

Why Was the Relationship Between Church Attendance and Wage Negative Among Younger Adults in the 1980s? An Explanation Based on the US Evidence

Madhu S. Mohanty
California State University - Los Angeles

Using data from the National Longitudinal Survey of Youth, 1979 (NLSY79), this study demonstrates that the relationship between church attendance and wage was negative among younger adults in the 1980s. This is contrary to what is predicted by several studies in the literature. Following evidence from earlier research, the current study presents a theoretical model that explains why the relationship between these two variables may be negative for younger adults, when it is positive for older adults, and tests it empirically using data from the NLSY79. The results indicate that the difference in this relationship exists in most cases due to the evidence of a positive relationship between church attendance and school attendance, and a negative relationship between school attendance and fulltime employment among younger adults.

Keywords: church attendance, school attendance, fulltime work, wage, years of schooling

INTRODUCTION

Recent research in “Economics of Religion” indicates in general a positive relationship between church attendance and wage (Tomes, 1983, 1985; Freeman, 1986; Iannaccone, 1998; Regnerus, 2003; McCleary and Barro, 2006). Most of these studies attribute this positive relationship to numerous behavioral factors. For example, Freeman (1986) claims that church-going is associated with substantial improvements in the behavior of black male youths, and hence their chances of escaping the inner city poverty rise with the rise in their church attendance. In an excellent survey, Regnerus (2003, p. 409) concludes, “*The general direction of religious influence is positive. That is, more extensive religiosity typically (and modestly) contributes to better educational outcomes, better emotional health, more satisfaction in the family, and more voluntarism.*” Since these behavioral improvements are known to be associated with better socio-economic outcomes (Goldsmith et al., 1997; Dowell et al, 1998; Mohanty, 2009, 2012; Heckman and Kautz, 2013), the above studies predict that the worker’s wages may in fact be positively correlated with regular church attendance indirectly through its direct effects on positive behavior.

The current study extends the above research in an important direction. First, using the US data, it shows that the positive relationship between church attendance and wage as predicted by several earlier studies is not necessarily true for workers of all age groups, especially among younger adults of the 1980s for whom it is negative. To provide an explanation for this difference among younger and older adults, it presents a theoretical model based on empirical evidence which explains why the relationship between these two variables may not necessarily be positive for workers of all age-groups. The sign of this relationship may differ among youths or young adults and older adults primarily due to differences in (i)

how their school attendance probability is related to their church attendance, and (ii) how their fulltime work status is related to their school attendance. Before presenting the justification of these hypotheses and testing their validity empirically, it is necessary to present the actual evidence on whether or not the relationship between church attendance and wage is uniform across workers of all age groups in the United States.

We drew three samples from the National Longitudinal Survey of Youth, 1979 (NLSY79). NLSY79 is a US longitudinal data set that started in 1979 with 12,686 individuals aged between 14 and 22, and continued annually until 1994 and biennially thereafter. This longitudinal data was chosen because it has information on the participant's church attendance decision in two earlier surveys (1979 and 1982) when they were youths or young adults and two later surveys (2000 and 2012) when they are middle-age and mature adults.¹ Since the purpose of this study is to find a suitable explanation for the negative church attendance-wage relationship among younger adults, we focus our investigation primarily on 1979 and 1982 samples.² However, to compare the results from these younger adult samples with those of older adults, we chose the sample of middle-age adults from the 2000 survey of the NLSY79 because it is closest to 1979 and 1982 surveys. The 2012 sample was dropped because it is at least 3 decades away from the early 1980s and therefore may be structurally less comparable to the samples of younger adults in the 1980s than the 2000 sample.³ Moreover, use of too many older adult samples is likely to unnecessarily take the focus of this study away from the younger adults to other important directions. In the remainder of this study therefore we restrict our analysis to three samples only – two younger adult samples from 1979 and 1982 surveys and a middle-age adult sample from the 2000 survey.⁴

