The Economics of Religious Altruism: The Role of Religious Experience

Working Paper

Timothy T. Brown, PhD
University of California, Berkeley
September 2009

tbpetris@berkeley.edu

Abstract: Altruism has many motivations, including religious motivations. Perceived religious experience plays a strong role in the life of many religious individuals in the U.S. and can be a strong motivator of altruistic behavior. Religious altruistic behavior can be described by an economic theory of religious/spiritual health. Empirical tests using a theoretically and statistically valid set of instrumental variables show a strong causal link between perceived religious experience and the frequency of altruistic acts. An additional weekly event during which an individual perceives feelings of love that they believe come directly from God results in individuals increasing their altruistic acts by an average of 4.7% over a one-year period.

JEL Classification Codes: D64, Z12
Keywords: altruism, religion, prayer, church attendance, godly love

Financial support for this study was provided in part by the Flame of Love Project, a project funded by the John Templeton Foundation.

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I. Introduction

From the very beginnings of the discipline of economics, altruism has been a topic of major interest (Kolm, 2006). Altruism can be defined in terms of motivation as "…the desire to enhance the welfare of others at a net welfare loss to oneself," or behaviorally as "any act that could have resulted from altruistic motivations" (Elster, 2006). While most economic theories are based on self-interest, economic models can be built which incorporate both self-interested and altruistic motivations and behaviors. Empirically, such models are supported by studies in experimental economics which have shown that motivations other than self-interest are often behind individuals' actions (Fehr and Schmidt, 2006).

As Kolm (2006) notes, altruism can be categorized as normative or natural (hedonic). Normative altruism includes altruism based on values and norms, which are, in turn, based on everything from intuition to non-moral social values/norms to rational moral principles. Natural altruism includes affective altruism (affection), pure hedonistic altruism (empathy or emotional contagion) and moral hedonistic altruism (compassion and pity). Religious altruism can be seen as a subset of both normative and natural altruism. Each of the three major monotheistic religions (Judaism, Christianity, and Islam) both prescribes and proscribes behavior based on clear sets of normative principles. In addition, each tradition prescribes spiritual practices such as prayer and attendance at religious services that can produce subjective religious experiences with a significant emotional component. Such religious experiences can, in turn, lead to altruistic acts. Such altruistic acts would be both normative (as each tradition would prescribe

appropriate altruistic acts) and natural (as altruistic acts may be based on emotional contagion resulting from religious experiences).

While the literature on the economics of altruism is broad (see Kolm and Ytheir (2006) for extensive literature reviews), there is no published examination to date within the field of economics that addresses the question of the role of subjective religious experience as a motivator for altruistic acts. This paper serves as a starting point to examine whether there is a causal connection between religious experience and altruism using a theoretical framework that situates altruism in the context of the demand for religious/spiritual health. Using recently collected and nationally representative data, I estimate a model of the demand for altruistic acts as well as a religious/spiritual health production function.

II. Theoretical model

Altruism, within the framework of the three Western Monotheistic religions (Christianity, Judaism, and Islam), is a religious duty, that may or may not be influenced by religious experience. In this section, the demand for altruistic behavior as a function of religious experience is derived from the demand for religious/spiritual health model developed by Brown (2009). Brown's (2009) model is derived from Grossman's (1972) model of the demand for physical health as interpreted by Nocera and Zweifel (1998), Zweifel and Breyer (1997) and Muurinen (1982).

Religious individuals maximize their lifetime utility:

$$\int_0^T e^{-\rho t} U[(s(R(t)), Z(t)] \tag{1}$$

where T is total life expectancy, ρ is a time discount factor, U is utility, s is spiritually "sick" time, R is religious/spiritual health, t is time, and Z is a composite consumption commodity.

