delta},$$

where $D_j = \frac{\gamma_j \times \phi_{jg}}{(d_0 - \alpha)(1-t)^{\delta}}$.

Taking the first and second derivative of (A7) with respect to r_j yields

(A8) $y_j' = y_j^{1-\delta} \times D_j$

and

(A9) $y_j'' = (1-\delta) \times y_j^{1-2\delta} \times D_j^2$.

Substituting (A8) and (A9) into (A6) and performing some simple algebra, we obtain that concavity holds if and only if

(A10) $-\frac{f'(y_j)}{f(y_j)} y_j < 1 - \delta + \frac{2}{r_j D_j} y_j^{\delta} = 1 - \delta + \frac{2(d_0 - \alpha)(1-t)^{\delta} y_j^{\delta}}{r_j \gamma_j \varphi_{jg}} > 0..$

Q.E.D.

Next we characterize when condition (A10) holds under 3 different income distributions: uniform, log-normal, and Pareto.

Uniform Distributions

For any uniform income distribution, $f'(y_j) = 0$, and thus (A10) strictly holds.

Log-Normal Distributions

A log-normal income distribution has density

$$f(y) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left[-\frac{(\ln y - \mu)}{2\sigma^2}\right]$$

Thus, in this case (A10) holds if

(A11) $-\frac{f'(y_j)}{f(y_j)} y_j = \frac{1}{2\sigma^2} < (1-\delta) + \frac{2}{r_j D_j}\left[y_0^{\delta} + D_j \delta (r_j - 1)\right].$

Epple and Romano (1996) calibrate a value of $\delta = -0.54$. They mention that this value is also consistent with the elasticity of substitution reported by Rubinfeld and Shapiro (1989). Because $\delta < 0$, the right-hand side of (A11) is a decreasing function of r_j. Thus, to show that concavity holds for every value of r_j, it suffices to show that it holds for $r_j = 1$. Substituting $r_j = 1$ in (A11) yields

(A12) $$\frac{1}{2\sigma^2} < 1 - \delta + \frac{2y_0^\delta}{D_j}.$$

In a lognormal distribution, σ can be expressed as a function of the logarithm of the median to mean income ratio

(A13) $$\sigma^2 = -2\ln\left(y^m / \bar{y}\right)$$

Substituting (A13) into (A12) yields the following testable condition:

$$\ln\left(y^m / \bar{y}\right) > -\frac{1}{4\left(1 - \delta + 2y_0^\delta / D_j\right)}$$

As we demonstrate in the text, for our calibrated parameter values this condition holds for each of the denominations for more than 99% of the counties in the U.S.

Pareto Distributions

Finally, we consider the case of a Pareto distribution, which implies that expression (A10) can be written as

(A14) $$\frac{-f'(y_j)}{f(y_j)} y_j = a + 1 < \left(1 - \delta\right) + \frac{2y_0^\delta}{D_j},$$

where *a* is the shape parameter of the Pareto distribution. This condition implies that

(A15) $$a < \frac{2y_0^\delta}{D_j} - \delta.$$

As in the case of the log-normal distribution, in a Pareto distribution the median to mean income ratio can be expressed as a monotonic increasing function of the shape parameter: $y^m / \bar{y} = (1 - 1/a) \times 2^{1/a}$. As a result, condition (A15) is equivalent to requiring that the median to mean income ratio is above a threshold value.

A.4 Proof of Proposition 4

In Table A1 we provide a transition matrix that reports the distribution of religions at generation $t + 1$ among groups of households with different religions and school-choice decisions at generation t. For example, the market share of the secular group at generation $t + 1$ is obtained by multiplying the share in the generation t population of each household type (given by the combination of household religion and school choice), shown in column (3), by the share of each generation t household type that will belong to the secular group at generation $t + 1$, shown in column (4). These products are then summed across all household types. Formally, the market share of the secular group at generation $t + 1$ is

