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ABSTRACT

An Economic Perspective on Religious Education: Complements and Substitutes in a Human Capital Portfolio*

This paper models the tradeoffs between education in secular subjects, formal and informal, and the formation of religion-specific human capital. It explores some implications of negative externalities between religious and secular education. Applications include the tension between science and religion during the European Enlightenment and the development of religious education by American Jewry in the 20th century United States. The paper also discusses some implications for the vitality and intergenerational robustness of religious communities.

JEL Classification: Z12, J20, J15

Keywords: religion, ethnic groups, education, minorities

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I. Introduction

Education is an important aspect of religious life. Most parents aspire to raise their children in their own religion, defined broadly to include as "religion" any belief system that speaks to spiritual needs and for which there is a community of adherents. They also provide their children with a "secular" education that enhances their productivity as workers, as consumers, and as members of society. Individuals may be viewed as choosing a portfolio of human capital investments, some of which are religious (i.e., specific to a particular belief system) and the rest of which are secular (i.e., general with respect to religion). Religious and secular education are thus substitutes for each other as they compete for investment resources, primarily time and money.

The goal (output) of education is the formation of human capital. The prototype educational process is formal schooling, a system especially well suited to the formation of cognitive knowledge and certain types of decision-making skills. In a modern economic setting formal schooling is also an important means of acquiring occupational skills that associate positively – and often strongly – with future earning power. Another method of human capital formation involves experience with activities that provide skills through observation, repetition or familiarity. On-the-job training is but one example. Other human capital is accumulated through social interactions that provide feedback about the desirability of various behaviors and produce memories crucial for identity formation.

All three methods of education – schooling, experience and socialization – are important determinants of the human capital available to an adult decision-maker and affect his or her resource allocation decisions. The economics literature tends to focus on those types of human capital most relevant for the workplace, on investments in

schooling and experience that raise the productivity of labor and therefore hourly earnings (Mincer 1974; 1984). Other types of human capital that have received attention include investments in health (Schultz, T. Paul 1993; Schultz, T.W. 1980), family (marriage and children) (Becker 1981; Schultz, T.P. 1981), language (Chiswick, B.R. and Miller 1995), culture (including the arts) (Filer 1990; Smith 1998), religion (Iannaccone 1990), and consumption (Becker 1996).

Religious human capital is defined as knowledge, skill, experience and memories that enhance productivity in religious activities but have no effect on the productivity of resources allocated to other types of output (Chiswick, C.U. 1999; Iannaccone 1990). Examples of investment in religious human capital include the study (formal and informal) of religious subjects, participation in religious ritual at home and in the church (or its analogue for non-Christian religions), experiencing religious holidays and life cycle events, involvement in religious communal life, and learning the language used for religious observance. It is not simply that the value (utility) of religious experience is sensitive to the level of religion-specific human capital applied to a given set of resources, for the content of the religious human capital embodied in a person in some sense defines that person's religion. (Chiswick, C.U. 1999). As such, it is central to religious experience and a crucial aspect of the intergenerational transmission of each religion (Chiswick, B.R. and Chiswick 2000).

Education involves ideas as well as skills, and various studies suggest ways in which religious human capital raises the productivity of other types of human capital (Chiswick, C.U. 2001; Iannaccone 1998; Lehrer and Chiswick 1993).. It has also been argued that religious education has a positive effect on the productivity of secular

education, with positive complementarities between these two investment activities (Hollander, Kahana, and Lecker 2002). However less attention has been paid to the effects of secular on religious education, which may be either positive or negative. A modern secular education generally increases the productivity of investments in other types of human capital and thus may be expected to have a similar effect on religious education. Yet religious education often appears to be structured around the notion that secular education leads to ideas and behaviors that are undesirable and that need to be counteracted or even destroyed. Thus while secular education may be a desirable investment overall, some of its components have adverse effects on the productivity of religious training that offset some of the positive complementarities and make the overall effect ambiguous.

This paper focuses on how the curricula associated with secular and religious education, respectively, affect mutual complementarities in the production of these two types of human capital. Section II reviews the concept of religious human capital and presents a model of the educational choices. Section III uses this model to discuss complementarity properties as they pertain to each type of education. Section IV applies the model to two instances of religious change, the conflict between science and religion during the European Enlightenment and the development of new synagogue movements by American Jews during the twentieth century. Section V concludes with some implications for the life of religious communities.

