SKEWNESS EXPLAINED:
A Rational Choice Model of Religious Giving*

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Abstract

This paper explores the determinants of religious giving through simulations, economic theory, and survey data. Skewness, a distinctive yet poorly understood feature of religious giving, proves to be an inevitable consequence of the weak correlation between absolute levels of income and percentage rates of giving. The weak correlation can be derived, in turn, from a formal, rational choice model of religious participation. Data from the General Social Surveys show that this model also accounts for many other observed patterns in giving and church attendance.

Skewness Explained:

A Rational Choice Model of Religious Giving

Of all the behaviors that sustain formal religious institutions, none is more critical than financial giving.[1] Without adequate income, churches fold, denominations fail, and the faithful flock to greener pastures. At the same time, no other facet of religious commitment is more concrete and quantifiable. People may *say* all sorts of things about their faith, but there is no substitute for putting your money where your mouth is. Faced with skepticism about the accuracy of church attendance numbers, the obvious alternative is to follow the money.

It is surprising, therefore, that traditional research in social scientific study of religion almost never addressed financial giving. Of the countless surveys of religious belief and behavior, few have asked people about their contributions.[2] Texts in the sociology of religion have little to say about giving or church finances. And even after Andrew Greeley and William McManus (1987) wrote a widely-cited book on contributions and NORC added a contributions question to its General Social Surveys, the subject scarcely appeared at conference sessions of the ASR, RRA, or SSSR, or in pages of their respective journals.

It took a bribe to change things, the Lilly Endowment's 1991 decision to provide substantial support for new research on religious giving and church finances. With Lilly's help, and Dean Hoge's leadership, about 30 scholars met in 1992 and 1993 to analyze data on church giving. (I count myself among those "bribed.")[3] Many of the papers from these seminars were presented at special sessions of the SSSR, and a dozen appeared in a special December 1994 issue of the *Review of Religious Research*.[4]

In his introduction to the special issue, Hoge (1994: 102-103) proposed "five assumptions ... as starting points for future research ... [all of which] are grounded in empirical findings."

> "(1) Religious giving is rational behavior and can be modeled using existing sociological and economic methods. ... (2) People strongly committed to God and God's promises will give more money to the church. ... (3) Church members who have more discretionary income will, on average, give more to the church. ... (4) The distribution of the amount of money given by members of any church is greatly skewed ... (5) The amount of money potentially available to churches from members is a variable sum, not a fixed sum."

Of these assumptions, the fourth merits special attention. Whereas the rest may apply to *all* aspects religious participation, skewness is truly a distinctive feature of giving.[5] Professional fund-raisers consider skewness "a bedrock rule of thumb" relevant to virtually every setting, large or small, religious and non-religious (Hoge 1994: 103). In practice, it means that 20 percent of a congregation's members provide more than 80 percent of the giving. Inevitably, these people also exercise substantial power; for who can afford to alienate the few families that keep the church afloat? Yet the cause of skewness remains unclear. The "phenomenon begs for theoretical explanation" (Hoge 1994: 103).

The explanation for skewness turns out to be surprisingly simple. As subsequent simulations demonstrate, the mathematics of giving make skewness virtually inevitable. When varying rates of giving combine with varying incomes, a highly skewed distribution of dollar contributions *must* emerge. In practice, therefore, three facts suffice to generate skewness: (1) percentage rates of giving vary greatly from one person to the next; (2) income levels also vary greatly; and (3) income levels and giving rates are not strongly (and negatively) correlated.

These three facts need not stand as isolated axioms or independent observations. The more elegant and fruitful strategy is to embed them within a *general* model of religious participation. The model rests on the assumptions of rational choice and household production,

and it provides a unified approach to religious giving, church attendance, and other aspects of religious behavior.[6] It correctly identifies the most important observable determinants of church participation while also describing the conditions under which these determinants will *not* predict participation.

In short, this paper transforms the five fundamental assumptions listed above, shifting them from the realm of empirical generalization to that of axiom (in the case the first) and testable derivations (in the case of the rest). It is in this sense that skewness, and more, is explained.

Skewness Observed:

Before turning to the analysis, it helps simply to look at data on religious giving. Figure 1a graphs the histogram of annual church contributions reported by a sample of about 2,300 adult Americans, respondents to the 1987-1989 General Social Surveys (Davis and Smith 1994).[7] The horizontal axis shows the number of dollars contributed by each respondent, and the vertical axis shows the number of respondents contributing at each dollar level. The resulting distribution is heavily skewed. Even after truncating contributions over $5,000 so as to eliminate the outliers, the skewness statistic is 2.7 (versus zero for any non-skewed, symmetric, distribution). Whereas the majority of respondents contribute only a few hundred dollars or less, a small fraction of the population make contributions of several thousand dollars or more. The practical importance of these larger contributors cannot be overemphasized -- they literally keep churches alive through donations that account for 80 to 90 percent of the funds used to pay pastors, operate church facilities, finance missions, and the like.[8] This seemingly mundane fact goes a long way toward explaining the persistent (and inevitable) power of "elites" within *all* congregations and denominations, even those that embrace democratic values and non-hierarchical structures.