$$\text{(A16)} \quad \begin{aligned} r_0^{t+1} &= r_0^t[(\omega-\varphi_0)+(1-\omega+\varphi_0)r_0^t]+\sum_{j=1}^{n} r_j^t[(1-\theta_j^t(r_j^t))((1-\omega+\varphi_{jg})r_0^t] \\ &\quad +\sum_{j=1}^{n} r_j^t[\theta_j^t(r_j^t)(1-\omega)r_0^t], \end{aligned}$$

where the first term in (A16) reflects those who were secular in generation t and remained secular in t+1 (obtained by multiplying columns (3) and (4) in the "j=0" row of the table); the second term represents those who belonged to other denominations, attended public schools, and became secular; and the last term reflects those who belonged to other denominations, attended religious schools, and nevertheless became secular. After some algebraic manipulations, we can rewrite (A16) as

$$\text{(A17)} \quad r_0^{t+1} = r_0^t[1-\varphi_0(1-r_0^t)+\sum_{j=1}^{n} r_j^t(1-\theta_j^t(r_j^t))\varphi_{jg}],$$

If $\varphi_0 = 0$ then r_0^{t+1} will be greater than r_0^t as long as any r_j^t is strictly positive because $\varphi_{jg} > 0$ and $\theta_j^t(r_j^t) < 1$. As t approaches infinity, $r_j^t = 0 \; \forall j$ and $r_0^{t+1} = r_0^t = 1$.

A.5 Proof of Proposition 5

We next consider the steady state when $\varphi_0 > 0$, that is, when the probability of successful vertical socialization is smaller for secular families than for religious families. In this case, the market share of denomination *k* at generation *t* + 1 is obtained by multiplying the population share of each household type, given in column (3) of Table 1, by the fraction of those households that will belong to denomination *k* at generation *t* + 1, given in column (5), and then summing across all household types:

$$\begin{aligned}(\text{A18})\quad r_k^{t+1} &= r_k^t(1-\theta_k^t(r_k^t))[(\omega-\varphi_{kg})+(1-\omega+\varphi_{kg})r_k^t]+r_k^t\times\theta_k^t(r_k^t)(\omega+(1-\omega)r_k^t)\\ &+\sum_{\substack{j=1,\\ j\neq k}}^{n} r_j^t[(1-\theta_j^t(r_j^t))((1-\omega+\varphi_{jg})r_k^t]+\sum_{\substack{j=1,\\ j\neq k}}^{n} r_j^t\times\theta_j^t(r_j^t))(1-\omega)r_k^t]\\ &+r_0^t\times(1-\omega+\varphi_0)r_k^t.\end{aligned}$$

The first term after the equality in (A18) reflects those who belonged to denomination *k*, attended public schools, and remained in denomination *k*; the second term reflects those who belonged to denomination *k*, attended religious schools of their denomination, and remained in denomination *k*; the third and fourth terms reflect those who moved from denomination *j* to denomination *k* after attending public and religious schools, respectively, and the final term reflects those who were secular and moved to denomination *k*.

The steady state is defined by $r_j^{t+1}=r_j^t\equiv r_j\ \forall j=1,\dots,k,\dots,n.$ Substituting into (A18) and rearranging, we find that the market share of all denominations *k* is in steady state when

$$(\text{A19})\quad \varphi_{kg}(1-\theta_k(r_k))=r_0\varphi_0+\sum_{j=1}^{n} r_j\times(1-\theta_j(r_j))\varphi_{jg}.$$

Because expression (A19) holds for every denomination, it implies that the market shares of all denominations are in steady state when

$$(\text{A20})\quad \varphi_{jg}(1-\theta_j(r_j))=\varphi_0\ \forall j.$$

Appendix B: Calibration-Estimation Exercise

In this section we pursue a combined calibration-estimation exercise based on county level data in the U.S. We have two purposes for this calibration. First, Proposition 3 shows that if $\kappa_j > \bar{\kappa}(\alpha,\delta,\bar{x},t) = \frac{(1-F(y_0))(d_0-\alpha)(1-t)^{\delta}}{F'(y_0)y_0^{1-\delta}}$, then q_j is increasing in r_j up to its maximal value at an interior value of r_j, then is decreasing in r_j. Thus, in order to check whether this condition holds for each denomination we must calibrate both $\bar{\kappa}$ and the value of κ_j for each denomination.