II. Religious Education and the Human Capital Portfolio

The demand for religious education is derived from the production function for religious experience. The production function itself reflects a religious lifestyle choice, which is in turn affected by an individual's tastes and preferences. Utility-maximizing

consumers allocate their time between consumption and investment (education) and between religious and non-religious activities. The problem can be expressed as:

(1) Max U(Y, R) subject to $L_Y + L_R + L_E = L^*$

where R = Religion
Y = All other consumption goods and services
L_R = Time spent in religious production
L_Y = Time spent in non-religious production
L_E = Total time spent in human capital formation

and L* is the total time available for all purposes. The two consumption goods, Y and R, are home-produced with production functions that depend primarily on human capital specific to each activity:

(2) $Y = f(h_Y L_Y)$

(3) $R = g(h_R L_R)$

where h_Y = level (quality) of general human capital
and h_R = level (quality) of religious human capital

The level of human capital thus enters the production function indirectly as a determinant of the total amount of human capital, $H_R \equiv h_R L_R$ or $H_Y \equiv h_Y L_Y$, which is (for simplicity) the sole input for producing the corresponding consumption good.

Each type of human capital is in turn produced by an educational process with its own production function, the main input to which is the student's time. These can be written inversely as cost functions, expressing the time cost of education as a function of the level of skill to be acquired.

(4) $L_E = L_{YE} + L_{RE}$

(5) $L_{YE} = \varphi(h_Y)$, $\varphi', \varphi'' > 0$

(6) $L_{RE} = \gamma(h_R) + \omega\, h_Y\, h_R$, $\gamma', \gamma'' > 0$

where L_{YE} = Time spent in non-religious learning activities
L_{RE} = Time spent in religious learning activities

and the constant coefficient ω indicates the degree to which the acquisition of general human capital imposes an external effect on religious education. For example, if ω>0 a greater level of general human capital (h_Y) would make it more costly to acquire any given level of religious education (h_R), while if ω<0 the opposite would be true.

This problem is solved by maximizing the Lagrangian function:

(7) $\pounds = U(g(h_R L_R),\ f(h_Y L_Y)) - \lambda[L_R + L_Y + \gamma(h_R) + \varphi(h_Y) + \omega\, h_Y h_R - L^*]$.

Its first-order conditions can be solved to yield

(8) $U_g g' h_R = U_f f' h_Y$

(9) $L_R / h_R = [\gamma' + \omega h_Y]$

(10) $L_Y / h_Y = [\varphi' + \omega h_R]$

(11) $L^* = h_R \gamma' + h_Y \varphi' + \gamma + \varphi + 3\omega h_R h_Y$

Equaton (8) equates the marginal rate of substition in consumption between religious and non-religious uses of time to –1, the slope of the time budget line, requiring that the marginal value of time be the same in both consumption activities. Equations (9) and (10) equate the slopes of the human capital quantity-quality isoquants, L_R/h_R and L_Y/h_Y respectively, to the marginal cost of the corresponding type of education, allocating time to each type of education up to the point where the marginal time required for an additional unit of human capital is the same as the opportunity cost of that time in consumption activities. Equation (11), which expresses the time constraint as a function of the levels of the two types of education, is obtained by solving (9) and (10) for L_R and L_Y and substituting the result into the constraint in (1).

Equations (9) and (10) may also be solved for h_R and h_Y, the result substitituted into equation (8) and terms rearranged to yield:

$$\frac{U_g g' L_R}{U_f f' L_Y} = \left[\frac{\gamma' + \omega h_Y}{\varphi' + \omega h_R} \right] \tag{12}$$

The expression on the left-hand side of this equation is the marginal rate of substitution in consumption between h_R and h_Y, the slope of an indifference curve between levels of the two types of education. The right-hand side is the slope of a production possibility frontier (PPF) that holds constant L_E, the total resources devoted to education. Optimization thus requires tangency between an indifference curve and a human capital PPF determined by the allocation of time between consumption and education.

By varying the amount of time devoted to education, equation (12) implies an expansion path with a positive slope as long as both h_Y and h_R are normal (in the sense that more resources devoted to education raises the demand for each type). In contrast, the boundary in equation (11) describes a single opportunity set where the overall constraint on time has been converted (by means of the education production functions) into an equivalent constraint on the attainable combinations of human capital. This constraint generally has a negative slope, for which a sufficient condition is $\omega \geq 0$ (i.e., that any external effects of general education on religious education be non-positive). The overall solution to the consumer's problem occurs where the expansion path either crosses the constraint at a unique combination of h_R and h_Y or at one of its corners.

