

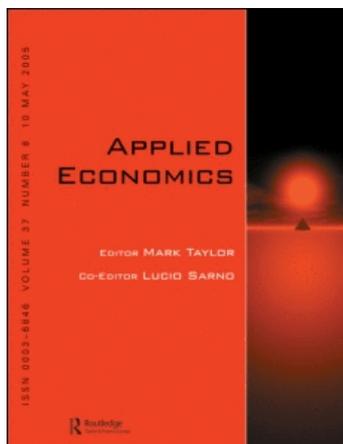
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Religious observance within a human capital framework: theory and application

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Religious observance within a human capital framework: theory and application

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I. INTRODUCTION

Economists and sociologists have in recent years shown an increasing interest in questions relating to the interrelation between religious and economic variables. Research on these issues has taken two main but opposing directions. The first deals with the influence of membership in particular religious grouping on such economic and socio-economic variables as fertility (Hartman, 1984; Mosher and Hendershot, 1984; Neuman and Ziderman, 1986), earnings (Gockel, 1969; Greeley, 1976; Featherman, 1981; Roof, 1981; Taubman, 1973), human capital and the rate of return on human capital (Chiswick, 1983; Tomes, 1983, 1984), occupational mobility and membership in trades union (Lanski, 1961).

In the second, more recent, direction of research, economists have focused on the question: how and to what extent do economic factors influence religious behaviour? In a series of recent papers by Azzi and Ehrenberg (1975), Long and Settle (1977), Ehrenberg (1977) and Ulbrich and Wallace (1983), Becker's allocation of time model has been extended to encompass the question of time allocation to religious activities. Azzi and Ehrenberg's pioneering paper formulated and tested an economic theory of 'religiosity'; the main thrust of the literature has related to the empirical testing of the Azzi and Ehrenberg basic model. The contribution of the present paper lies generally in the same direction. It attempts to shed additional light on the role of economic factors (mainly wage rates) on time devoted to religious activities.

First a theoretical model is formulated in which 'religiosity' is treated as a consumption good with individuals deriving current utility from religious practice.¹ These utilities may result directly from religious observance, either because of the satisfaction they afford to those holding religious beliefs or because individuals simply enjoy participating in religious ceremonies (such as carol concerts at Christmas). Additionally (or alternatively) these benefits may be indirect and

¹Azzi and Ehrenberg (1975) emphasize a 'salvation motive' for religious observance (in the form of church attendance), in which time devoted to religious activities is regarded as an investment in an expected stream of benefits in an afterlife. However, they recognize that current consumption motives may be at work as well. Ulbrich and Wallace (1983), in the spirit of the 'new home economics', treat church attendance as a leisure activity, supporting the consumption motive approach.

stem less from the religious observance *per se*, than from the *social* benefits of religious participation. Although it may initially seem strange to look upon religious observance as a consumption good in this way, the present approach lies very much in the Beckerian tradition that extends the individual choice model to a wide range of applications, outside the traditional range of consumption goods, such as crime, marriage etc.

After outlining the theoretical model, the effect of wage rates on time devoted to religious activities is examined using graphical presentation and comparative statics methods. The results are then related to various theoretical and empirical findings from the human capital literature, in order to formulate a number of hypotheses that are subsequently tested empirically.

In contrast to most indicators of performance is so-called household activities, which are either dichotomous (as in the case of time devoted to religious activities, proxied in the studies mentioned above by church attendance) or defined over a narrow range of possible values, the dependent variable which was focused on (time devoted to religious observance) has the considerable advantage of being a continuous variable, taking on a wide range of values. The large variance in time devoted to Jewish religious observance follows from the time component inherent in fulfilment of Jewish religious observances.

Following the formulation of the theoretical model in Section II, the empirical results are presented and discussed in Section III. Concluding remarks are given in the final section.

II. PRESENTATION OF THE MODEL

The individual is assumed to have a preference ordering that can be denoted by a classical utility function

$$U = U(\mathbf{c}, R) \quad (1)$$

where \mathbf{c} is a consumption vector, of which quantities of goods and services are components² (religious goods and services are excluded from \mathbf{c}) and $R = R(r, \tau)$ denotes the individual's 'level of religiosity', R being the 'religiosity production function', whose inputs are: money spent on the purchase and use of religious goods (r) and time devoted to religious activity (τ). R is defined in terms of positive measures rather than, for example, in terms of degree of belief. R is assumed to be an increasing function of r and τ , and the individual is assumed to derive satisfaction (utility) from observing the religious laws (i.e. from being religious).