Moreover, even $\kappa_j > \bar{\kappa}(\alpha,\delta,\bar{x},t)$ holds for a specific denomination, Proposition 3 is silent about whether there is only one peak in q_j as a function of r_j. In order to test whether the relationship between q_j and r_j is inversely *u*-shaped and where it peaks, i.e., when the conditions underlying Lemma 1 hold, we calibrate the model and simulate this relationship for each denomination using the calibrated parameters. The calibrated model also shows that $q_j(r_j)$ is almost perfectly quadratic in r_j for all groups *j*.

We start the calibration by deriving, for each county *c*, the per-household expenditure on public schools, $\bar{x}_c$. Since data on public spending per student is not available at the county level we use school-district level data from the Local Educational Agency (School District) finance Survey (F-33) and aggregate those data to the county level.[16] Then, we multiply this variable by the number of school-age children per household, which is constructed by multiplying the share of the county population that is of school age by the ratio of persons per household in each county (both variables are available from the County and City Data Book 2000). For example, public spending per student in Autauga County, Alabama, was

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[16] Available at http://nces.ed.gov/ccd/f33agency.asp.

$4,716.90 in 2000. In addition, 21.7% of the county residents were of school age in 2000, and the ratio of persons per households was 2.71. These two numbers imply that there were about 0.588 school-age children per household. Multiplying public spending per student by this number, public spending per household $\bar{x}$ = $2773.87.

Assuming a balanced budget, the value of $\bar{x}_c$ corresponds to $t_c \times \bar{y}_c / q_{g,c}$, where $q_{g,c}$ denotes the public enrollment rate at county c. Thus, we can calibrate the tax rate of each county by multiplying its value of $\bar{x}_c$ by its public enrollment rate and dividing it by the county mean income. For example, in Autauga the pubic enrollment rate was 0.962 and mean income was $50,151, so its tax rate was 5.32%.

Assuming that the distribution of income in each county y_c is lognormal, $\ln y_c \sim N\left(\mu_{y,c}, \sigma^2_{y,c}\right)$, we calibrate $\mu_{y,c}$ and $\sigma^2_{y,c}$ from median and mean household income in the county in 1999, noting that in a lognormal distribution $\mu_{y,c} = \ln(y_{m,c})$ and $\sigma^2_{y,c} = -2\ln(y_{m,c} / \bar{y}_c)$, where $y_{m,c}$ and $\bar{y}_c$ denote the county median and mean household income, respectively.[17] For example, the values of these variables for Autauga county are y_m = $42,013 and $\bar{y}$ = $50,151, implying that $\mu_y = 10.65$ and $\sigma_y = 0.595$. We set $\delta = -\ 0.54$, which is the calibrated value used in Epple and Romano (1996). As Epple and Romano (1996) mention, this value of δ implies an elasticity of substitution between consumption and educational services of –0.65, which is within the range of price elasticity estimates, ranging from –0.43 to –0.719, reported by Rubinfeld and Shapiro (1989).

Next, we set the value of α based on the minimum distance estimator using county level observed and predicted secular enrollment rates (we weight each county according to its size of the population):

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[17] Available at http://factfinder.census.gov/faces/nav/jsf/pages/download_center.xhtml.

$$\hat{\alpha} = \arg\min_{\alpha} \sum_{c=1}^{3118} pop_c \cdot \left[\hat{q}_{0c}(\alpha, \delta = -0.54, \bar{x}_c, r_{0,c}, \mu_c, \sigma_c) - q_{0c}\right]^2.$$

Then, using the calibrated parameters of α and δ, which equal 0.9939 and -0.54, respectively, we find for each county the value of

$$\bar{\kappa}_c(\alpha = 0.9939, \delta = -0.54, \bar{x}_c, r_{0,c}, t_c, \mu_c, \sigma_c).$$

For the calibration we assume that the utility function is linear in *z* and thus set β to be equal to one. This assumption simplifies the expression for y_j given in (7) above to

$$y_{j,c}(\bar{x}_c, r_{j,c}, \gamma_j, \varphi_{jg}) = \left[\left(\frac{1-\alpha}{d_0 - \alpha}\right)\left(\frac{\bar{x}_c}{1-t}\right)^{\delta} + \frac{\kappa_j \delta (r_{j,c} - 1)}{(d_0 - \alpha)(1-t_c)^{\delta}}\right]^{\frac{1}{\delta}},$$

where $y_{j,c}$ is no longer a function of ω.