Religious/spiritual health is defined as the perception of being strongly connected to God. Religious/spiritual health increases utility. Spiritual "sick" time is assumed to occur when an individual is slack in religious practices that cultivate the perception of being strongly connected to God such as prayer, attendance at religious services, and altruistic acts. Spiritually "sick" time occurs when an individual perceives that they are not sufficiently connected to God. The composite commodity *Z* increases utility. The first derivatives of the utility function are thus as follows:

$$\frac{\delta U(t)}{\delta s(t)} < 0, \frac{\delta U(t)}{\delta R(t)} > 0, \frac{\delta U(t)}{\delta Z(t)} > 0, \tag{2}$$

Cross-partial restrictions are as follows:

$$\frac{\delta^2 U(t)}{\delta s(t)\delta Z(t)} > 0, \frac{\delta^2 U(t)}{\delta R(t)\delta Z(t)} > 0. \tag{3}$$

These restrictions state that utility increases as the composite good increases regardless of the amount of religious sick time or the level of religious/spiritual health. In other words, the composite good unambiguously increases utility in all states of the world.

Finally, religious/spiritual health reduces spiritually "sick" time,

$$\frac{\delta s(t)}{\delta R(t)} < 0. \tag{4}$$

An individual starts life with a zero stock of religious/spiritual health capital, which changes over time,

$$\dot{R}(t) = C(t) - \delta(t)R(t), \tag{5}$$

where spiritual practices such as prayer, attendance at religious services, and altruistic acts are represented by $C(.)$. Depreciation, $\delta(t)$, occurs naturally as a function of time.

Spiritual disinterest occurs when religious/spiritual health capital, $R(t)$, dips below a minimum point. Most religious individuals, believing that death is not the cessation of existence; tend to behave in a way such that T is very long (but finite in length due to a degree of myopia) if they invest sufficiently in $C(.)$. .

$$T = \min\{t: \bar{R}(t) \leq R(t)\} \tag{6}$$

Financial asset accumulation is described as follows:

$$\dot{A}(t) = rA(t) + Y[s(R(t)), t))] - \pi^C(t)C(t) - \pi^Z(t)Z(t) \tag{7}$$

This stock of financial assets increases over time according to the sum of interest income, $rA(t)$, and income from market work, $Y(t)$, less the sum of expenditures on $C(t)$, religious/spiritual investment goods, and $Z(t)$, consumption goods. The price of religious/spiritual investment goods (where the main opportunity cost if the value of one's time) is the market wage rate, $w(t)$: $\pi^C(t) = w(t)$. The price of consumption goods is $\pi^Z(t)$.

The relationship of income from market work and spiritual "sick" time is as follows:

$$\frac{\delta Y(t)}{\delta s(t)} \geq 0. \tag{8}$$

Spiritual "sick" time tends to increase as an individual's income from market work increases. This is because the more spiritual a person becomes (oriented towards existence after death) the less time they spend in income-generating activities and the more time they spend in spiritual practices.

The individual chooses time paths for $R(t)$ and $Z(t)$ subject to the constraints (5), (6), and (7). The solution to this problem yields the following optimality condition:

$$\left[\frac{\delta U(t)/\delta s(t)}{\lambda(0)} e^{-(\rho-r)t}\right]\frac{\delta s(t)}{\delta R(t)} = \left[r+\delta(t)-\frac{\delta \dot{\pi}^{C}(t)}{\delta \pi^{C}(t)}\right]\pi^{C}(t) - \frac{\delta Y(t)}{\delta s(t)}\frac{\delta s(t)}{\delta R(t)} \qquad (9)$$

where $\lambda(0)$ is the marginal effect of relaxing the asset constraint (7). Condition (9) simply states that the marginal benefits of religious/spiritual health (left-hand side) must equal the marginal cost of religious/spiritual health (right-hand side). The left-hand side represents the utility of better religious/spiritual health. The first part of the right hand side is the forgone interest on the alternative use of funds, the depreciation that must be made up for by expenditures, and $\frac{\delta \dot{\pi}^{C}(t)}{\delta \pi^{C}(t)}$ stands for the change in the value of religious/spiritual health in monetary terms. The last term represents the potentially decreased level of income that is a cost of religious/spiritual health.