To estimate wage equations, we focused on the employed workers only. The dependent variable in our wage equations is log hourly wage. The set of standard explanatory variables for this regression includes years of schooling (Yearschl), years of work experience (Exp, Expsq), years of tenure with the current employer (Tenure), innate ability measured by the worker's Armed Force Qualifications Test (AFQT) score, fulltime employment status (Fulltime), race (White), gender (Male), residential location (Urban), marital status (Married) and presence of health problems (Hlthprob). Parental education may have a genetic effect on the worker's human capital endowments (Taubman, 1976; Behrman and Taubman, 1989) and hence years of schooling acquired by both mother and father (Mothgrad, Fathgrad) are also included in the set of wage covariates to control for these otherwise unobserved genetic endowments. Most of the studies in the economics of religion focus on the effects of the worker's religious affiliation on his/her economic performance (Sander, 1992; Keysar and Kosmin, 1995; Lehrer, 1999, 2004; Muller and Ellison, 2001; Beyerlein, 2004; Norton and Tomal, 2009), and consequently we include four dummy variables (Catholic, Jews, Protmain = Mainline Protestants, and Protbapt = Baptist Protestants) to control for these effects. Since the respondents in our samples with some religious affiliation are mostly Christians, their religious attendance in fact implies their church attendance, and consequently these two terms have been used interchangeably throughout this study.

Note that true religiosity of an individual may not necessarily be reflected by his/her religious affiliation at birth. A worker may belong to a particular religious group, but may not practice the teachings associated with that religion. The worker's regular religious (or church) attendance (Regattnd or CA), on the other hand, shows a deliberate attempt by the individual to practice his/her religiosity, and thus it represents a better measure of religiosity than mere religious affiliation inherited mostly from parents at birth. The variable of interest in this study therefore is the worker's current regular religious attendance (Regattnd) which is generated from the response to the following question asked slightly differently in our four samples. In 1979, the respondents were asked, "*In the past year, about how often have you attended religious services – more than once a week, about once a week, two or three times a month, about once a month, several times or less during the year, or not at all?*" Following the literature (Lehrer, 1999, 2004), we define regular religious attendance as attendance of religious services at least once a month. Consequently, the variable Regattnd assumes the value 1 when the individual attended religious services at least once a month, and is zero otherwise. The reference group consists of those who never attended any religious services. To draw a clear comparison between the two groups – with and without religious attendance – we dropped from all our samples the respondents who attended religious services sporadically,

only a few times a year. After eliminating missing observations from all relevant variables, we found the samples of the following sizes: 3027 in 1979, 5740 in 1982, and 5451 in 2000.⁵ The means and standard deviations of variables obtained from these samples are reported in the Appendix I which also provides their definitions.

Table 1 reports the wage equation estimates from all three samples considered in this study. It is interesting to note that most of the wage covariates assume coefficients with expected signs and significance levels. To save space, however, we focus only on our variable of interest, the regular church attendance (*Regattnd*). Interestingly, *Regattnd* assumes statistically significant negative coefficients in both young-adult samples of 1979 and 1982, but a statistically significant positive coefficient in the middle-age adult sample of 2000. These estimates confirm that the relationship between church attendance and wage is not necessarily positive for workers of all age groups, as predicted by earlier studies. No earlier study in the literature to our knowledge has examined this difference. The objective of this research therefore is to explore “Why was the church attendance-wage relationship among younger adults of the 1980s negative when the literature suggests otherwise?” Following the literature, the study presents in the next section a theoretical model that explains why the sign of this relationship may be different for workers of different age-groups, and thus it makes a contribution to the literature.