Finally, once we obtain the calibrated value of α, all the other quantities are observable apart from κ_j, so we estimate values of κ_j based on a minimum distance estimator using county-level observed and predicted enrollment rates. For example, for Catholics, we estimate κ_j as follows:

$$\hat{\kappa}_{Cath} = \arg\min_{\kappa_{Cath}} \sum_{c=1}^{3118} pop_i \cdot \left[\hat{q}_{Cath,c}(\hat{\alpha}, \delta, \beta = 1, \bar{x}_c, r_{jc}, \mu_c, \sigma_c, \kappa_{Cath}) - q_{Cath,c}\right]^2,$$

where $\hat{q}_{Cath,c}$ denotes the predicted Catholic school enrollment rate in county *c* for a given value of κ_{Cath}, and $q_{Cath,c}$ denotes the actual Catholic school enrollment rate in county *c*. We estimate values of κ_j for Evangelical and Mainline Protestants similarly.

The calibrated values are $\kappa_{Catholic} = 0.000188$, $\kappa_{Evangelical} = 0.000135$, and $\kappa_{Mainline} = 0.0000342$. Most notably, Mainline Protestants' value of κ_j is equal to less than one-fifth of that of Catholics and about a quarter of that of Evangelicals. In addition, the values of κ_j are always larger than $\bar{\kappa}_c$ for all counties, except for Mainlines where for 8 counties κ_j is less than $\bar{\kappa}_c$.

Finally, we use the calibrated parameters to simulate the relationship between q_j and r_j for each *j*. Figure A1 shows that the relationship between q_j and r_j is approximately quadratic for Catholic and Evangelicals but appears to be approximately linear among Mainlines. As shown in the text, when κ_j =0, the relationship between q_j and r_j is perfectly linear. Similarly, if κ_j is very small, as is the case for Mainlines, the relationship between q_j and r_j is "close" to linear.

Finally, we note that, in order to simulate the relationship between θ_j and r_j, we only needed to identity κ_j and not its components γ_j and ϕ_{jg}. However, for a given value of ϕ_0, by assuming that the market shares that we observe are in steady state, we are able to identify the components of κ_j as well. In the steady state, equation (19) showed that the market share of each denomination *j*, $r_j^{s.s}$, is implicitly defined by $\varphi_0 = \varphi_{jg}(1-\theta_j(r_j^{s.s}))$. Thus, we can calibrate the values of each φ_{jg} based on a minimum distance estimator using county-level observed and predicted market shares. For example, for Catholics,

(A2) $$\hat{\phi}_{Cathg} = \arg\min_{\phi_{Cathg}} \sum_{c=1}^{3118} pop_i \cdot \left[r_{cathg}^{s.s} - r_{cath}^{observed}\right]^2,$$

Then, we can compute γ_j by dividing κ_j by ϕ_{jg} for each denomination *j*. Because of space limitations we do not pursue this exercise here.

Table A1. The Probability of Belonging to Each Religion in Generation *t* + 1 as a Function of Household Religion and School Choice in Generation *t*.