Here, we focus on the pure consumption model, where $\frac{\delta Y(t)}{\delta s(t)} = 0$. This model describes the level of religious/spiritual health people demand when there is no decrease in income from participation in spiritual practices (income is held constant). Taking the logarithms of both sides of (9), the following equation is derived:

$$\ln\left[\frac{\delta U(t)}{\delta s(t)}\frac{\delta s(t)}{\delta R(t)}\right] - \ln\lambda(0) - (\rho - r)t = \ln\delta(t) + \ln\pi^{C}(t) - \ln\psi(t), \qquad (10)$$

where $\ln\psi(t) = \delta(t)/[r + \delta(t) - \dot{\pi}^{C}(t)/\pi^{C}(t)]$. In order to transform (10) into an equation that can be estimated the functional forms of $\delta(.)$, $C(.)$, and $\pi(.)$ must be determined.

Depreciation of religious/spiritual health is defined as follows:

$$\ln\delta_i(t) = \ln\delta_0 + \beta_1 t, \qquad (11)$$

where $\beta_1 < 0$ since the older an individual is, the more aware they are of life after death and the more importance it holds for them.

$C(.)$ is assumed to be a Cobb-Douglas constant returns-to-scale production function produced by a combination of one's own time and spiritual practices, the marginal cost function of which is as follows:

$$\ln\pi^C(t) = (1 - \beta_2)\ln w_i(t) + \beta_2 \ln P_i^R(t) + \beta_3 E_i \quad (12)$$

where $w_i(t)$ is the opportunity cost of one's time, measured by implicit wages, and $P_i^R(t)$ is the price of religious participation, defined as 10% of one's income (the traditional tithe of both Judaism and Christianity).[1] Education is E_i, which reduces technical inefficiency. It is thus assumed that $0 < \beta_2 < 1$ and $\beta_3 > 0$.

Using (5), (10)-(12) the structural demand for religious altruism can be derived

$$\ln C_i(t) = \beta_4 + \ln R_i(t) - (1 - \beta_2)\ln w_i(t) - (1 - \beta_2)\ln P_i^R(t) + \beta_3 E_i + \beta_1 t + u_{1i} \quad (13)$$

where $\beta_4 = -(1- \beta_2)\ln[(1- \beta_2)/\beta_2)$, and $u_{1i} = \gamma \ln\delta_0 + \ln[R(t)/ \delta_i(t)]$.

Finally, the religious/spiritual health production function (5) is assumed to be, consistent with the above assumption concerning $C(.)$, a Cobb-Douglas constant returns-to-scale production function.

The following theoretical predictions are made by the structural demand equation for altruistic acts. With respect to the demand-for-altruistic-acts equation, wages will negatively correlate with the frequency of altruistic acts (due to the opportunity cost of time). Second, age will correlate positively with the frequency of altruistic acts. Third, educational level will correlated positively with the frequency of altruistic acts. Finally, the price of spiritual goods (which is proportionate to income – tithe or Zakat) will correlate negatively with the frequency of altruistic acts.

[1] This will be an overstatement for adherents of Islam, whose traditional Zakat is only 2.5%)

III. Econometrics and Data

Econometric Specification

The above discussion suggests the estimation of two equations to shed light on the extent to which religious experience influences altruistic behavior. The first equation of interest is the religious/spiritual health production function (5). In particular, the relationship between spiritual practices and religious/spiritual health is of primary interest. Since available data is limited to a cross-section, the last term in the equation cannot be estimated. In addition, in a cross-sectional context $C(.)$ is likely to be endogenous to religious/spiritual health. An instrumental variable approach is thus necessary for estimating this production function.

Appropriate instrumental variables for spiritual practices include the character of a person's religious upbringing (no religious upbringing, liberal religious upbringing, moderate religious upbringing, fundamentalist religious upbringing) and state-level religious employment per capita lagged by two years (Petris Social Capital Index – religious portion). A lag is necessary as any influence from the religious environment on religious behavior will take some time to occur (Brown, 2009).