The individual's objective function is the maximization of U with respect to the decision variables: \mathbf{c} , r , τ , subject to budget and time constraints. i.e.:

$$\max_{\mathbf{c}, r, \tau} U(\mathbf{c}, R(r, \tau)), \quad (2)$$

subject to:

$$y_0 + w \cdot \ell = \mathbf{P}_c \cdot \mathbf{c} + \mathbf{P}_r \cdot r \quad (\text{a budget constraint})$$

$$L_0 = \ell + \tau + \mathbf{t}_c \cdot \mathbf{c} \quad (\text{a time constraint}),$$

²Sometimes, it is assumed that \mathbf{c} is produced by the individual (or household). As our interest is mainly in the allocation of time and capital to religious activity, it is assumed, for simplicity, that \mathbf{c} is purchased in the market place.

where y_0 is a non labour income; w is the wage rate; ℓ is number of hours of work (assuming that ℓ is exogenously determined: as the survey includes salaried employees, this is a realistic assumption); P_c, P_r are price vectors of consumption and religious goods and services; t_c is a vector of consumption time, i.e., time needed for consuming a unit of c ; L_0 is the total time available per period (say 24 hours a day).

It is assumed that $y_0, w, \ell, P_c, P_r, t_c, L_0$ are defined exogenously.

The first-order conditions for the constrained optimum yield a system of simultaneous equations, the solution of which gives the optimum values of c, r, τ , in terms of the exogenous variables. Using the second-order conditions for optimum, and by means of comparative statics, it is possible to examine how changes in each of the exogenous variables affect each of the decision variables.³ As the primary interest of this paper lies in time allocation to religious activities (τ) and in the role the wage rate (w) plays in this allocation decision, the way in which τ is affected by changes in w is examined.

The model is presented in graphical form (Fig. 1); a mathematical appendix is available on request.

The initial situation (before changes in w occur) is described by the set of dashed curves (marked 0). In the first of the four quadrants an iso-utility curve is plotted which is tangent to a 'full income' constraint, y_0 .⁴ An optimal combination (c_0, R_0) is defined at the point of tangency.

Given the optimal level of $c(c_0)$, the optimal level of $\tau(\tau_0)$ is defined in quadrant IV, along the time constraint which is linear in c and τ .

In quadrant III 'iso-religiosity curves' are plotted; since the level of religiosity (R_0) and τ_0 have already been ascertained, r_0 can be identified.

In quadrant II 'partial religiosity production functions' are presented (R/τ), and as τ has been determined in a previous stage, the relevant curve is R/τ_0 where, given r_0, R_0 is reached, which brings us back to quadrant I.

Consider now a change in w . With a rise in w , a higher income constraint is reached (non-dashed curve, y_1); to this, a higher iso-utility curve (U_1) lies tangent, yielding higher levels of R and c (assuming both are normal goods). Then the adjustment process starts again (indicated by

³A brief summary of the mathematical results obtained from the comparative statics analysis is given in the following table:

	dc	dr	dτ
dy_0	+	+	-
dw	+	+	-
dL_0	+	-	+
$d\ell$?	+	-
dP_c	-	?	+
dP_r	?	-	?
dt_c	-	+	?

+ stands for a positive association, whereas - stands for a negative one, and ? indicates an ambiguous result.

⁴Substitution of the time constraint into the income constraint yields the following: $y_0 + w \cdot L_0 = (P_c + w \cdot t_c)c + P_r \cdot r + w \cdot \tau$, the 'full income constraint'. It can be readily proved that: $dR/dc < 0$ and $d^2R/dc^2 < 0$.