TABLE 1
WAGE EQUATION ESTIMATES FOR DIFFERENT YEARS.^a

Variable	1979	1982	2000
Constant	0.2657** (4.78)	0.7326** (16.47)	0.8878** (13.66)
Regattnd	-0.0697** (3.90)	-0.0522** (4.36)	0.0626** (3.11)
Catholic	0.0896** (4.19)	0.0365** (2.04)	0.0561** (2.78)
Jews	0.0756 (0.83)	-0.0081 (0.12)	0.1582** (2.11)
Protmain	0.0058 (0.25)	0.0007 (0.04)	0.0159 (0.83)
Protbapt	0.0340 (1.45)	-0.0015 (0.08)	-0.0452** (2.22)
Yearschl	0.0536** (10.61)	0.00304** (8.36)	0.0625** (17.28)
Exp	0.1587** (2.29)	0.0016 (0.09)	0.0136** (2.16)
Expsq	-0.0142 (0.29)	0.0161** (4.24)	0.0002 (0.97)
Tenure	-0.0548** (4.18)	0.0214** (4.06)	0.0109** (8.40)
AFQT	0.0004 (1.22)	0.0012** (4.95)	0.0033** (9.83)
Mothgrad	-0.0023 (0.98)	-0.0017 (1.07)	0.0043** (2.13)
Fathgrad	0.0059 (0.32)	0.0019 (1.58)	0.0022 (1.38)
Hlthprob	-0.0214 (0.57)	-0.0122 (0.47)	-0.1476** (5.95)
White	-0.0467** (2.31)	-0.0269** (1.99)	0.0155 (0.90)

Male	0.1840** (12.02)	0.1451** (13.81)	0.1782** (12.78)
Urban	0.0680** (3.65)	0.0794** (6.29)	0.0572** (3.80)
Married	0.1438** (5.64)	0.0945** (7.34)	0.0796** (5.64)
Fulltime	0.1816** (10.78)	0.1303** (11.66)	0.0806** (4.03)
R ²	0.2317	0.2108	0.3447
Sample size	3027	5740	5451
^a	Values in parentheses are absolute t-values.		
** (*)	Significant at 5 (10) percent level.		

The study is organized as follows. The next section develops a model that provides theoretical justification of why wages of older and younger adults may be related to church attendance differently. Next, we present the estimating equations to test the hypotheses proposed in this study, and then we present results for the test of these hypotheses. The following section examines the validity of our findings by conducting some robustness checks. Next, we examine the policy implications of our study, and the final section summarizes our findings.

THE MODEL: AN EXPLANATION OF THE EMPIRICAL EVIDENCE

In this section, we present a model that demonstrates the relationship between church attendance and wage. Following the existing literature, we propose two hypotheses which, by being different for younger and middle-age adults, explain theoretically why the church attendance-wage relationships among these two groups of workers are different.

Hypotheses

There are numerous studies in the literature that demonstrate that regular church attendance in the current period enhances the individual's educational attainment in the same period or in later periods (Sander, 1992; Keysar and Kosmin, 1995; Darnell and Sherkat, 1997; Sherkat and Darnell, 1999; Lehrer, 1999, 2004; Muller and Ellison, 2001; Beyerlein, 2004; Norton and Tomal, 2009; Sander and Cohen-Zada, 2012; Boppart et al., 2014; Mohanty, 2016). Since educational attainment of an individual is the result of his/her current or prior school attendance, we can conclude following the studies just mentioned that regular church attendance during youth is associated with greater likelihood of school attendance during the same period (Freeman, 1986; Regnerus, 2000, 2003; Regnerus and Elder, 2003), leading to acquisition of more years of schooling in future periods. This may not, however, be true for most of the older adults because they are expected to have already completed their desired years of schooling, and therefore are unlikely to attend schools in the current period even if they attend church services regularly. This is evident from Appendix II which shows a significant decline in school attendance among employed workers of the NLSY79 from almost 50% in 1979 to 3% in 2000 and approximately 1% in 2014.⁶

The younger adults attend school primarily as an investment in human capital. Due to their longer post-schooling working career, the net present value of future earnings resulting from higher human capital investment, with everything else held constant, is much higher for younger adults than for older adults with a shorter post-schooling working career. An increase in the probability of school attendance resulting from regular church attendance therefore is likely to be higher among younger adults than among older adults. For the latter group, it may even be statistically insignificant. Thus, the first hypothesis we propose is as follows:

Hypothesis 1: *“The relationship between church attendance and school attendance is positive among younger adults, but not necessarily so among older adults.”*

Note that full-time school attendance leaves less time with the worker for market work, and consequently it is likely to affect the fulltime work status of most workers – younger or older – negatively. However, for older adults, who may have already completed their desired years of schooling, it may have no effect or very insignificant effect on their fulltime work status. Thus, our second hypothesis may be stated as follows:

Hypothesis 2: “Fulltime work is related to school attendance negatively among younger adults, whereas they may be unrelated among older adults.”