Although theoretically this function was assumed to be Cobb-Douglas (double-log), there are too many zeros in the measures of P (14.6%) and S (17.1%) to perform a logarithmic transformation. Therefore, a log-linear model is used. The religious/spiritual health production function is thus specified as follows:

$$\ln R_i = \alpha_0 + \alpha_1 A_i + \alpha_2 P_i + \alpha_3 S_i + \alpha_4 D_i + \varepsilon_i \qquad (14)$$

where R_i is measured as the weekly frequency that a person perceives feeling love directly from God; A_i is the annual frequency of eleven possible altruistic acts, P_i is the weekly frequency of prayer, S_i is annual attendance of religious services, and D_i is demographic information that

includes sex, (male, female), age (18-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75 and older), race (white, black, other race), marital status (single, married, divorced/separated, widowed), and education (less than high school, high school graduate or equivalent, associate's degree, bachelor's degree, graduate school). Finally, ε_i is the error term.

The weekly frequency of R_i is coded as follows: never or almost never (coded as 0.5), once in a while (coded as 1); some days (coded as 2), most days (coded as 4), every day (coded as 7), and many times a day (coded as 21).

The variable A_i is measured as the sum of the annual frequency of eleven different altruistic acts: (1) allowing stranger to cut ahead in line, (2) carrying a stranger's belongings, (3) donating money to a charity; (4) giving money or food to a homeless person, (5) donating blood, (6) giving directions to a stranger, (7) giving up a seat for a stranger, (8) loaning an item of value to someone you don't know well (e.g., dishes, tools), (9) looking after a person's plants, mail, or pets while they were away, (10) returning money to a cashier after getting too much change, and (11) doing volunteer work for a charity. Frequency was coded for each category as follows: not at all in the last year (coded as zero); once in the past year (coded as 1), at least 2 or 3 times in the last year (coded as 3), once a month (coded as 12), once a week (coded as 52), more than once a week (coded as 104).

The weekly frequency of P_i is coded as follows: never (coded as zero), less than once a week (coded as zero), once a week (coded as 1), several times a week (coded as 3), once a day, (coded as 7) and several times per day (coded as 21).

The annual frequency of S_i is coded as follows: never (coded as zero), once or twice a year (coded as 2); several times a year (coded as 3), once a month (coded as 12), two or three

times a month (coded as 36), nearly every week (coded as 48), every week (coded as 52), and several times a week (coded as 104).

As above in equation (14), a number of variables in the operationalization of the demand for altruistic acts have a large proportion of zeros (earnings per hour, non-wage income) making a logarithmic transformation of these variables problematic. Thus, as above the equation is simply estimated using a log-linear functional form:

$$\ln A_i = \varphi_0 + \varphi_1 w_i + \varphi_2 Y_i + \varphi_3 D_i + \varphi_4 R_i + \eta \qquad (15)$$

where w_i is a vector of earnings per hour and whether an individual is employed or not. Earnings per hour is constructed by dividing each respondent's annual income (2004 dollars before taxes and deductions) by the product of hours worked per week and weeks worked per year. If an individual is not employed, earnings per hour is set to zero and a dichotomous variable indicating that a person is not working is set to one following Plotnik (1983) and Hutchens (1981), and similar to the procedure used by Saffer (2008). Non-wage income, Y_i, is constructed by subtracting the respondent's annual income from family income. Finally, η_i is the error term.

Equations (14) and (15) are estimated using limited information maximum likelihood (LIML) in order to help assure appropriate instrument strength. The strength of the set of instruments used to correct the bias in the potentially endogenous variables is tested using the criteria developed by Stock and Yogo (2005) for LIML estimators. Overidentification tests are used to test the exogeneity of the overidentifying instruments (Hayashi, 2000). An endogeneity test is performed to determine if the instrumental variable (IV) approach is necessary when estimating equations (14) and (15) (Hayashi, 2000). All equations incorporate the probability

weights provided with the data. Standard errors are calculated that are robust to potential heteroscedasticity. All statistical analyses is performed using Stata 10.1.