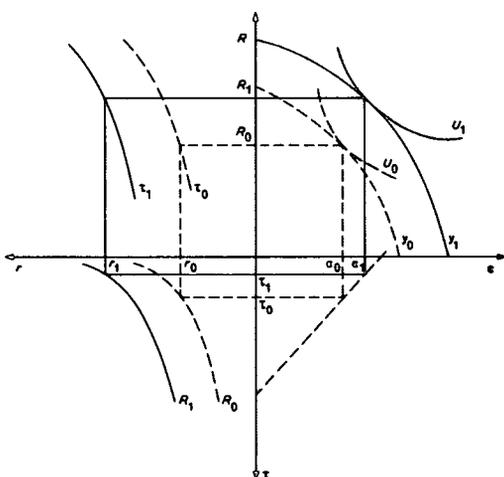


Fig. 1. Graphical presentation of the model.

the undashed curves), with the result that $\tau_1 < \tau_0$. This result follows from the fact that w is part of the shadow price of τ and as the latter rises, the consumption of religious time is reduced (i.e. $\partial\tau/\partial w < 0$).

Relating these findings to a central result of the human capital literature—that the age earnings profiles rise, reach a maximum in the forties, and then decline, with the point of maximum earnings moving to the right as education rises⁵—three testable hypotheses may be derived:

- (1) Controlling for age, changes in the wage rate have a negative impact on time devoted to religious activities.
- (2) When the wage rate is *not* controlled for (to allow for changes in w as age advances), the age profile of τ is U-shaped, having its minimum point at the age that w reaches a maximum.
- (3) With a rise in education the minimum point of τ moves to the right, as a result of the moving of the maximum wage points.

III. EMPIRICAL ANALYSIS

The data for the present study were obtained from an unpublished sample survey of some 700 Jewish workers in Israel, carried out by Israel Public Opinion Research Ltd., in June 1968.⁶ Respondents answered a battery of questions relating to various areas of everyday life, with an

⁵See, for example, Levi (1968), Mincer (1974), Amir (1975).

⁶Thanks are due to Yehuda Ben Meir and Peri Kedem for making available the data from this survey.

emphasis on religious activities; information was obtained also on the socio-economic background of respondents, including age, number of children, schooling, family income, continent of birth and period of immigration. Given the dominant role accorded to males in the performance of religious activities in Judaism, only males were included in the regression runs. Results are presented in Table 1 and Table 2.

The dependent variable is 'time allocated to religious activity'. This was measured by summing the estimated number of hours per year devoted by respondents to each of a series of religious activities on which information was solicited in the survey. Men were found to devote, on average, 232.7 hours a year to religious activities with a variance of 246.8; the relatively high variance is due to the large number of separate observances.

Explanatory variables included age and variables representing proxy measures for the wage income (which was unavailable from the survey), i.e. 'family income' (in Regressions 1 and 3, Table 1), and 'years of schooling' (in Regression 2, Table 1); in addition, a number of control variables were used. (a) Number of children. (b) Dummy variables relating to the religious definition of the respondent's wife, father and mother. Each respondent defined his wife, father and mother as either nonreligious, traditional or religiously observant. (c) Continent of birth and period of immigration. Ethnic origin was included as an interaction variable, on the assumption that continent of birth has a differing influence for different periods of immigration.

The three hypotheses posited in Section II are now tested; results relating to the first two are given in Table 1 and to the third in Table 2.

(1) In Regressions 1 and 2 (Table 1)⁷ the wage rate proxies are of the expected sign and significant. Since the number of years of schooling and family income are highly correlated with the wage rate, it follows that the dependent variable declines with the wage rate.

(2) When the proxy variables for the wage rate are omitted in Regression 4 (Table 1), thus allowing the age variables to express changes in the wage rate by age, the outcome is highly significant regression coefficients for the variables 'age' and 'age squared'. This indicates that the age profile of τ is U-shaped, with a minimum at the age of 42.9, a finding that fits well with human capital theories.⁸ It is worth noting that when 'family income' is included in the regression model and 'age squared' is added, then both 'age' and 'age squared' variables become insignificant (Regression 3, Table 1).

(3) In order to examine whether the age profiles of τ move to the right as the level of education rises, the sample was divided into three subsamples: males with 0–8, 9–12 and 13+ years of schooling, and a regression of type 4, Table 1 (i.e. excluding 'family income') was run separately for each subsample. Regression coefficients for the age variables are presented in Table 2, and points of minimum τ are calculated.