Figure 1b provides an alternative view of the disparity in rates of giving. It plots the same

data in the form of a *Lorenz curve*, a type of graph routinely used to assess economic inequality (Atkinson 1975:15). To construct such a curve, one sorts respondents according to the magnitude of their contributions and then plots the cumulative total of contributions as one moves from the smallest to the largest givers. The numbers along the horizontal axis indicate the relative position of contributors -- the ten percent of the survey population giving the least money appear between zero and .1, the next ten percent fall between .1 and .2, and so forth. The numbers along the vertical axis track cumulative giving as a fraction of the total reported by the entire survey population. Hence, looking at the height of the curve above .1, we see that the lowest 10% of all contributors account for less than 1% of total giving. The height of the curve above .5 shows that the bottom half of all church-goers account for less than 10% of total giving, which means that the top half accounts for more than 90% of total giving. Moving to the .8 level, we see that 20 percent of the church-goers account for more than 70 percent of total giving (and this fraction rises to nearly 90% if we include "outlying" contributions in excess of $5,000). By way of contrast, the dotted line running straight from (0,0) to (1,1) shows how the curve would look if everyone contributed equal amounts.[9]

How are we to account for this pattern? It is no less evident among the members of specific congregations -- large or small, Catholic or Protestant -- than it is among the population as a whole. As Hoge (1993:3) observes, it is hard to believe that the underlying religious needs of individual members vary as widely as their contributions. Indeed, most other measures of religious participation and religiosity are much less heavily skewed. Consider, for example, the church attendance rates reported by the same sample of General Social Survey respondents described above. Figure 2a displays a histogram of annual attendance rates based on the response categories in the GSS, and figure 2b plots the corresponding Lorenz curve. (To construct such graphs, I recoded attendance response categories as annual rates: "monthly" = 12, "weekly" = 52,

more than weekly = 104, and so forth.) Once again, skewness does arise, but it far less pronounced. The skewness statistic for attendance is only .79, much lower than that of contributions. The corresponding statistic for frequency of prayer is only .68. When it comes to skewness, giving is in a class by itself.

It is tempting to explain the observed pattern in terms of the underlying skewness of individual incomes. If typical church-goers contribute a fixed percentage of their income, then contribution skewness would exactly mirror that of the underlying income distribution. But the facts prove otherwise. Percentage rates of giving vary dramatically from one family to the next, and the skewness of contributions greatly exceeds that of income (see footnote number 9). The following simulations show that heavily skewed contributions will persist even when the underlying income distribution is *not* skewed.

Skewness Explained:

Skewness can be explained in terms of three observable facts. First, percentage rates of giving vary dramatically from household to household. Second, incomes also vary. Third, there is little correlation between the *amount* of income a household has and the *share* of income that it donates to religion. The following simulation shows how the explanation works.

(1) Contribution rates: All studies of giving find that the share of income given to religion varies greatly from one person to the next. I will discuss the motivation for share-oriented giving in the next section. For the moment, however, it suffices to note that actual shares vary widely, that they depend on a person's religiosity, and that the tendency to choose a share (rather than an absolute dollar amount) is widespread.[10] Churches routinely emphasize the notion of tithing rather than the notion of giving absolute amounts, and in practice one observes fairly similar *average* rates of giving across different income levels.[11]

The share of income given to religion varies dramatically from one individual to the next, but surveys show that most people give between zero and four percent and the mean share is about two percent of income. My simulations therefore include a share variable that is uniformly distributed between zero and four percent.[12] By randomly generating 1000 cases, I obtained the histogram in figure 3a.

(2) Incomes: Although actual incomes are both widely dispersed and highly skewed in every country, my simulation employs a distribution that is nearly symmetric. I do so to prove that a skewed distribution of contributions will arise even when the underlying incomes are *not* skewed. (When incomes *are* skewed the result becomes stronger still, since the skew in the underlying income distribution tends to reinforce the skew caused by the interaction between varying levels of income and varying rates of giving.) Since actual household income was around $30,000 in the late 1980's, I generated the variable income from a normal distribution (truncated at zero), with a mean of $30,000 and a standard deviation of $15,000. Figure 3b graphs the resulting simulated income distribution.

(3) Correlations: Decades of survey research prove that the actual relationship between religiosity and income is weak. Richer folks may attend church a bit more or pray a bit less, but on the whole the impact of income is not particularly great. Hence, the simulation assumes that income and share are *independently* distributed in the population. The actual correlation among General Social Survey respondents is around -0.1, meaning that income explains only 1 percent of the variation in contributions.

Assumptions (1) through (3), enable us to simulate contributions as the product of income and share. People take their (randomly distributed) income, multiply by their (randomly distributed) propensity to give, and arrive at an actual dollar amount: contribution = share * income.

Figure 4 shows that the resulting distribution of contributions is heavily skewed. The resulting skewness in contributions is especially striking given that both underlying distributions (income and share) are *not* skewed. Stated differently, the observed skewness is entirely the consequence of the *multiplicative* nature of the model. Almost *any* underlying distributions for share and income will produce the same sort of result.[13]

The simulated results in figure 4 look strikingly similar to the actual distribution of giving observed in figure 1 -- quite a few near zero, most folks in the few-hundred dollar range, and a handful of much larger contributions.[14] The results would, of course, mirror reality even more closely if one used "bootstrap" sampling methods to simulate share's and income's based on their actual distributions.