Household type at generation t			Distribution of religions at generation *t* + 1		
(1)	(2)	(3)	(4)	(5)	(6)
Household's religion	School choice at generation *t*	Share in the population at generation *t*	$j=0$	$j=k$	$j=1,....,n$ $j \neq k$
$j=0$	Secular schooling (public or private)	r_0^t	$(\omega-\varphi_0)+(1-\omega+\varphi_0)\times r_0^t$	$(1-\omega+\varphi_0)\times r_k^t$	$(1-\omega+\varphi_0)\times r_j^t$
$j=k$	Public schooling	$r_k^t \times (1-\theta_k^t(r_k^t))$	$(1-\omega+\varphi_{kg})\times r_0^t$	$(\omega-\varphi_{kg})+(1-\omega+\varphi_{kg})\times r_k^t$	$(1-\omega+\varphi_{kg})\times r_j^t$
	Religious schooling of denomination *k*	$r_k^t \times \theta_k^t(r_k^t)$	$(1-\omega)\times r_0^t$	$\omega+(1-\omega)\times r_k^t$	$(1-\omega)\times r_j^t$
$j=1,....,n$ $j \neq k$	Public schooling	$r_j^t \times (1-\theta_j^t(r_j^t))$	$(1-\omega+\varphi_{jg})\times r_0^t$	$(1-\omega+\varphi_{jg})\times r_k^t$	$(\omega-\varphi_{jg})+(1-\omega+\varphi_{jg})\times r_j^t$
	Religious schooling of denomination *j*	$r_j^t \times \theta_j^t(r_j^t)$	$(1-\omega)\times r_0^t$	$(1-\omega)\times r_k^t$	$\omega+(1-\omega)\times r_j^t$

Table A2. First-Stage Estimates of Each of the Religious Market Shares on Ancestral Shares

VARIABLES	Catholic	Evangelical	Mainline
Acadian Cajun	8.954***	-2.304**	-2.257***
	(1.326)	(1.093)	(0.507)
Afghan	-7.830***	-6.465***	-1.935
	(2.764)	(2.296)	(1.580)
Albanian	7.845	2.273	-2.577
	(5.982)	(3.713)	(2.630)
Alsatian	7.959***	-2.458	-0.247
	(2.439)	(1.607)	(0.711)
Arab	3.831**	-2.112*	-0.154
	(1.541)	(1.204)	(0.577)
Armenian	6.412***	-2.783***	-0.874*
	(1.394)	(1.008)	(0.506)
Assyrian Chaldean Syriac	0.376	0.139	0.489
	(1.549)	(1.937)	(0.886)
Australian	16.816**	-16.884***	-2.327
	(7.017)	(4.854)	(3.587)
Austrian	2.808	0.962	-2.663***
	(1.938)	(1.773)	(0.860)
Basque	1.266	-4.509***	-5.657***
	(2.866)	(1.262)	(1.580)
Belgian	0.939***	-0.212	-0.447**
	(0.338)	(0.189)	(0.172)
Brazilian	1.451	1.310	2.717*
	(4.969)	(1.962)	(1.444)
British	-0.665	2.624	2.921**
	(2.215)	(1.892)	(1.277)
Bulgarian	-10.948	-12.570*	-6.253
	(13.653)	(6.482)	(4.831)
Canadian	1.253	-2.520	-5.825***
	(3.550)	(2.252)	(1.603)
Celtic	5.655	-10.389*	-5.896**
	(7.474)	(5.765)	(2.633)
Croatian	1.782	-2.375**	-1.365
	(1.803)	(1.118)	(0.987)
Cypriot	-49.962	23.735	29.346
	(33.505)	(36.173)	(20.983)
Czech	1.433***	0.275	-0.053
	(0.440)	(0.439)	(0.185)
Czechoslovakian	-9.190***	0.248	-0.844
	(2.976)	(3.236)	(1.309)
Danish	0.638	0.042	0.186
	(0.389)	(0.288)	(0.435)
Dutch	-0.272*	0.144	0.047
	(0.137)	(0.098)	(0.108)
English	-0.283	-0.503***	-0.089
	(0.221)	(0.150)	(0.118)
Estonian	-12.767	-9.354	-4.557
	(10.019)	(6.615)	(6.818)