The results strongly support the finding of human capital models *vis-à-vis* the rightward shift of the maximum earnings age. Males that have not received more than primary education (i.e. with 0–8 years of schooling) devote minimum time inputs to religious activities at age 36. For the intermediate educational group (with 9–12 years of schooling) the age of minimal time devoted to religious activities rises to 40, while for those that have both completed secondary school and

⁷The difference between the sample sizes in Regressions 1 and 2 is due to the fact that many respondents did not answer the question relating to 'family income'. However, the results of a regression of type 4, run over the smaller sample of 204 cases yields similar results.

⁸See footnote 5.

Table 1. Allocation of time to religious activity equations (males)

Independent variables	Regression 1	Regression 2	Regression 3	Regression 4
Age	2.198 (2.009)	1.076 (1.656)	-5.562 (0.797)	-10.208 (2.588)
Age squared	—	—	0.084 (1.126)	0.119 (2.889)
Family income	-21.292 (2.231)	—	-16.905 (1.641)	—
Years of schooling	—	-16.767 (2.349)	—	—
Number of children	15.092 (1.860)	19.737 (3.543)	19.638 (2.168)	28.332 (4.892)
Religious definition of wife				
Traditional	114.761 (3.220)	71.621 (3.551)	116.483 (3.268)	70.510 (3.507)
Religiously observant	359.757 (8.158)	369.292 (13.486)	362.512 (8.214)	356.940 (12.952)
Religious definition of father				
Traditional	-108.877 (1.403)	-25.858 (0.655)	-114.609 (1.475)	-24.017 (0.612)
Religiously observant	-23.541 (0.285)	-15.228 (0.338)	-29.768 (0.360)	4.102 (0.095)
Religious definition of mother				
Traditional	100.989 (1.265)	36.211 (0.905)	106.120 (1.327)	32.637 (0.821)
Religiously observant	46.092 (0.513)	58.116 (1.277)	50.245 (0.558)	52.079 (1.152)
Continent of birth/period of immigration:				
Asia/Africa				
Before 1947	-11.540 (0.184)	-25.001 (0.662)	-8.841 (0.141)	-6.697 (0.176)
1948-58	-42.185 (1.072)	-36.952 (1.357)	-37.058 (0.936)	-18.931 (0.715)
After 1959	40.757 (0.563)	46.869 (0.783)	53.967 (0.737)	85.062 (1.454)
Europe/America				
Before 1947	-52.741 (0.994)	-20.533 (0.765)	-46.651 (0.876)	-10.940 (0.405)
1948-58	-9.126 (0.195)	6.766 (0.261)	-5.836 (0.122)	19.014 (0.729)
After 1959	74.074 (1.044)	20.495 (0.394)	83.891 (1.174)	52.077 (1.006)
Sample size	204	414	204	414
R ²	0.489	0.524	0.493	0.527
Adjusted R ²	0.448	0.506	0.449	0.509

The values in brackets are *t*-values.

Allocation of time to religious activity is measured in hours per year.

The following variables are excluded in order to prevent linear dependence: definition of wife, father and mother as nonreligious; born in Israel.

Table 2. Relationship of age to time devoted to religious activities for various schooling groups

	Years of schooling		
	0-8	9-12	13+
Coefficient of 'age'	-12.169 (1.300)	-9.838 (3.178)	-13.034 (2.308)
Coefficient of 'age squared'	0.169 (1.805)	0.123 (3.520)	0.108 (1.829)
Age at the minimum τ point	36.003	39.992	60.342
Sample size	110	221	83

t-values in brackets.

gone on to higher education (13+ years of schooling) age 60 is the age at which time devoted to religious activities is at a minimum.

The coefficients of the control variables are now considered.

Age. The impact of age on time spent on religious activity is seen to be positive and significant. It has been argued (Neuman, 1982) that this may be explained as the outcome of a process of habit formation (as defined by Pollack, 1970): the amount of time spent on religious activities in period *t* is a positive function of the time allocation to religion in past periods, with the outcome that, as he ages, the individual spends more time on such an activity.