A critic might dismiss these results as mere tautologies. After all, in simulations, what you get depends entirely upon what you assume. Yet this criticism misses several points. Skewness is indeed the inevitable consequence of facts (1), (2), and (3), but knowing this moves us past the mere observation that "contributions are skewed." With these facts in hand, we need no longer simply acknowledge skewness, but can instead explain it in terms of more basic facts about income and religiosity.

Can we push the analysis further still? Having traced skewness to people's varying propensity to contribute a share of their income to religion, can we explain *why* people tend to frame their choices in terms of income shares rather than absolute dollar amounts? I turn to these questions next and offer answers based on a formal model of religious participation. The model embeds contribution decisions within a much broader rational choice framework and thereby provides testable hypotheses regarding giving, church attendance, and religiosity. It explains why estimated correlations between giving and attendance are extremely high, why both depend on the same underlying determinants of religiosity, and yet why the former displays much more skewness

than the latter.

Skewness Derived:

Theories of religious giving are few and far between. Hoge and Griffin (1992:4-1) state that most research on giving is "exploratory in nature, not guided by *any* theoretical models" (my italics). This situation stems from a corresponding weakness in the sociology of religion as a whole, which according to Robert Wuthnow (1988:500) "has grown more rapidly in inductive empirical research and in subspecializations than it has in attempts to identify theoretically integrative concepts .... The problem is not one of lively disagreement over serious intellectual disputes but an absence of unifying constructs."

Rational choice theory seeks to integrate numerous predictions within a single conceptual framework. It is well suited for modeling the measurable dimensions of religious participation, particularly contributions. Even the most resolutely non-rational church members, who absolutely refuse to consider the "opportunity cost" of their time, have no choice but to economize when it comes to their money. Unlike an hour, the monetary value of a dollar is concrete, objective, and impossible to ignore. It is easy therefore to sympathize with Hoge's (1993:36) claim that the "rational choice economic model" is a "major theoretical resource" for understanding giving, one that we would be "unwise" abandon.[15]

Hoge and his associates (1995: 6, 7, 11) admit that "the economic model arouses fervent opposition on psychological and sociological grounds." But after weighing each of four distinct "attacks," they conclude that "the economic model [is] still the best starting place for understanding religious giving ... Religious giving is rational behavior." Thus our “theoretical task” is not to debate rationality but rather “to identify the conditions under which gift-giving *is* rational” (italics original).

Most formal economic models of religious participation build from Gary Becker's (1976) theory of household production. The models of Azzi and Ehrenberg (1975), Sullivan (1985), Iannaccone (1992), and Montgomery (1995) are all simplified variants of a single, general model that encompasses church attendance, contributions, religious intermarriage, denominational mobility, life-cycle patterns, church-sect theory, free rider problems, the strength of strict churches, organizational dynamics, and more. Iannaccone (1990) provides a non-technical introduction to household production theory and its application to religious participation. For a more comprehensive overview of the economics of religion, see Iannaccone (1996).

The general model rests on the assumption that individuals allocate their time and money resources so as to maximize their utility from the production of abstract "household commodities." Religious satisfaction constitutes one such commodity, and for the purpose of formal analysis all other commodities may be viewed as an aggregate "secular" commodity. This gives rise to a series of formal results, summarized below. Some readers may wish to skip these details and pass directly to the subsection labeled "implications."

Details: To simplify the analysis, without altering any key results, assume that each household consists of a single person. Let the letters R and S denote the quantities of religious and secular commodities that a household consumes. R and S are produced with inputs of personal time and purchased goods. ("Purchased goods" refers to anything bought with money, including physical items and human services. In the absence of changing prices, the quantity of such goods can be proxied by the amount of money spent on them.) Hence, R and S are *functions* of time and money inputs:

$$R = R(t_R, m_R) \tag{1a}$$

$$S = S(t_S, m_S) \tag{1b}$$

where t_R and m_R denote the amount of time and money devoted to religion, and t_S and m_S denote the amount of time and money devoted to all other (secular) activities. The total amount of available time is of course fixed, since each person has only 24 hours per day. Hence, letting T denote the total amount of available time and letting H denote the hours of work, each person's time constraint may be written as:

$$t_R + t_S + H \leq T \tag{2}$$

which simply states that altogether, the time devoted to religion plus the time devoted to secular activities plus the time devoted to work can not exceed the total time available.