These relationships are illustrated in Figure 1. Religious education, h_R, is measured on the horizontal axis and all other education, h_Y, on the vertical axis. A family of PPF curves depicts the maximum combinations of human capital attainable from various levels of investment in education, each curve representing a different amount of L_E. If each type of investment is subject to diminishing marginal productivity the PPF will be concave to the origin (i.e., bowed outward), and Figure 1 illustrates the case

where there are no externalities to alter this property. A family of indifference curves reflects the utility attainable (indirectly from the own-production process) from various combinations of human capital, and the points of tangency between indifference and PPF curves describe an expansion path. The heavy line with a negative slope is the time constraint from equation (11). The consumer's optimum occurs where the expansion path crosses the time-constraint boundary.

III. The Effects of Externalities on Religious Education

Supply-side complementarity between investments in the two types of human capital, described by the sign and magnitude of the parameter ω, affects the shape of the opportunity set and the PPF curves. If secular education confers positive externalities on religious education ($\omega<0$), these curves would be bowed even further outward and the optimal investment for both types of human capital would be greater. If two types of human capital have few complementarities and/or negative externalities ($\omega>0$) the family of PPF curves would be less concave and the optimal portfolio would not only be smaller but would also display a greater tendency toward specialization in investment.

Figure 2 illustrates the implications of negative externalities for decisions about religious education. The two axes represent different types of human capital, religious and non-religious. The curve ACB is the Production Possibility Frontier in the absence of externalities and point C, where the indifference map is tangent to the PPF, describes the optimal allocation of investment in education for this case. Negative externalities would reduce the concavity of the PPF and if large enough can even cause it to bow inward, as illustrated by the curve AEB. The optimal resource allocation in this (admittedly extreme) case is at point E.

Negative externalities have two effects on the optimal allocation of resources. Because they increase the costs of education there is a scale effect, reducing the total amount of human capital attainable from fixed resources and hence the area under both the PPF and the overall time constraint. Negative externalities also induce a substitution effect, increasing the incentive to concentrate resources in one or the other type of human capital because the externalities raise the cost of combining the two. For example, an expansion path passing through the optimum at point E in Figure 2 (corresponding to the PPF family to which AEB belongs) would be everywhere to the left of the no-externalities expansion path passing through point C. Since externalities have a similar effect on the shape of the overall time constraint, altering it less near the corners than in the interior, the consumer's optimum will be lower on the expansion path the greater the negative externalities.

Figure 3 further illustrates the substitution effect of an increase in negative supply-side externalities on specialization in education. As in Figure 2, the outwardly bowed PPF (curve ACC'B) represents the case without supply-side externalities in education while the inner PPF (curve AEE'B) represents the case where there are large negative externalities. Figure 3 displays two indifference maps corresponding to two different people with different productivity in the production of religious experience. For example, the solid curves might apply to a person living in a weak religious community and the dashed curves for a person in a strong, vibrant one. Alternatively, the solid curves might represent a person with a talent for scientific achievements and the dashed curves a person more inclined toward the theological or mystical.

While there will always be differences in the educational outcomes chosen by these two people, these differences will be far greater in the presence of negative externalities. The expansion path corresponding to point E lies to the left of the expansion path for point C, while the path for E' lies to the right of the one for C'. Geometrically, the more outwardly-bowed (convex) the PPF, the closer the expansion paths for people with different preferences. Economically, this occurs because positive externalities reduce the cost of combining the two types of education, while negative externalities have the opposite effect.

The illustrations thus far have assumed smooth production functions, yet educational is often organized as a series of levels, or degrees, reflecting discontinuities in the underlying process. This characteristic suggests that one or both of the education production functions, $\varphi(h_Y)$ for general education or $\gamma(h_R)$ for religious education, might be written as a step function. To take a simple case, suppose $\varphi(h_Y)$ is subject to a minimum threshold at C* such that there is little or no value to lower levels of general education. Figure 4 illustrates this case by effectively eliminating the area under this threshold (shaded) from the opportunity set. This same graph would also illustrate the effect of an exogenous educational standard imposed by law or custom.