European	-3.422***	1.310	-2.814***
	(1.073)	(1.202)	(0.741)
Finnish	0.101	0.126	-0.046
	(0.169)	(0.119)	(0.194)
French except Basque	0.333**	0.076	-0.426***
	(0.144)	(0.187)	(0.113)
French Canadian	1.389***	-1.027***	0.639**
	(0.487)	(0.329)	(0.311)
German	0.355***	-0.389**	0.073
	(0.124)	(0.149)	(0.060)
GermanRussian	4.232	1.620	-2.347
	(3.703)	(7.980)	(2.734)
Greek	0.561	-2.438*	0.972
	(1.600)	(1.284)	(0.703)
Guyanese	3.135	0.428	-0.560
	(3.823)	(1.357)	(1.034)
Hungarian	-1.501**	-1.803***	-0.445
	(0.717)	(0.640)	(0.377)
Icelander	3.415**	-1.559*	0.969
	(1.412)	(0.845)	(1.194)
Iranian	-0.071	3.170*	-0.421
	(2.523)	(1.681)	(1.085)
Irish	0.686***	0.216	-0.425***
	(0.178)	(0.214)	(0.091)
Israeli	13.787*	-18.318***	0.640
	(7.427)	(4.440)	(3.676)
Italian	0.694***	-0.646***	-0.083
	(0.130)	(0.229)	(0.075)
Latvian	11.814	2.383	6.741
	(9.349)	(4.662)	(4.240)
Lithuanian	-0.497	-2.063	0.549
	(1.681)	(1.500)	(0.602)
Luxemburger	6.002*	0.716	0.586
	(3.007)	(2.295)	(0.995)
Macedonian	-17.523**	13.907***	4.567
	(8.471)	(3.675)	(4.003)
Maltese	-40.892***	9.424	2.168
	(9.688)	(6.383)	(3.397)
Norwegian	-0.203**	-0.053	0.595***
	(0.086)	(0.114)	(0.095)
Pennsylvania German	-1.576***	-0.531	2.524***
	(0.401)	(0.619)	(0.336)
Polish	0.448**	0.208*	-0.400***
	(0.179)	(0.112)	(0.100)
Portuguese	0.706***	-0.317**	-0.429***
	(0.204)	(0.123)	(0.091)
Romanian	-7.271**	0.258	-1.690
	(3.594)	(2.343)	(1.128)
Russian	1.351**	-0.123	0.393
	(0.534)	(0.323)	(0.265)
Scandinavian	3.508*	0.823	-9.607***
	(1.823)	(1.665)	(1.777)
ScotchIrish	-2.058***	3.438***	1.904***
	(0.702)	(0.870)	(0.215)

Scottish	-0.930	-2.493***	-0.695*
	(0.658)	(0.786)	(0.380)
Serbian	0.195	-4.116	-1.585
	(2.201)	(2.855)	(1.655)
Slavic	4.545	-10.147**	-0.282
	(3.816)	(4.565)	(2.024)
Slovak	2.097***	1.291*	0.825**
	(0.548)	(0.674)	(0.381)
Slovene	0.426	1.582**	-0.455
	(0.865)	(0.694)	(0.307)
Sub-Saharan African	-2.440**	-0.550	1.418***
	(1.015)	(0.577)	(0.436)
Swedish	-0.408***	-0.271	0.487***
	(0.151)	(0.238)	(0.145)
Swiss	0.067	0.160	-0.535*
	(0.357)	(0.643)	(0.272)
Turkish	-1.842	6.710*	3.090
	(8.066)	(3.810)	(3.256)
Ukrainian	0.820	-1.185*	0.803
	(1.516)	(0.699)	(0.550)
United States or American	-0.315	0.593**	-0.446***
	(0.246)	(0.276)	(0.106)
Welsh	-1.516**	-3.124***	0.136
	(0.647)	(1.045)	(0.333)
West Indian non-Hispanic	-0.401	-0.654***	-0.692***
	(0.829)	(0.224)	(0.157)
Yugoslavian	-2.545	0.189	-2.193***
	(2.229)	(1.619)	(0.787)
Other ancestries	0.347**	-0.225*	-0.289***
	(0.156)	(0.113)	(0.051)
Observations	3,138	3,138	3,138
F statistic	191.6	117.8	95.4
R-squared	0.805	0.717	0.672

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A3. Tests of Proposition 1: Denomination-Specific Enrollment Rates into Religious Schools – Inverse Hyperbolic Sine Transformation