In a similar fashion, the amount of money devoted to religious and secular activities can not exceed total income, I.

$$m_R + m_S \leq I \tag{3}$$

Total income equals earnings plus non-earned income. Hence, letting w denote the person's wage rate and N his or her non-earned income, we may write total income as

$$I = wH + N. \tag{4}$$

Following Becker and others, we can define "full income," I*, as the amount of income that would be generated if the household devoted all its time to market labor.

$$I^* = wT + N. \tag{5}$$

By definition, a rational consumer seeks to allocate his or her resources so as to maximize the utility derived from R and S:

$$U(R,S) \tag{6}$$

subject to the previously described constraints on time and money income (and subject also to whatever additional constraints govern the production of household commodities).[16]

To proceed I must specify the mathematical form of functions in equations (1) and (6). Because of its relative simplicity and popularity in traditional economic research, I will use the

Cobb-Douglas form.[17] The Cobb-Douglas specification for equation (6) is:

$$U(R,S) = R^{c}S^{1-c} \qquad (5')$$

The Cobb-Douglas specifications for equations (1) are:

$$R(t_R,m_R) = t_R^{a}m_R^{1-a} \qquad (1a')$$

$$S(t_S,m_S) = t_S^{b}m_S^{1-b} \qquad (1b')$$

These functions are all multiplicative in their inputs (R, S, t, and m) and exponential in their parameters (**a**, **b**, and **c**). Despite their apparent complexity, the behavioral interpretation of the equations is straightforward: each one percent increase in R yields a **c**-percent increase in utility, each one percent increase in t_R yields an **a**-percent increase in religious output, R, and each one percent increase in m_R yields a **(1-a)**-percent increase in religious output, R.[18]

The parameter **c** captures the relative value that the individual assigns to religious (as opposed to secular) commodities. We may therefore interpret **c** as the person's underlying religiosity. If **c** equals zero then the person attaches no value to religion, and larger **c**'s correspond to greater levels of religiosity. Empirically, **c** will depend on the person's religious upbringing, personal experiences, beliefs, and numerous unobservable, random factors. The parameter **c** thus captures the "religious human capital" effects described in Iannaccone (1990, 1995:118-119). The parameter **a** has an analogous interpretation, but it reflects the relative value of time (as opposed to money) devoted to religion. Institutional factors such as congregation size (which affects the incentive to free ride) and denominational norms (concerning giving practices) certainly influence this parameter -- see Hoge and Griffin (1992, chapters 2 and 5) for details. In terms of the model, denominations whose members average high rates of church attendance relative to giving (such as Catholics) have a large **a**-parameter. Denominations with high rates of giving relative to attendance (such as Mormons and Jews) have a small **a**-parameter.

Drawing on standard mathematical results for Cobb-Douglas functions (Varian 1992:111), the explicit solution to the preceding utility maximization problem is

$$t_R^* = ac(I^*/w) \tag{7a}$$

$$m_R^* = (1\text{-}a)cI^* \tag{7b}$$

$$m_R^*/t_R^* = ((1\text{-}a)/a)w \tag{7c}$$

where w and I* denote the individual's wage rate and full income, respectively. Taking logarithms we obtain a pair of *religious demand equations* suitable for regression analysis:

$$\log(t_R^*) = \log(a) + \log(c) + \log(I^*/w) \tag{8a}$$

$$\log(m_R^*) = \log(1\text{-}a) + \log(c) + \log(I^*) \tag{8b}$$

$$\log(m_R^*/t_R^*) = \log((1\text{-}a)/a) + \log(w) \tag{8c}$$

In an actual regressions, the term log(c) would be replaced by a series of variables believed to affect a person's *overall* religiosity, such as demographic variables and measures of previous religious involvement. The terms log(a) and log(1-a) would be replaced by institutional variables such as congregational size and denomination thought to affect the *relative* weight given to time versus money.[19]

Implications: To understand the behavioral implications of equations (7) and (8) consider their final, rightmost terms. In the time equations, 7a and 8a, this term has the form (I*/w), which equals full income divided by the wage rate. Since most households derives almost all of their income from wages, this term is approximately equal to the person's full allotment of time, T.[20] The model thus predicts little or no relationship between income and church attendance. The intuition behind this result is straightforward: each day has 24 hours; so the rich have, on average, no more time to give to any particular activity (including religion) than do the poor.

But richer people *do* have more money. The final term in the money equations, 7b and 8b, is full income, I*. The model thus predicts that as income grows, dollar contributions will rise

proportionately. In other words, the share of full income given to religion will remain nearly constant. The share, which equals (1-a)c, will depend on individual religiosity, institutional attributes, and unobservable random factors.

We have thus derived the very result that the simulations *assumed*. Total dollar contributions arise out of the multiplicative interaction between two factors (full income and underlying religiosity) that vary independently of each other.[21] Skewness thus follows as a formal prediction of a rational choice/household production model of religious participation.

Of course, the model does more than predict skewness. Equations (7) and (8) also predict that: church attendance will be *less* skewed than giving; church attendance will be virtually unrelated to earned income; and individual rates of attendance will correlate more strongly with the share of income contributed than the absolute amount contributed. Finally, the model predicts that, apart from income, the same set of individual attributes (i.e, the same underlying determinants of religiosity) will have nearly equal impact upon both contributions and attendance. Empirically, this means that including attendance in the right hand side of a contributions regression will tend to wash out the effects of all other individual-level variables *except* income. (Alternatively, it means that the ratio of contributions to attendance should be positively affected by the determinants of full income but relatively unaffected by the underlying determinants of religiosity. See [7c], and note that the religiosity parameter, **c**, has dropped from the equation.) Moreover, since attendance depends on all the underlying determinants of religiosity, even those not observed, its inclusion should substantially boost the contribution regression's overall goodness of fit.