Whatever its cause, by eliminating the possibility of outcomes in the shaded area the constraint on general education has the effect of inducing substitution away from religious education. In the absence of externalities the PPF would be ACC'B and people with the solid-line indifference curves (tangent at point C) would be unaffected by the constraint. People with dashed-line indifference curves would move to C" by substituting secular education for religious education, making them worse off than at

their unconstrained optimum C'. If there are negative externalities the PPF would be AEE'B and a constraint at C* would have an even more dramatic effect on the size of the feasible area, increasing both the likelihood and magnitude of adverse effects. People with the solid-line indifference curves would find a new optimum at E", a corner solution with only slightly less utility than at the unconstrained optimum but with a much reduced level of religious education. Those with the dashed-line indifference curves would also optimize at E" but would experience a much greater reduction in utility and would prefer the corner solution at B. If the constraint is inherent in the production function itself rather than imposed exogenously, people with the dashed-line indifference curves would opt out of general education entirely.

IV. Responses to Negative Externalities: Some Applications

A. Science vs. Religion in the Enlightenment

The Enlightenment refers to a period in post-Medieval European history in which proponents of a newly discovered faith in science and rationality collided with the guardians of the Christian religious *status quo.* The traditional social and economic order provided little opportunity or incentive for ordinary people to acquire a secular education, its scholarly traditions were skewed toward investment in religion-specific human capital, and hostility toward religious dissention was common. The new ideas offered the possibility to break free of the religious establishment by "assimilating" into a larger society of scholars for whom affiliation with a particular religion was not a prerequisite. Universities and learned societies attracted people of various backgrounds, encouraging the ideas of freethinkers, agnostics and even atheists.

But part of the price of an advanced secular education and professional life was a penalty – explicit or implicit – on religious observance. Students seeking higher

education would have faced incentives to specialize, choosing between religious schools or secular universities with their respective differences in lifestyles. "Enlightened" philosophers and scientists often substantially reduced their observance of religious traditions and especially their investment in religion-specific human capital. The universities taught secular subjects from a "godless" perspective that could be viewed as blasphemous, while the religious curriculum was focussed inward and therefore "backward" by the standards of Enlightenment. The consequent split in the community was extreme, with marked differences in lifestyles and little overlap between the content of religious and general education.

Although this outcome was interpreted by both groups as an incompatibility between higher secular education and advanced religious learning, between assimilation and religious observance, the analysis in this paper suggests that this need not have been the case. It would have been sufficient cause for the split if religious observance imposed heavy costs on those choosing a secular profession, whether because of a cultural antagonism toward all religion among the educated or because of hostility toward a specific set of beliefs. If educated people responded to these incentives by distancing themselves from religion in general, becoming "secularists," then secularism would be understood as a threat to the authority of the religious establishment. The tension between science and religion was very real, but its root cause might have been strong negative supply-side externalities rather than incompatible subject matter.

The analysis here suggests that it is not the acquisition of general human capital that undermines the legitimacy of religion but rather the failure to acquire specifically religious human capital. Strategies for assimilation into general society that neglect

religious education would weaken the individual's attachment to a specific religion, potentially generating reverse bandwagon effects that would weaken the entire religious community. In contrast, strategies that successfully adapt religious education to a new social environment could enhance religious observance, developing a distinctively modern religious culture that could eventually generate its own positive bandwagon effects.

B. Education of American Jewry

European Jews who migrated to America, primarily near the turn of the twentieth century came from lands of limited opportunities and significant religious persecution. America was much more hospitable than Europe to Jewish life, presenting far more opportunities for secular achievement and relatively indifferent to Jewish religious observance. While negative externalities might continue to characterize Jewish education, they would have been far less extreme than in the old country. Conversely, Jewish education would no longer have exerted negative effects on the general education of Jews and may even have had some positive externalities. These changes in the shape of the PPF would have induced increases in the optimal ratio of general to Jewish human capital. Compulsory schooling laws and high career aspirations would have had the same effect, and the empirical evidence suggests a large substitution of general for Jewish education among the children of immigrants (Sarna 2003).

As a group, Jewish immigrants to America also tended to be self-selected for people with strong preferences for secular achievement relative to religious observance, suggesting an indifference map (and therefore an expansion path) resting somewhat to the left of the old-country average. In their eagerness to adapt to their new environment, however, they often misinterpreted – and underestimated – the negative externalities

between Jewish and general human capital. Many immigrants assumed that their children would be Jewishly identified even with low levels of Jewish education, taking for granted the formation of Jewish human capital attained so inexpensively in the old-country community. That is, they underestimated the importance of Jewish education – whether formal or informal – for producing Jewish experience in the new country. For the community as a whole, the reduced levels of Jewish investment by its constituent members would generate mutually reinforcing reverse bandwagon effects that would flatten indifference maps and shift the expansion paths even further to the left (Chiswick, B.R. and Chiswick 2000).