Data

The analysis above uses data from the 2004 General Social Survey (GSS). The GSS is a survey administered to adults 18 years of age and older in the U.S. by the National Opinion Research Center. Data was only used for individuals who self-identified as religious persons. A small number of individuals who self-identified as adherents of Eastern or Native American religions are included in the sample. Only the 2004 wave of the GSS contains all of the variables necessary for this analysis.

The religious component of the lagged Petris Social Capital Index (PSCI) was combined with the GSS based on state-level geocodes. The religious portion of the PSCI uses publicly available data from County Business Patterns and is constructed by dividing the total number of individuals employed in North American Industry Classification System code 8131 (Religious Organizations) by each state's population. This quotient is then multiplied by 100 to derive a percentage measure. The religious portion of the PSCI is a proxy for the density of religiosity in a given state and has been used in other types of economic analysis (Brown et al., 2006). Descriptive statistics are presented in Table 1.

Of interest is that, on average, self-identified religious individuals in the sample perform about 66.1 altruistic acts per year (approximately 1.27 acts per week), pray almost 10 times per week, and attend religious services about 30 times per year. The subjective religious experience of feeling love that is perceived to come directly from God occurs, on average, about 8 times per week.

IV. Results

Religious/Spiritual Health Production Function

Limitations were encountered when estimating the religious/spiritual health production. A reasonable set of instruments passed tests of strength and exogeneity only for the frequency of prayer and the frequency of attendance at religious services. However, no set of instruments was found that predicted altruistic acts with sufficient strength. In addition, it was not possible to jointly estimate the effects on religious/spiritual health of the frequency of prayer and the frequency of attendance when both were included in the equation. This was likely due to multicollinearity as the correlation of these two measures is 0.47. Thus, two separate equations of religious/spiritual health were estimated each including either the frequency of prayer or the frequency of attendance at religious services. Since the instrumental variable approach corrects for omitted variable bias, the omission of the two remaining spiritual practices in each production function is not problematic.

In each of the religious/spiritual production functions, three instruments were used: whether an individual was raised in a religiously moderate home, whether an individual was raised in a religiously fundamentalist home, and the percentage of the population within the individual's state that is employed by a religious organization. For the production function that included the frequency of prayer, the strength of these instruments in the first stage results was tested using a partial-F test with the instruments being found to be sufficiently strong (Kleibergen-Paap Wald $F = 10.49$; Stock and Yogo (2005) critical value for 10% maximal LIML size：6.46). Note that the Staiger and Stock (1997) rule of thumb of a partial-F of 10 is not appropriate in a LIML context. Stock and Yogo (2005) have developed critical values that vary

with the number of endogenous variables in model, the number of instruments, and the estimator being used.

This set of instruments yielded results from an overidentification test suggesting that the exogeneity of the overidentifying instruments cannot be rejected (Hansen's J statistic: 1.27, p = 0.53). In addition, separate tests of the exogeneity of each individual instrument were performed which also showed that the exogeneity of each individual instrument cannot not be rejected (moderate religious upbringing, C-statistic: 0.70 , p = 0.40; fundamentalist religious upbringing, C-statistic: 0.003 , p = 0.96; religious portion of the PSCI, C-statistic: 0.47, p = 0.49). Finally, an endogeneity test of the endogenous regressors (frequency of prayer) rejected the hypothesis that the suspected endogenous variables are actually exogenous (χ^2 = 15.85, p < 0.001).

For the religious/spiritual health production that included frequency of attendance, the corresponding statistics were as follows: Kleibergen-Paap Wald F = 9.31, Stock and Yogo (2005) critical value for 10% maximal LIML size：6.46; Hansen's J statistic: 0.73, p = 0.70; moderate religious upbringing, C-statistic: 0.02 , p = 0.90; fundamentalist religious upbringing, C-statistic: 0.43 , p = 0.51; religious portion of the PSCI, C-statistic: 0.69, p = 0.41; χ^2 = 18.74, p < 0.001).