The regressions in table 1 test these predictions against the General Social Surveys data.[22] Following equations (8), the dependent variables are always expressed as logarithms. The independent variables fall into several groups. The first group consists of two socio-economic

variables, income and education, that best capture a person's *full income* and potential wage rate.[23] The next group includes several demographic variables -- age, sex, race, marital status -- that probably affect both full income and underlying religiosity. Then comes a set of dummy variables that indicate the respondent's denomination, followed by a set of variables designed to capture the individual's underlying religiosity -- belief in the after life, belief in the Bible as the literal word of God, and parents' rates of church attendance. Finally, two of the contributions regressions include attendance (of self and spouse) as explanatory variables. One might imagine including still other variables, but I preferred to use those that have proved most powerfully predictive in other studies of religious participation (such as Hoge and Yang 1994, Hoge et al. 1995, and Donahue 1994).

Given the relatively large sample size and the fact that the dependent variables were chosen on the basis of past research, it comes as no surprise that nearly all the variables prove statistically significant (at the 5, 1, or .1 percent levels). Table 1 therefore reports only the beta coefficients, since these do a better job of indicating which independent variables have the greatest *substantive* impact.[24]

Columns (1) and (2) report on attendance regressions patterned after equation (8a). (Since the log of zero is undefined, the sample is restricted to respondents who claim to attend church at least once a year.) Column (1) shows that, as predicted, income has very little effect on attendance. The effect of education is only slightly greater, and the two effects tend to offset each other (since the variables are positively correlated but their coefficients have opposite signs). Other demographic variables have much stronger effects, but they still only explain 6 percent of the variance in church attendance rates. (The impact of marriage is an artifact of the regression sample and should therefore be ignored.[25]) The portion of explained variance jumps to 16 percent, however, once we add the variables designed to capture institutional effects and personal

religiosity. Stepwise regressions confirm the importance of these latter variables and underscore the *un*importance of income and education. (In a forward stepwise regression, the economic variables enter very late and add less than 1 percent to cumulative R^2. The order of entry is: postlife, age, sect, literal, married, paattend, mormon, catholic, black, sex, educ, jewish, maattend, l_income, conserv, and moderate.) In short, the results strongly confirm the prediction, derived from equation (8a), that people's actual earnings and earning power have little influence on the time they devote to religion.

Columns (3) through (5) report on contributions regressions patterned after equation (8b). As predicted, the economic variables prove extremely important and, together with the basic demographic variables, account for 24 percent of the variance in contributions -- see column (3). Column (4) shows that denomination, personal beliefs, and religious background also matter. Comparing columns (2) and (4), we see that these variables have nearly the same effects on both attendance and contributions -- another prediction of the model. They raise total R^2 by nearly 10 percent in each case, and most variables have similar betas in each equation.[26]

Column (5) validates yet another prediction derived from equations (8a) and (8b) -- attendance is a very strong predictor of contributions and tends to "knock out" the other religion variables. Attendance catapults R^2 from .33 to .55 while dramatically cutting the betas for most of the religion variables, particularly those associated with the individual's own beliefs and background. On the other hand, attendance actually increases the betas on income, education, and age (the variables most correlated with full income). Dropping the belief, background, and denomination variables, in column (6), leaves total R^2 essentially unchanged -- further proof that the economic variables and attendance suffice to predict contributions as well as is possible. (Again, note the consistency with the predictions derived from equations (8). Attendance does more than merely take the place of the observable beliefs and background; it substantially

improves over them because it also captures unobservable components of underlying religiosity.)

Finally, columns (7) and (8) test the predictions concerning the ratio of contributions to attendance. According to the equation (8c), this ratio should depend on a person's (actual or potential) wage rate, **w**, should depend to a lesser extend on institutional variables, **a**, and should be independent of underlying religiosity, **c**. This, in fact, is what we find. Income is by far the most important determinant, contributing by itself .18 to the cumulative R^2 of .28. Two other economically important variables, age and education, are also quite important, as is one denominational variable, catholic. In contrast, the religious background and belief variables have virtually no effect. They influence overall levels of religious activity, but not the extent to which such activity is money-intensive or time-intensive.

In short, the model fits the GSS data in numerous ways. It also accounts for the key findings, both "significant" *and* nonsignificant, in previous studies of giving. (I am referring here to the empirical studies that Hoge and Griffin [1992:4-1] characterized as "exploratory in nature, not guided by any theoretical models.") The model explains why income predicts contributions but not attendance. It explains why attendance and income are by far the most important predictors of contributions. Most importantly, it explains why the effects of virtually all predictors *except* income "wash out" once we take account of attendance. In this sense, the model illuminates both the predictors of contributions and the limits to prediction.

Conclusion

For many decades, researchers neglected the study of religious giving. They probably did so for two reasons. First, they lacked any real theory of giving. And second, they approached giving as a distinct aspect of religion, separable from other dimensions of religiosity and not particularly interesting in its own right. This gave rise to a strange imbalance: a hundred studies of church attendance for every one of church giving, and scarcely any research integrating both. In the past decade, and especially the past few years, researchers have begun to redress this imbalance. But the work continues to emphasize description, and skewness, the most distinctive feature of giving, remains unexplained.