However, alternative explanations for the positive age coefficient are available in the literature. In their model that looks upon religious activities as a form of investment in afterlife benefits, Azzi and Ehrenberg (1975) explain this positive relationship as an outcome of the individual concentrating his afterlife investments in the later stages of his life-cycle. In this way he keeps investment costs low by being temporally closer to the period in which expected benefits will accrue. On the other hand, Ulbrich and Wallace (1983) argue that in regressions based upon cross-sectional data, a positive age coefficient may be due to changing tastes for religiosity over time: elderly people may have acquired tastes for religious activities in the past, during a period when this form of leisure activity was far more dominant than more recently.

Number of children. This was found to be positively related to time devoted to religious activity. Clearly, causality runs in two directions: more religiously observant parents tend to have more children (Hartman, 1984; Neuman and Ziderman, 1986), while a larger number of children will tend to make heavier time demands on parents, in inculcating religious values to their children. However, holding constant the level of religiosity of the family (as proxied by the dummy variable for religious definition of the wife), the positive influence of the number of children on time allocated to religious activities would reflect the desire on the part of the parent to instil in the younger generation, through time-consuming instruction and personal example, a knowledge of the Jewish religious heritage and its values. A larger number of children would imply greater time inputs to these activities.

Religious definition of relatives. Rather surprisingly, the religious definition of the respondent's father and mother has no significant influence on religious performance. This

perhaps unexpected empirical finding seems to be the result of statistical multicollinearity; the religious definition of the respondent's wife, father and mother are highly correlated.

Men married to religiously observant women do spend significantly more time observing Jewish religious practices than men married to women defined as traditional, and these, in turn, spend more time than those married to nonreligious wives ('nonreligious wife' is the constant term).

Two alternative explanations are available for this observed positive association between a husband's and a wife's religiosity. First, a process of positive sorting is at work. Religious partners may select each other in order to avoid potential conflict over values and life-style. Alternatively, a partner could influence the spouse's level of religiosity through a process of 'investment' in the latter's religiosity. Such a process could be direct, through persuasion and formal (or informal) religious teaching, or indirect, in the form of encouragement and being prepared to assume a larger share of time-consuming activities which cater to family needs, thus freeing the spouse to devote more time to religious practices. This alternative explanation (described more systematically in Grossbard-Shechtman and Neuman, 1984) is more interesting from an economist's perspective, since it reinforces explanations of a wife's influence on her husband's productivity in the labour market (Kenny, 1983) and in health production (Grossman, 1976).

The continent of birth/immigration period. This interaction variable ('Israeli born' is the constant term) has some tendency to be larger for more recent immigration groups. This is particularly so for immigrants from Europe/America. This finding may reflect consumption motives for religious activities: in particular newer immigrants, less well integrated socially, find in synagogue attendance and other forms of religious activities a substitute for as yet unavailable, more natural social mixing. The negative relationship between length of residence in Israel and time devoted to religious activities may also be a reflection of the positive relation between seniority and the wage rate in Israel.⁹

IV. SUMMARY AND CONCLUSIONS

This paper has examined from a theoretical and (mainly) empirical point of view the correlates of time devoted to religious activity, using cross-sectional data on Jewish male employees in Israel.

A model is developed describing the individual males' 'religious behaviour'. By the maximization of a constrained utility function, one of the components of which is 'religiosity level', and with the aid of a graphical presentation and comparative statics methods, the influence of changes in the wage rate on time allocated to religious activity is examined. Relating the results to various findings from the human capital literature, a number of hypotheses are proposed and then tested empirically. These main empirical findings are reported:

- (1) Time devoted to religious activity is negatively correlated with the wage rate.
- (2) The age profile of time devoted to religious performance is U-shaped with a minimum at the age of 43.

⁹For some evidence see, for example, Levi (1968) and Amir (1975).

(3) As the level of education rises, this minimum point shifts to the right; from age 36 for males with 0–8 years of schooling, to 40 for those having 9–12 years of schooling, and to 60 for males with an educational level of 13+ years.

The human capital model ushered in during the 1960s has proved extremely valuable in explaining a wide range of socio-economic phenomena; the present extension, to time devoted to religious activity, is presented as yet another application of this extremely fecund model. The model used in this paper, however, while developed in the context of time devoted to religious observance, is not limited to this area. In further work it could be applied to other time-intensive activities such as sports and various types of hobbies which are associated with both time and money outlays.

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