The major findings show that both the frequency of prayer and the frequency of attendance at religious services are important causal factors in religious/spiritual health. The marginal effect of an additional weekly prayer session for someone who is already at the mean increases the weekly frequency of the perceived experience of being loved directly by God by 28.7%.[2] The marginal effect of an additional religious service per year for someone who is

[2] In order to properly estimate the marginal effect, in terms of percent change, of a continuous variable in a log-linear model, we must apply the following formula: $100 \cdot [\exp(b) - 1]$ where b is the relevant parameter estimate.

already at the mean increases the weekly frequency of the perceived experience of being loved directly by God by 6.9%.[3]

Demand of Altruistic Acts

A similar approach was taken to estimate the demand for altruistic acts (equation 15), although the instrument of moderate religious upbringing was replaced with having a liberal religious upbringing.[4] The strength of these instruments in the first stage results was tested using a partial-F test and the instruments were found to be sufficiently strong (Kleibergen-Paap Wald $F = 6.48$; Stock and Yogo critical value for 10% maximal LIML size：6.46). This set of instruments yielded results from an overidentification test suggesting that the exogeneity of the overidentifying instruments cannot be rejected (Hansen's J statistic: 0.13, $p = 0.94$). In addition, separate tests of the exogeneity of each individual instrument were performed which also showed that the exogeneity of each individual instrument cannot not be rejected (liberal religious upbringing, C-statistic: 0.08, $p = 0.78$; fundamentalist religious upbringing, C-statistic: 0.12 , $p = 0.73$; religious portion of the PSCI, C-statistic: 0.01, $p = 0.92$). However, an endogeneity test of the endogenous regressor (frequency of feeling love that is perceived to come directly from God) did not reject the hypothesis that the suspected endogenous variable is actually exogenous ($\chi^2 = 0.05$, $p = 0.82$). Thus, the final equation was estimated assuming that the frequency of perceiving being loved directly by God is exogenous.

The major findings are as follows. First, on the margin, a weekly additional event during which an individual feels love that they perceive comes directly from God results in individuals

[3] In order to properly estimate the marginal effect, in terms of percent change, of a continuous variable in a log-linear model, we must apply the following formula: $100 \cdot [\exp(b) - 1]$ where b is the relevant parameter estimate.
[4] Using moderate religious upbringing resulted in a somewhat weaker set of instruments (Kleibergen-Paap Wald $F = 6.05$).

increasing their altruistic acts by an average of 4.7% over a one-year period.[2] This is a causal effect and consistent with the predictions of the theoretical model.

Additional results are also consistent with the theoretical predictions of the demand-for-altruistic-acts function. Education has a strong positive effect on the frequency of performing altruistic acts. A high school education increases the frequency of altruistic acts by 76.1% relative to those with less than a high school education.[5] Having two years of college increases the frequency of altruistic acts by 94.4%, having a bachelor's degree increases the frequency of altruistic acts by 142%, and attending graduate school increases the frequency of altruistic acts by 189%, all relative to those with less than a high school education.[5]

However, age behaves in the opposite of manner of what is predicted from theory. There is a significant drop in altruistic acts (approximately 62.5%) once a person reaches retirement age.[5]

Non-wage income also behaves in a way that is different from the predictions of theory. As non-wage income increases, the number of altruistic acts an individual performs grows, on average, by approximately 1.7% for every additional $10,000 earned per year. Note that this is not a trade-off between using one's own time to perform altruistic acts and simply giving money for charitable purposes.

Earnings per hour is negatively related to the frequency of altruistic acts, as predicted by theory. However, it is not statistically significant.

[5] In order to estimate the marginal effect, in terms of percent change, of a dummy variable in a log-linear model, we must apply the following formula: $100 \cdot [\exp(b - V(b)/2) - 1]$ where b is the relevant parameter estimate and $V(b)$ is the variance of the parameter estimate (Halvorsen and Palmquist 1980; Kennedy 1981).

V. Discussion

An economic model of religious altruism derived from Brown's (2009) model of religious/spiritual health predicts that individuals with more frequent religious experiences will perform altruistic acts at a higher frequency. Our model obtained causal estimates of this relationship using an instrumental variables approach with LIML.