Note that fulltime work is known to have a significant positive effect on the worker’s wage rate (Barzel, 1973; Moffitt, 1984; Costa, 2000), and therefore any variable that affects school attendance probability positively is likely, by hypothesis 2, to lower the worker’s chances of working fulltime and hence the wage rate. Since regular church attendance, as explained in hypothesis 1, affects the school attendance probability of younger adults positively, it is likely to lower their probabilities of fulltime work, leading to lower wages. It is quite possible therefore to find the evidence of a negative relationship between church attendance and wage among younger adults, even though this relationship among older adults may be positive. Clearly, this is an empirical issue that deserves appropriate statistical tests.

The Model

Following these hypotheses, we formally present in this section a model that explains why church attendance may affect wages ($W = \log$ hourly wage) of these two groups of workers differently. Assume that the wage of a worker during a given time period t depends on a host of standard variables included in the vector X_t . Some of these variables may be related to church attendance, and the others may not. For example, years of schooling, which is known to be positively correlated with wage, is also related to church attendance through improved school attendance (Freeman, 1986; Mohanty, 2016), whereas residence in a particular region, which is known to be related to wage, is very much unlikely to be affected by church attendance. Define $X_t = [X_{1t}, X_{2t}]$, where X_{1t} is the vector of covariates that are related to church attendance and X_{2t} represents the vector of variables that are unrelated to church attendance.

As mentioned above, wage is positively related to the fulltime employment status (F_t) which may also be related to church attendance (CA) indirectly through school attendance (SA), especially among youths and young adults. The church attendance-wage relationship in a general form may thus be written as follows:

$$W_t = W(X_{1t}(CA_t), X_{2t}, F_t(CA_t)), \partial W_t / \partial F_t > 0. \quad (1)$$

To show how wage is related to church attendance at time period t , we rewrite equation (1) as

$$\frac{\partial W_t}{\partial CA_t} = \frac{\partial W_t}{\partial F_t} \frac{\partial F_t}{\partial CA_t} + \sum \frac{\partial W_t}{\partial X_{1kt}} \frac{\partial X_{1kt}}{\partial CA_t}, k = 1, \dots, K. \quad (2)$$

It is important to note that the sign of $\partial W_t / \partial CA_t$ on the left-hand-side of equation (2) depends on the signs of the two terms on the right-hand-side. For the sake of simplicity, we assume that church attendance affects X_{1kt} of older and younger adults identically, and consequently the sign of the second term remains the same for both groups of workers. With the help of the two hypotheses stated above we can show that the sign of the first term may be different for older and younger adults, and consequently $\partial W_t / \partial CA_t$ may have different signs for these two groups.

Under hypothesis 2, fulltime school attendance reduces the number of hours an individual can supply for market work, and thus it is likely to lower the probability of his/her fulltime employment regardless of whether he/she is a younger or an older adult. In other words, for most workers, our second hypothesis suggests that

$$F_t = F(SA_t), \quad dF_t/dSA_t < 0. \quad (3)$$

With the availability of online alternatives in recent years, however, we may find $dF_t/dSA_t \geq 0$, especially in recent surveys. Moreover, for older adults of the 2000 survey, who may have already completed their desired years of schooling, we may expect $dF_t/dSA_t = 0$. For the younger adults of 1979 and 1982 samples, however, the sign of this derivative is still expected to be negative, because (1) online schooling was not available in 1979 and 1982 as the technology then was not advanced enough to support it, and moreover (2) younger adults with a longer working career ahead are more likely than older adults to prefer regular schooling over fulltime work regardless of whether or not online schooling opportunities are available. Thus under hypothesis 2, $dF_t/dSA_t < 0$ for younger adults, but $dF_t/dSA_t \geq 0$ for older adults.