In this paper, I have derived skewness from three behavioral attributes: (1) varying rates of giving (as a percentage of income); (2) varying levels of income; and (3) a weak correlation between rates of giving and levels of income. I have, in turn, traced these attributes back to rational decisions concerning the production of religious and secular commodities. A fairly simple model of religious participation thus suffices to explain not only skewness, but many other facts about contributions and church attendance as well.

Notes

1. Resource mobilization scholars have long emphasized that "study of the aggregation of resources (money and labor) is crucial to an understanding of social movement activity" (McCarthy and Zald 1977: 1216). Iannaccone, Olson, and Stark (1995) have shown that increased inputs of money and time (as measured by giving and attendance) lead to increased rates of growth in both individual congregations and entire denominations. In principle, one would like comprehensive measures of giving that include all transfers of financial resources, whether from contributions, membership fees, product sales, or government transfers. In practice, however, nearly all non-established churches derive the bulk of their income from contributions.

2. The notable exceptions are Glock and Stark's 1963 Northern California Church Member survey, NORC's 1963 and 1974 surveys of American Catholics, a 1969 Jewish Population study, a 1971 survey by Douglas Johnson and his associates, and the Independent Sector's surveys of philanthropic giving in the 1980s.

3. Reviewers have warned that a casual reader might misconstrue my quips about bribes. For the record, I do not *really* mean that my colleagues and I succumbed to bribery. We simply supplied more scholarship as the financial incentives grew -- a response that was both predictable (if one accepts rational choice theory) and amusing (given the subject of our inquiry).

4. Hoge and Griffin (1992) also reviewed existing research on giving, and Hoge, et al. (1995, 1996) conducted a major new study of giving across six denominations.

5. The other assumptions apply to church attendance no less than to giving. Assumptions (1), (2), and (5) carry over unchanged and (3) has an obvious analogue ("church members who have more discretionary time will, on average, attend church more frequently").

6. To give the model predictive content, one must also specify the *form* of the utility and

production functions governing people's behavior. My analysis employs "Cobb-Douglas" functions because of their analytic simplicity and popularity in traditional, applied economic research. The key results, however, carry over to many other functional forms.

7. This sample is smaller than the approximately 4,000 who were asked about their contributions in the 1987, 1988, and 1989 GSS. I restricted my analysis to those who: identified themselves Protestant, Catholic, or Jewish; claimed to attend religious services at least once a year; reported their household income; and were either single or were married to someone of the same religion. (The last restriction proved necessary to resolve an ambiguity in the way the GSS contributions question was asked. See note #21 for details.) In practice, however, these restrictions did not alter any substantive feature of the giving distribution.

8. Contributions to America's Jewish philanthropies are even more skewed. According to Fruehauf (1991:176, table 11-2) the largest 1.6 percent of all gifts to the 1987 Jewish Federation Campaigns of 1987 (contributed by 13,000 donors who each gave $10,000 or more) accounted for nearly 60% of all the money collected, and the largest 11.7 percent of all gifts (from the 100,000 donors giving $1,000 or more) accounted for nearly 90% of the campaign total. In contrast, the 450,000 donors who gave $100 or less accounted for 50 percent of all the givers but just 2% of the campaign total.

9. The overall level of inequality may be summarized by a single number known as the Gini coefficient, which ranges from zero (if all give equally) to one (if one person gives everything and the rest nothing). Economists routinely calculate Gini coefficients for earnings, income, and wealth distributions. The contributions reported by General Social Survey respondents yield a Gini coefficient of 0.72 (and a skewness statistic of 2.7). This is substantially larger than the 0.39 Gini coefficient (and skewness statistic of 0.79) derived from the same respondents' stated

incomes. It also greatly exceeds Gini coefficients for household income estimated by the U.S. Department of Commerce, which averaged around 0.4 in the late 1980s (U.S. Government printing office 1992: page 123, chart 4-4).

10. For analyses of data from national and congregational surveys, see Hoge and Yang (1994), Donahue (1994), Olson 1994, Hoge et al. (1995). For summaries of the literature on giving and the most consistent empirical findings, see Hoge and Griffin (1992) and Hoge (1994).

11. The supposed "inverse relationship" between religious giving and income is founded upon a misperception. Richer people give, on average, much more money and only a slightly lower *percentage* of their income to religious causes than do poorer people. Some studies, such as Hodgkinson and Weitzman (1986:58-59), find virtually no relationship between income and the percentage of income given to religion. Others, using GSS, Gallup, and congregational survey data, find relationships that are negative but only account 2 to 3 percent of the overall variation in percentage rates of giving (Hoge and Yang 1994; Hoge et al. 1995). Moreover, much of this observed negative correlation comes about because poor people's expenditures on *all* types activities tend to be high relative to their official income due to borrowing and government assistance). Among non-poor households, income has little effect on rates of giving (Hoge and Yang 1994:130; Hoge, et al. 1995: 103-104). The income elasticity of religious giving is thus well above zero and (probably) near one.