Our empirical results support the predictions of the theoretical model and also suggest a mechanism by which individuals increase the frequency of their religious experiences: prayer and attendance at religious services. Estimates of the religious/spiritual health production function, again using an instrumental variables approach with LIML, find a strong causal connection between the frequency of religious experience and both the frequency of prayer and the frequency of attendance at religious services.

The model's prediction did not hold for a number of key variables. Non-wage income was predicted to have a negative effect on altruistic acts, but in fact had a strong positive relationship. This suggests that individuals do not perceive the tithe or zakat as a price with regard to altruistic acts as was found in previous research on the demand for prayer (Brown, 2009). It may be the case that non-wage income is acting in the way it does in traditional demand equations, such that altruistic acts are simply normal goods.

In addition, age was found to be related to altruistic acts in the way opposite to that suggested by theory. It may be the case that older individuals are simply less able to physically perform the altruistic acts listed in the index. Again, this is contrary to the previous research on the demand for prayer (Brown, 2009).

While the above research operationalized religious/spiritual health as the frequency with which a person felt love that they perceived came directly from God, future research should

examine alternative measures of religious/spiritual health and various spiritual practices that may be antecedent to such religious experiences. It is likely that spiritual practices that require time, but not physical exertion will be more likely to conform to the theory presented in this paper.

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Table 1: Descriptive Statistics

Variables	Value
Altruistic acts per year (mean/SD)	66.081/81.002
Religious/spiritual health experiences per week (mean/SD)	7.973/7.415
Prayer sessions per week (mean/SD)	9.815/8.474
Attendance at religious services per year (mean/SD)	30.419/22.149
Earnings per hour $10s (2004 dollars: mean/SD)[1]	1.687/4.727
Non-wage income $10,000s (2004 dollars: mean/SD)	3.492/5.152
Religious community-level social capital (% of population; mean/SD)	0.560/0.129
Age 25-34 (proportion)	0.185
Age 35-44 (proportion)	0.222
Age 45-54 (proportion)	0.186
Age 55-64 (proportion)	0.154
Age 65-74 (proportion)	0.079
Age 75 or older (proportion)	0.064
Female (proportion)	0.535
Married (proportion)	0.610
Widowed (proportion)	0.053
Divorced/separated (proportion)	0.130
Black (proportion)	0.119
Other race/ethnicity (proportion)	0.098
High school graduate (proportion)	0.544
Associate's degree (proportion)	0.080
Bachelor's degree (proportion)	0.163
Graduate degree (proportion)	0.096
Not employed (proportion)	0.374
Raised religiously moderate (proportion)	0.457
Raised religiously fundamentalist (proportion)	0.328
Observations (altruistic acts, earnings per hour, and non-wage income)	1,110 (949)[2]

[§]SD = standard deviation

[1]Earnings per hour includes a large number of individuals who are unemployed and earn zero dollars per hour.

[2]The number of observations missing for each variable varies with the equations estimated below.

Table 2: First-Stage Estimates: Frequency of Prayer and Frequency of Attendance at Religious Services (LIML)

	Frequency of Prayer		Frequency of Attendance	
Variables	**Parameters**	**Standard Errors**	**Parameters**	**Standard Errors**
Moderate religious upbringing	1.153	0.715	6.325***	2.541
Fundamentalist religious upbringing	3.446***	0.804	14.046***	3.139
Petris Social Capital Index – religious portion	5.529***	2.057	18.246**	8.790
Age 25-34	0.347	1.062	-6.856	4.304
Age 35-44	1.449	1.134	-5.197	4.354
Age 45-54	2.143*	1.159	-4.336	4.668
Age 55-64	2.596**	1.212	-2.694	4.778
Age 65-74	1.901	1.322	-0.882	5.581
Age 75 or older	2.868*	1.499	-2.172	5.941
Female	4.023***	0.546	8.333***	2.054
Married	2.122***	0.783	13.020***	2.858
Widowed	-1.272	1.245	12.626**	6.072
Divorced/separated	-0.110	0.899	-2.798	3.291
Black	4.140***	0.846	13.654***	3.194
Other race	2.013**	0.984	6.333	4.261
High school graduate	-1.128	0.902	1.868	3.364
Associate's degree	0.093	1.267	2.988	4.201
Bachelor's degree	-0.681	1.086	7.011*	3.939
Graduate degree	-0.215	1.261	6.774	4.319
Constant	0.229	1.843	-1.444	7.156
R^2	0.15		0.12	
F-statistic	10.24***		8.63***	
Observations	1,110		1,114	