To formally model hypothesis 1, we first assume that school attendance is related positively to a host of personal, demographic and family characteristics denoted by Z . Thus at time period t ,

$$SA_t = f(Z_t), \quad dSA_t/dZ_t > 0. \quad (4)$$

Then, following the literature (Freeman, 1986; Regnerus, 2000, 2003; Regnerus and Elder, 2003), we predict that increase in the frequency of church attendance results in behavioral improvements (a psychological progress similar to technical progress in production theory) that augment the school attendance function by a positive factor $CA(t)$. Thus at t , the modified school attendance equation can be written as

$$SA_t = CA(t)f(Z_t), \quad dCA(t)/dt > 0. \quad (5)$$

From equation (5), we can write

$$\frac{dSA_t}{dt} = CA(t) \cdot \frac{df(Z_t)}{dt} + f(Z_t) \frac{dCA(t)}{dt} = \frac{SA_t}{f(Z_t)} \cdot \frac{df(Z_t)}{dZ_t} \cdot \frac{dZ_t}{dt} + \frac{dCA(t)}{dt} \cdot \frac{SA_t}{CA(t)}. \quad (6)$$

Dividing both sides of equation (6) by SA_t , we find

$$\frac{dSA_t/dt}{SA_t} = \frac{df(Z_t)}{dZ_t} \cdot \frac{Z_t}{f(Z_t)} \cdot \frac{dZ_t/dt}{Z_t} + \frac{dCA(t)/dt}{CA(t)}. \quad (7)$$

Defining growth rate of Z (or G_Z) as $(dZ/dt)/Z$, we can re-write equation (7) as

$$G_{SA} = \epsilon_{SA,Z} G_Z + G_{CA}, \quad (8)$$

where $\epsilon_{SA,Z}$, the elasticity of school attendance with respect to Z , is positive by equation (4). Equation (8) clearly suggests that improvement in church attendance ($G_{CA} > 0$) during a given time period like technical progress in production theory augments school attendance during the same period even if $G_Z = 0$. Thus, in time period (t),

$$SA_t = g(CA_t), \quad dSA_t/dCA_t > 0. \quad (9)$$

Note that dSA_t/dCA_t in equation (9) is expected to be positive mostly for younger adults who are in their school going age and have not completed their desired years of schooling. However, for older adults, who may have already completed their desired years of schooling and have very little benefits to expect from additional schooling, current church attendance may not have any significant effect on their school attendance decision. Thus, for this group, we predict

$$dSA_t/dCA_t = 0. \quad (10)$$

There is another reason why the sign of dSA_t/dCA_t may differ between youths and older adults. In most cases, youths attend church due to parental pressure, whereas most of the older adults attend church voluntarily out of their own interest. These self-motivated mature adults may commit more time to church services, and thus may be left with less time for school attendance. For these adult workers, who may be highly dedicated to church services and may have no urgency for school attendance, it is quite possible even to find a scenario in which

$$dSA_t/dCA_t < 0. \tag{11}$$

Equations (9), (10) and (11) quite succinctly summarize our first hypothesis which claims that the relationship between church attendance and school attendance (dSA_t/dCA_t) is positive among younger adults, whereas it may be zero or negative among older adults. This reveals an interesting fact. It shows that a difference in the relationship between church attendance and school attendance among younger and older adults in equations (9), (10) and (11) may contribute partly to differences in their church attendance-wage relationship observed in the introductory section. Since school attendance of youths may be affected positively by their church attendance (hypothesis 1: equation 9) and since increased school attendance is likely to affect their fulltime employment negatively (hypothesis 2: equation 3), church attendance of youths may indirectly have a negative effect on their current fulltime employment. Thus, for younger adults,

$$dF_t/dCA_t = (dF_t/dSA_t) \times (dSA_t/dCA_t) < 0. \tag{12}$$

For older adults, on the other hand, the relationship between church attendance and school attendance is not necessarily positive [$dSA_t/dCA_t \leq 0$ by equations (10) and (11)]. With $dF_t/dSA_t < 0$ by equation (3), we find for this group of workers,

$$dF_t/dCA_t = (dF_t/dSA_t) \times (dSA_t/dCA_t) \geq 0. \tag{13}$$

It is primarily this difference in the direction of relationship between church attendance and fulltime employment among younger and older adults [as demonstrated by equations (12) and (13)] that leads to a scenario in which the direction of relationship between church attendance and wage may be different for these two groups of workers.