12. I also ran simulations in which share followed a normal distribution (truncated at zero) with a mean of two percent and a standard deviation of one percent. This changed none of the key results.

13. The product of any pair of independent, positive, uniformly distributed random variables is always skewed. Moreover, the Central Limit Theorem implies that the product of a collection of

independent draws from *any* strictly positive distribution must be asymptotically log-normal and thus heavily skewed.

14. Readers may wish to use a statistics package, spreadsheet, or programming language to check the result occurs for virtually any reasonable choice of underlying distributions -- uniform, truncated normal, log-normal, pareto, and so forth. Note, however, that the distributions must be non-negative.

15. Hoge also reviews a variety of facts consistent with a rational choice approach to giving: most giving is well-considered and continuous rather than spontaneous and emotional; people are much more likely to give to causes from which they or those close to them benefit; and rates of giving diminish when the opportunities to "free ride" increase (as in a large, anonymous congregation).

16. Iannaccone (1984, 1992) formally analyzes two additional categories constraints: past experience and interpersonal effects. Past experience is modeled as a stock of "religious human capital," k_R, and interpersonal effects are modeled as an variable, R_{group}, that equals the average inputs of fellow church members. Congregation size affects the opportunities to free ride, and so enters as yet another variable, n. The combined commodity production function, $R(t_R,m_R,k_R,R_{group},n)$, generates testable predictions concerning religious participation, experience effects, free-riding, strictness, and more. The simpler model of equation (1a) suffices in the present context, however, because neither human capital nor interpersonal effects alter the basic predictions concerning the relationship between time and money.

17. The Cobb-Douglas has found a place in sociology as well as economics -- James Coleman (1990) repeatedly used it to mathematically model social behavior. A different choice of utility function, such as the CES, would yield somewhat different demand equations (7) but similar basic results. See Varian (1992) for more on the mathematics of utility and production functions.

18. By way of contrast, a linear equation such as U(R,S) = cR + dS implies that each one *unit* increase in R yields a c-*unit* increase in U. In most contexts, this unit-oriented, additive specification seems less realistic than the Cobb-Douglas' percentage-oriented multiplicative specification. For example, the additive specification implies that the two commodities, R and S, are perfect substitutes -- each one-unit increase in R always provides exactly as much utility as a c/d-unit increase in S.

19. Although equations (8a) and (8b) may be estimated independently, a more efficient approach would be maximum likelihood estimation of the two-equation system, subject to cross-equation restrictions on the parameters **a** and **c**. See, for example, Griffiths, Hill, and Judge (1993: 557-563).

20. Compare, for example, two full-time workers, one deriving all income from earnings and the deriving 20% from non-earned sources (such government transfers, investment income, or pension payments). The term (I*/w) varies by only 8 percent across these workers. In general, only retirees, the very poor, and the very rich will have a (I*/w) term much larger than T.

21. One may justify the assumption that the terms (1-a)c and I* are uncorrelated with reference to past research on giving and the proposed theory -- neither of which suggest a strong relationship between the underlying determinants of religiosity and the determinants of wage rates (education, skills, choice of occupation, years of work experience, professional luck, and so forth). Moreover, even if these two sets of determinants were correlated, the basic result would remain as long as the correlation was not both strong *and* negative.

22. Hart (1990), Hoge and Yang (1994), Iannaccone (1990), and Musik (1993) have also examined the GSS contributions data. Most of these analyses are, however, purely descriptive.

23. A more sophisticated test would take account of earned versus non-earned income, hours of work, the actual wage rates of household earners, and the potential wage rates of any non-earners. The GSS does not permit such a test, since it lacks information on spousal earnings and hence provides no reliable way to estimate either a spouse's wage rate or the household's non-earned income.

24. The full regression output is available upon request. Table 1 also omits a set of dummy variables that had to be included to control for missing data on several of the religiosity variables. The missing data arise because certain GSS items, such as parental church attendance rates and some religious beliefs, are not asked of every respondent. Rather than omit such cases altogether, I coded the relevant variables as zeros (e.g, ma_attend = 0 if missing) and then added a dummy variable indicating the presence or absence of the variable in questions (e.g, ma_missing = 1).

25. The GSS contributions item asks respondents "About how much do you contribute to your religion every year (not including school tuition)?" In married households with both spouses attending the same church the question almost certainly elicits total household contributions. On the other hand, when the spouses are of different religions, the respondent may well state only the amount given to his or her own religion. The data support this interpretation, since the average contribution claimed in the latter case is only $431, not much more than the $391 average reported by single people, but less than one half the $963 average reported by people married to a spouse of the same denomination. In light of this ambiguity and the fact that only 14.5% of the sample is married to spouses of a different denomination, I decided to drop all such respondents from my analyses. Doing so leaves a sample in which the married respondents are somewhat more religious than the single respondents. Hence, the coefficients on the "married" variable will be biased upward, but the other coefficients in the model should not be affected.

26. The noteworthy exception is the catholic indicator variable, which raises attendance while lowering contributions. This implies that Catholics under-contribute relative to their rate of attendance, an interpretation consistent with Greeley and McManus (1987) and observed also by Iannaccone (1984).