One important Jewish response to this "threat" was to work to make American society more hospitable to Jews and thus reduce the negative externalities between Jewish and general education. The Anti-Defamation League was organized for this purpose, and many Jewish communal organizations had units focussing on political action or education of the general public, as appropriate. Interfaith activities also received support at all levels, based on the belief that anti-Semitism was born of ignorance and could be eroded by friendly relations between Jews and non-Jews (Silberman 1985). The hypothesized effects of these activities are illustrated in Figure 5 as a reduction in the convexity of the PPF, moving the optimum human capital portfolio from point E to F.

Another popular response was to modify Judaism itself to reduce its dependence on specifically Jewish human capital. Secular Judaism had many variations, none of which required much in the way of Jewish education, and was especially popular in the early part of the twentieth century. The early Reform synagogue movement emphasized

Jewish ethics and universal values over ritual, discarding the use of Hebrew for prayer, the dietary laws, and much of the "parochial" in Jewish holiday observance. (Many of these "reforms" have since been reversed.) The adherents of these modern variants of Judaism were typically proud of a heritage so in harmony with American ideals, feeling that Jewish parochialism was an old-country holdover and therefore an embarrassment undermining their American status (Wertheimer 1993). The economic effect of this strategy was to alter the production function so as to reduce its reliance on specifically Jewish education, illustrated in Figure 5 as an implicit movement from F to F'.

A third response involved revamping the Jewish curriculum so as to enhance as much as feasible the complementarity between Jewish and general education. American Jewish children would learn to read and write English in the public schools before beginning their Hebrew studies, so English literacy could be assumed in the Jewish schools. Like the public schools, Jewish education was organized by age with each grade meeting in a separate classroom and taught from its own textbook. Hebrew schools run by the Conservative synagogue movement typically held class meetings after school and on Sunday mornings, while the Orthodox ran day schools that taught the general curriculum as well as Jewish studies. (Later generations would greatly expand the Jewish day schools even for non-Orthodox Jewish children.) Textbook and curriculum development for schooling in Hebrew, Jewish history, Torah, and holiday observance continued to assume basic skills acquired in the course of a student's general schooling

(Wertheimer 1999). While negative supply-side externalities invariably remained important, they could be partially offset by the integration of Jewish and general studies.[1]

V. Implications for Religious-Group Behavior Patterns

Apart from its utility-enhancing role, religious human capital is an important underpinning of intergenerational continuity for the religious community. In this regard it serves two different functions. First, religion-specific human capital is what distinguishes adherents from everyone else, defining a separate religion and the adherents as members of an identifiable religious community. As such, the human capital acquired by each generation affects its ability to transmit that religion from parents to children. In addition, religious human capital, like most other forms of human capital, is a homogomous marital trait (i.e., one for which "like marries like") (Becker 1981). People with high levels of religious human capital tend to select spouses who also have high levels, forming family units for which the home production of religious education is more efficient (Chiswick, C.U. 1998). Conversely, people with low levels of religious human

[1] It is instructive to compare American Jewish education to that of Israeli Jewry. Since its independence in 1948, Jewish public schools in Israel have had two separate tracks, one religious and the other secular (Troen 2001). At first the difference was primarily a matter of emphasis, with considerable overlap in the curriculum, and the system could have been illustrated as the difference between points C and C' in Figure 3. In subsequent decades, however, budget cuts and politics combined to reduce specifically Jewish subjects in the secular schools and non-Jewish subjects in the religious schools. Religious lifestyles would increasingly de-emphasize achievement in the general sphere, while the lifestyles of second- and third-generation secular Jews would have less and less use for specifically Jewish human capital. Each decade would find the negative externalities more pronounced, the community would become more polarized toward the extremes and the two groups would have less and less in common ((Etzioni-Halevy 2002)). Eventually their situation would become more like points E' and E, respectively, in Figure 3.

capital are inefficient producers of religion and tend to marry others who are similarly inefficient.

The less religious human capital a person brings to the marriage market, the greater the probability that religion is outweighed by other attributes of a potential spouse, and the higher the probability of out-marriage. Whether the spouses have the same or different religions, however, a couple with less religious human capital would be relatively less efficient both as consumers of religion and as religious educators in the home. Without communal support, their children are likely to become adults with even lower levels of religious human capital.