To illustrate the validity of the above claim, we rewrite equation (2) as follows:

$$\frac{\partial W_t}{\partial CA_t} = \frac{\partial W_t}{\partial F_t} \frac{\partial F_t}{\partial SA_t} \frac{\partial SA_t}{\partial CA_t} + \sum \frac{\partial W_t}{\partial X_{1kt}} \frac{\partial X_{1kt}}{\partial CA_t}, k = 1, \dots, K. \tag{14}$$

For older adults, the first term on the right-hand side (RHS) of this equation is ≥ 0 because by equations (10) and (11), $dSA_t/dCA_t \leq 0$, and by equations (1) and (3) respectively, $dW_t/dF_t > 0$ and $dF_t/dSA_t < 0$. Since the second term on the RHS consists of a number of human capital and demographic variables that are known to be related positively to church attendance, we can expect the overall sign of the second term to be positive, and consequently the relationship between church attendance and wage is likely to be positive for older adults.

For youths and younger adults still in their school-going age, however, the scenario is different. The second term on the RHS of equation (14) for this group of workers like that of older adults is expected to be positive, whereas the first term unlike that in the older adult equation is likely to be negative because by equations (1), (3) and (9), $dW_t/dF_t > 0$, $dF_t/dSA_t < 0$, and $dSA_t/dCA_t > 0$. As a result, the overall effect of church attendance on wage is likely to depend on the relative strengths of the two effects of church attendance: (i) on fulltime employment (F_t) through school attendance, the first term, and (ii) on other wage covariates (X_{1t}), the second term. The overall effect may therefore be negative if the first term in absolute value is larger than the second term. In other words, when the effect of church attendance on fulltime employment through school attendance is so strong that it outweighs the positive effect of church attendance

on all other wage covariates, the overall effect of church attendance on wage is likely to be negative. Under our assumption that church attendance by improving behavior is likely to motivate youths to engage in schooling activities (Freeman, 1986; Regnerus, 2000, 2003; Regnerus and Elder, 2003), we expect the first term on the RHS of equation (14) to dominate the second term, and as a result, we may observe a negative relationship between wage and church attendance among youths and young adults. With the help of the two proposed hypotheses, equation (14) thus provides an explanation of why the church attendance-wage relationship among younger adults was negative in the 1980s and why it was different from that of older adults of the 2000 survey.

TEST STRATEGY AND ESTIMATION PROCEDURE

In the introductory section, we have already estimated the following log wage (W) equation:

$$W_t = \mathbf{X}_t \boldsymbol{\beta} + \gamma_1 CA_t + \gamma_2 F_t + \epsilon_t. \quad (15)$$

For middle-age adults, the sign of γ_1 , as demonstrated in the earlier literature, is positive. For young adults, however, the sign of γ_1 , as predicted by our theory, is negative. To explain this variation in the sign of γ_1 , we have proposed in the last section two hypotheses: (i) the school attendance (SA) probability of young adults is positively related to their church attendance probability (CA), and (ii) the probability of having fulltime employment (F) status at work of these young adults is negatively related to their likelihoods of school attendance (SA). Due to the differences in their school going behavior, we predict the opposite results for older adults. Test of these hypotheses requires estimating the following equations:

$$SA_t^* = \mathbf{X}_{3t} \boldsymbol{\beta}_2 + \alpha_2 CA_t + \epsilon_2, \quad (16)$$

$$SA_t = 1, \text{ if } SA_t^* > 0, \text{ and } = 0, \text{ otherwise,} \quad (17)$$