References

Atkinson, A. B. 1975. *The Economics of Inequality*. Oxford: Clarendon Press.

Azzi, Corry and Ronald Ehrenberg. 1975. "Household Allocation of Time and Church Attendance." *Journal of Political Economy* 84 (3): 27-56.

Becker, Gary S. 1976. *The Economic Approach to Human Behavior*. Chicago: University of Chicago Press.

Coleman, James. 1990. *Foundations of Social Theory*. Cambridge, MA: The Belknap Harvard University Press.

Davis, James A. and Smith, Tom W. 1994. *General Social Surveys.* [machine readable data file]. Principal Investigator, James A. Davis; Director and Co-Principal Investigator, Tom W. Smith. NORC ed. Chicago: National Opinion Research Center.

Donnahue, Michael J. 1994. "Correlates of Religious Giving in Six Protestant Denominations." *Review of Religious Research* 36(2): 149-157.

Fruehauf, Norbert. 1991. "The Bottom Line: Major Gifts to Federation Campaigns." In *Contemporary Jewish Philanthropy in America*, edited by Barry A. Kosmin and Paul Ritterband, pp. 173-185. Savage, MD: Rowman and Littlefield.

Greeley, Andrew M. and McManus, William E. 1987. *Catholic Contributions: Sociology and Policy.* Chicago, IL: The Thomas More Press.

Griffiths, William E.; Hill, R. Carter; and Judge, George G. 1993. *Learning and Practicing Econometrics.* New York, NY: John Wiley and Sons.

Hart, Stephen. 1990. "Religious Giving: Patterns and Variations." Paper presented at the meetings of the Society for the Scientific Study of Religion.

Hodgkinson, Virginia A. and Murray S. Weitzman. 1986. *The Charitable Behavior of Americans.* Washington, D.C.: Independent Sector.

Hoge, Dean R. 1993. "Theoretical Approaches for Explaining Levels of Financial Giving by Church Members." Paper presented at the Meetings of the Society for the Scientific Study of Religion.

Hoge, Dean R. 1994. "Introduction: The Problem of Understanding Church Giving." *Review of Religious Research* 36 (2, December): 101-110.

Hoge, Dean R. and Griffin, Douglas L. 1992. *Research on Factors Influencing Giving to Religious Bodies.*

Hoge, Dean R. and Yang, Fenggang. 1994. "Determinants of Religious Giving in American Denominations: Data from two Nationwide Surveys." *Review of Religious Research* 36 (2, December): 123-148.

Hoge, Dean R., Charles Zech, Patrick McNamara, and Michael J. Donahue. 1995. *Research Report on the American Congregational Giving Study*. Washington, DC: Life Cycle Institutute, The Catholic University of America.Hoge, Dean R., Charles Zech, Patrick McNamara, and Michael J. Donahue. 1996. *Money Matters: Personal Giving in American Churches.* Louisville, KY: Westminster John Knox Press.

Iannaccone, Laurence R. 1984. *Habit Formation and Consumption Capital, with an Application to Religious Participation.* Ph.D. Dissertation, University of Chicago.

Iannaccone, Laurence R. 1990. "Religious Participation: A Human Capital Approach." *Journal for the Scientific Study of Religion* 29(3):297 - 314.

Iannaccone, Laurence R. 1992. "Sacrifice and Stigma: Reducing Free-Riding in Cults, Communes, and Other Collectives." *Journal of Political Economy* 100(2): 271-291.

Iannaccone, Laurence R. 1995. "Second Thoughts: A Reply to Chaves, Demerath, and Ellison." *Journal for the Scientific Study of Religion* 34(1): 113-120.

Iannaccone, Laurence R. 1996. “An Introduction to the Economics of Religion.” Santa Clara University: Working Paper.

Iannaccone, Laurence R., Daniel V. A. Olson, and Rodney Stark. 1995. "Religious Resources and Church Growth." *Social Forces* 72(4): 705-731.

Musik, Marc. 1993. "Who Gives to the Church? Exploring Contribution Patterns Among Conservative and Non-Conservative Denominations." Paper presented at the meetings of the Society for the Scientific Study of Religion, Raleigh, NC.

Montgomery, James D. 1996. "The Dynamics of the Religious Economy: Exit, Voice, and Denominational Secularization." *Rationality and Society* (January).

Olson, Daniel V. A., and David Caddell. 1994. "Generous Congregations, Generous Givers: Congregational Contexts that Stimulate Individual Giving." *Review of Religious Research* 36(2): 168-180.

Sullivan, Dennis H. 1985. "Simultaneous Determination of Church Contributions and Church Attendance." *Economic Inquiry* 23 (2): 309-320.

Washington, D.C.: U.S. Government Printing Office. 1992. *Economic Report of the President*. Washington, DC.

Varian, Hal R. 1992. *Microeconomic Analysis, third edition.* New York, NY: W. W. Norton and Company.

Wuthnow, Robert J. 1988. "Sociology of Religion." In *Handbook of Sociology*, edited by Neil J. Smelser and Ronald S. Burt, 473-509.