For intergenerational continuity, a religious community requires that its adherents invest in some minimum threshold of religion-specific human capital. This requirement underlies the quasi-public good aspect of religion that has been explored elsewhere (Iannaccone 1992). Individual choices that tend to concentrate on general rather than religious education are often attributed to changes in preferences in favor of a non-religious "secularism." The analysis developed above suggests that secularism itself may be endogenous, the outcome of a time allocation problem in which religious human capital is relatively costly to acquire.

In the early part of the twentieth century, many immigrants viewed "assimilation" as a high-priority goal and invested heavily in general American human capital, "Americanizing" their religious practices as well. By the later part of the twentieth century their grandchildren and great-grandchildren could be divided into those that felt that perhaps "assimilation" was bad – or, perhaps more accurately, that it was "too much of a good thing" – and those who were so assimilated that they didn't care. The analysis

here suggests that it was not the acquisition of general human capital that mattered for religious continuity but rather the reduced acquisition of group-specific human capital. Strategies for assimilation that neglected religious education would have weakened the individual's attachment to the religion, generating reverse bandwagon effects that weakened the entire religious community.

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Figure 1
Optimal Investment in Education without Externalities

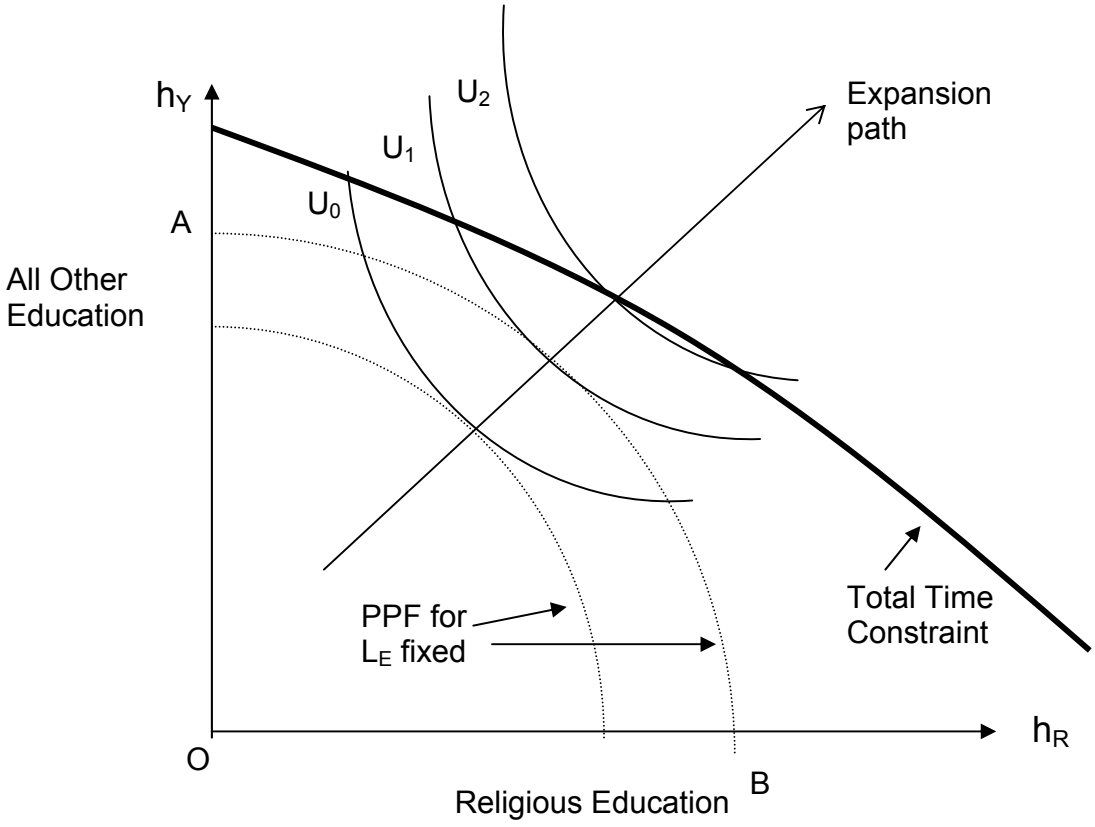

Figure 2
Optimal Investment with negative supply-side externalities

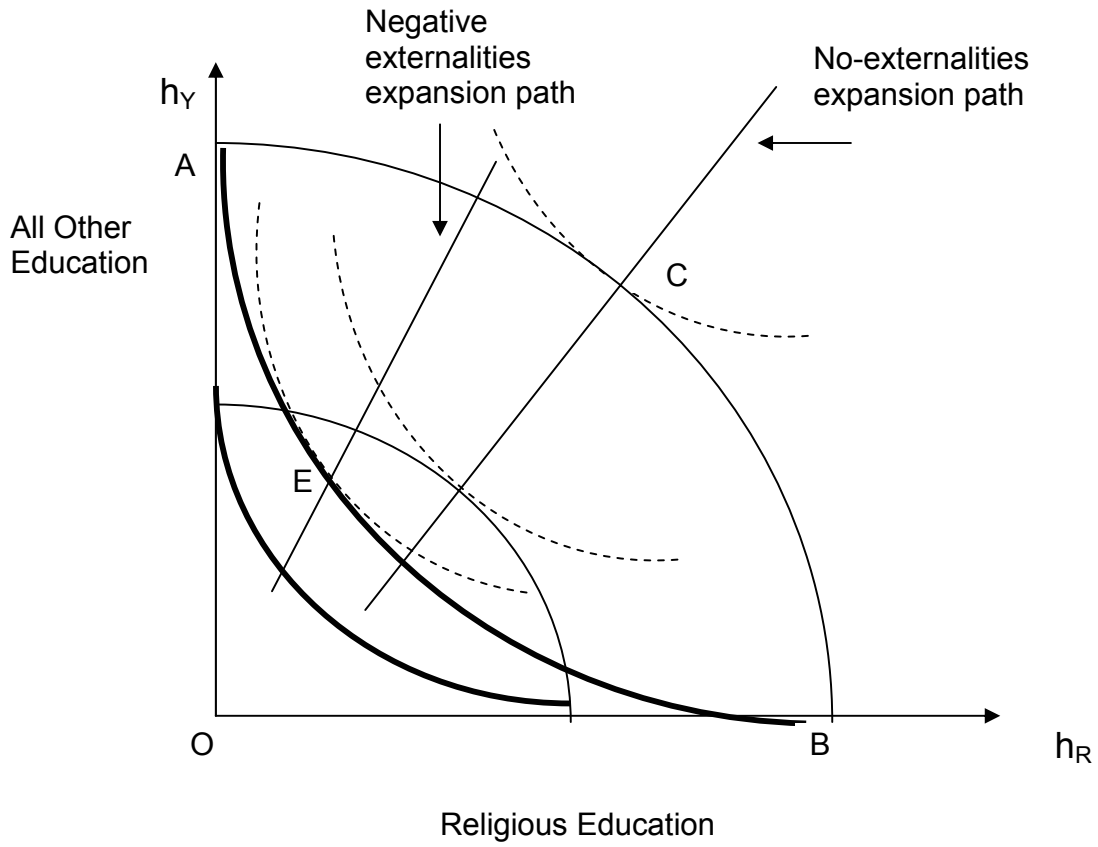

Figure 3
Preferences and Negative Supply-side Externalities

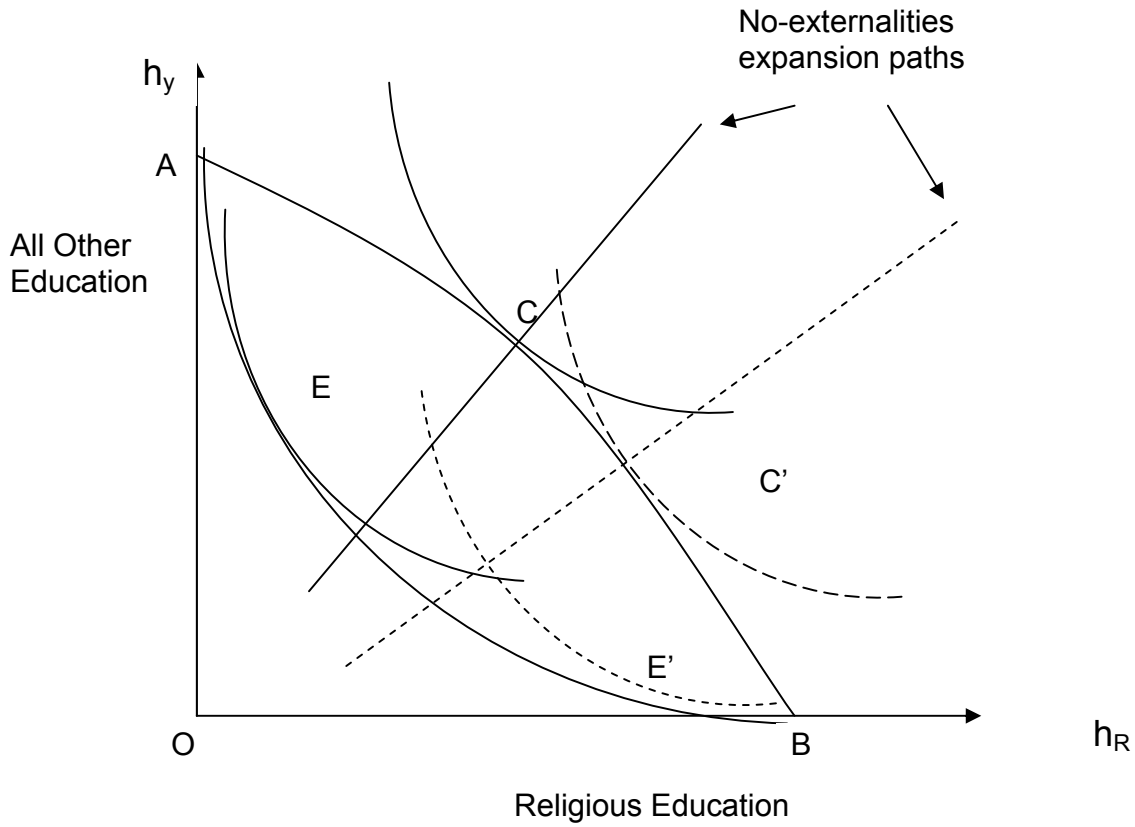

Figure 4
Discontinuity Constraints on Optimal Investment

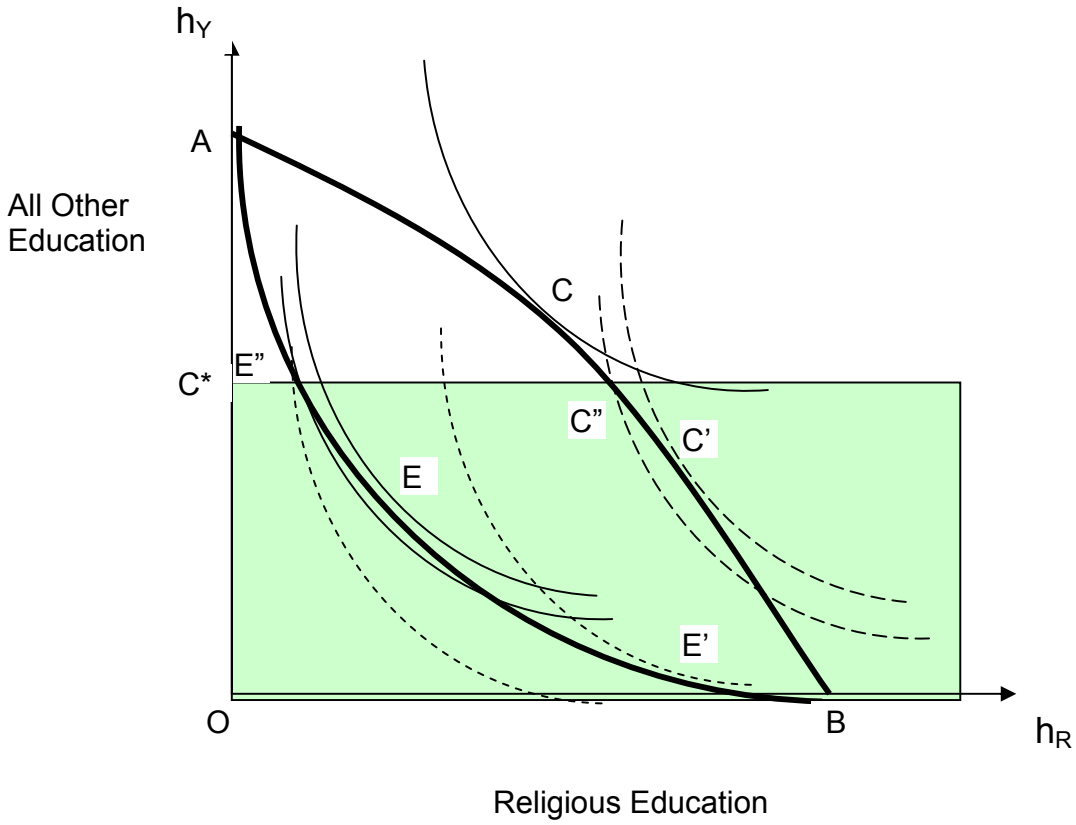

Figure 5
Optimal Investment with Adaptations in Jewish Practice