	Elementary		Secondary		Overall	
Variables	OLS	2SLS	OLS	2SLS	OLS	2SLS
	Catholic school enrollment					
% Catholic	0.667***	0.829**	0.382***	0.638***	0.699**	0.868*
	(0.105)	(0.090)	(0.109)	(0.140)	(0.114)	(0.094)
R-Squared	0.792	0.789	0.725	0.727	0.799	0.795
Observations	3,118	3,118	3,118	3,118	3,118	3,118
	Evangelical school enrollment					
% Evangelical	0.514***	0.368***	0.401***	0.404***	0.526***	0.377***
	(0.100)	(0.116)	(0.088)	(0.113)	(0.103)	(0.112)
R-Squared	0.793	0.787	0.747	0.746	0.785	0.78
Observations	3,118	3,118	3,118	3,118	3,118	3,118
	Mainline school enrollment					
% Mainline	0.509***	0.413**	0.555***	1.255	0.512***	0.399**
	(0.172)	(0.306)	(0.177)	(0.387)	(0.191)	(0.315)
R-Squared	0.671	0.669	0.420	0.432	0.648	0.646
Observations	3,118	3,118	3,118	3,118	3,118	3,118

Notes:
1) Standard errors, in parentheses, are robust to clustering at the state level.

2) Demographic controls include median income, density of population, percent of population at school-age, percent African–Americans in the population, percent Hispanics in the population, population, percent of population that lives in a rural area, average number of people per household and public expenditure per student, as well as their square terms.

3) Estimates marked with "*" are significantly lower from one at the ten percent level, "**"at the five percent level, and "***"at the one percent level.

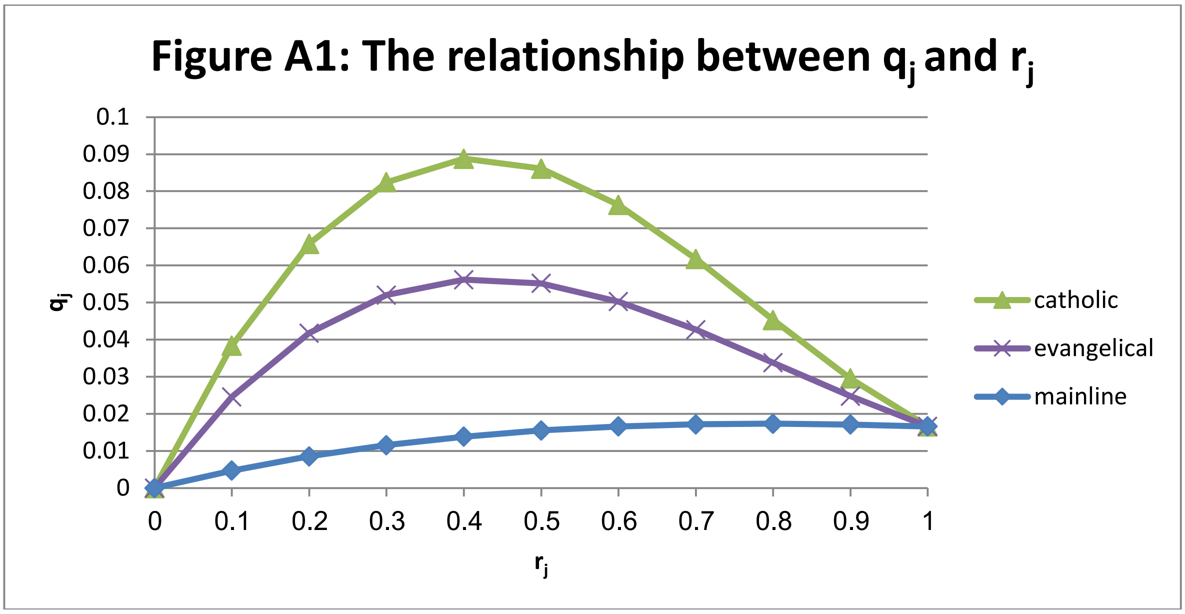
Figure A1: The relationship between q_j and r_j
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
q_j
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
r_j
catholic
evangelical
mainline