*** ≤ 1% statistical significance (two-tailed test)
** > 1% and ≤ 5% statistical significance (two-tailed test)
* > 5% and ≤ 10% statistical significance (two-tailed test)
LIML: Limited information maximum likelihood
Note that the number of observations differs slightly between the two equations due to missing prayer data

Table 3: Second-Stage Estimates: Natural Logarithm of Religious/Spiritual Health (LIML)

Variables	Parameters	Standard Errors	Parameters	Standard Errors
Frequency of prayer	0.252***	0.046	-	-
Frequency of attendance at religious services	-	-	0.067***	0.014
Age 25-34	-0.310	0.292	0.247	0.306
Age 35-44	-0.387	0.298	0.320	0.305
Age 45-54	-0.674**	0.305	0.154	0.319
Age 55-64	-0.932***	0.334	-0.096	0.335
Age 65-74	-0.967***	0.351	-0.407	0.383
Age 75 or older	-0.762*	0.400	0.126	0.410
Female	-0.298	0.225	0.158	0.182
Married	-0.049	0.240	-0.389	0.305
Widowed	0.566	0.403	-0.596	0.510
Divorced/separated	0.132	0.254	0.297	0.281
Black	-0.420	0.339	-0.281	0.342
Other race	-0.138	0.291	-0.074	0.293
High school graduate	0.015	0.241	-0.401*	0.241
Associate's degree	-0.485	0.321	-0.667**	0.341
Bachelor's degree	-0.416	0.285	-1.053***	0.306
Graduate degree	-0.214	0.308	-0.709**	0.313
Constant	-0.407	0.390	-0.253	0.389
F-statistic	5.84***		4.32***	
Observations[1]	1,110		1,114	

*** ≤ 1% statistical significance (two-tailed test)
** > 1% and ≤ 5% statistical significance (two-tailed test)
* > 5% and ≤ 10% statistical significance (two-tailed test)
LIML: Limited information maximum likelihood
Note: R^2 is not meaningful in the second stage and is thus not reported
[1]Note that the number of observations differs slightly between the two equations due to missing prayer data

Table 4: Natural Logarithm of Frequency of Altruistic Acts (LIML)

Variables	Parameters	Standard Errors
Religious/spiritual health	0.046***	0.009
Earnings per hour ($10s)[1]	-0.011	0.011
Not employed	-0.313**	0.131
Non-wage income ($10,000s)	0.017**	0.009
Age 25-34	-0.289	0.211
Age 35-44	-0.307	0.216
Age 45-54	-0.469*	0.263
Age 55-64	-0.230	0.221
Age 65-74	-0.525*	0.280
Age 75 or older	-1.032**	0.475
Female	-0.018	0.131
Black	0.113	0.158
Other race/ethnicity	0.119	0.395
Married	0.128	0.200
Widowed	-0.164	0.269
Divorced/Separated	-0.191	0.225
High school graduate	0.604**	0.276
Associate's degree	0.708**	0.294
Bachelor's degree	0.924***	0.288
Graduate degree	1.101***	0.288
Constant	2.806***	0.325
F-statistic	3.83***	
Observations[1]	949	

[1]Earnings and income are expressed in 2004 dollars.
*** ≤ 1% statistical significance (two-tailed test)
** > 1% and ≤ 5% statistical significance (two-tailed test)
* > 5% and ≤ 10% statistical significance (two-tailed test)
LIML: Limited information maximum likelihood
[1]Note: there are fewer observations here than in the production function to due missing observations for some variables that appear here but not in the production function (and vice versa).