$$F_t^* = \mathbf{X}_{4t} \boldsymbol{\beta}_3 + \alpha_3 SA_t + \epsilon_3, \quad (18)$$

$$F_t = 1, \text{ if } F_t^* > 0, \text{ and } = 0, \text{ otherwise,} \quad (19)$$

where SA_t^* and F_t^* are latent continuous variables that generate the binary variables SA_t and F_t . The variable vectors \mathbf{X}_{3t} and \mathbf{X}_{4t} include relevant characteristics related respectively to the worker's current school attendance probability and fulltime employment status. Since school attendance and fulltime employment status are traditionally available in most labor market data sets as binary variables, equation (16) along with equation (17) and equation (18) along with equation (19) can be estimated separately by probit. We predict the signs and significance levels of α_2 and α_3 to be different for younger and older adults which in turn will explain why the church attendance-wage relationship is different for these two groups of workers.

Our model presented in the above paragraph does not recognize the possibility that fulltime employment and school attendance may be simultaneously related. Note that a student attending school fulltime has less time left for market work, and similarly, a worker working fulltime has less time and incentive to attend school. As a result, both variables may be related to each other simultaneously which calls for an appropriate simultaneous equations procedure for their estimation. In the presence of such simultaneity, equations (16) and (18) can be rewritten as

$$SA_t^* = \mathbf{X}_{3t} \boldsymbol{\beta}_2 + \alpha_2 CA_t + \alpha_3 F_t^* + \epsilon_2, \quad (20)$$

$$F_t^* = \mathbf{X}_{4t} \boldsymbol{\beta}_3 + \alpha_3 SA_t^* + \epsilon_3. \quad (21)$$

Note that SA_t^* and F_t^* are not only unobserved, but also endogenous, and consequently we estimate these two equations along with equations (17) and (19) by a two-stage probit procedure suggested by

Maddala (1983).⁸ In the first stage, we estimate the reduced form school attendance and fulltime employment equations by probit to generate the predicted variables $F_{\hat{t}}$ and $S\hat{A}_{\hat{t}}$. These predicted variables are entered as explanatory variables in the structural equations (20 and 21) which are then estimated along with equations (17) and (19) by a second stage probit. Formulas for the corrected asymptotic variance-covariance matrices of these two-stage estimators are derived in Maddala (1983, p. 246). We used the econometric software *LIMDEP* (Green 2016) to compute corrected standard errors of the variable coefficients.

DATA AND RESULTS

To test the two hypotheses proposed in the last section, we used the same samples from 1979, 1982 and 2000 surveys that were used in the introductory section to show the empirical relationship between church attendance and wage. All the variables used in estimating the wage equation in the introductory section are also used to estimate both school attendance and fulltime employment equations in this section except when they are estimated simultaneously.

Church Attendance and School Attendance: Test of Hypothesis 1

With a view to testing the hypothesis that regular church attendance (*Regattnd*) improves the chances of school attendance (*SA*) among younger adults, we estimated current school attendance equations from 1979 and 1982 samples in which the dependent variable *SA* assumes the value 1 if the respondent is currently enrolled in a school/college, and is 0, otherwise. To further demonstrate that for older adults, who may have already completed their desired years of schooling, church attendance is unlikely to influence their school attendance decision or may affect it negatively we also estimated the school attendance equation from the 2000 sample. These equations are estimated by probit and the results are reported in Table 2. Most of the variable coefficients in the 2000 equation assume signs and significance levels that are very different from those in 1979 and 1982 equations. This clearly indicates that school attendance decisions of younger adults and older adults are influenced by different sets of variables. With the evidence that a large percentage of younger adults are still attending school and a large percentage of older adults have already completed their desired years of schooling (see *Schlatnd* in Appendix 1), differences in estimated coefficients between these equations are not surprising.

TABLE 2
PROBIT ESTIMATES OF SCHOOL ATTENDANCE (SA = *Schlatnd*) EQUATIONS FOR DIFFERENT YEARS.^a

Variables	1979	1982	2000
Constant	1.1433** (5.85)	-1.2830** (7.63)	-2.6617** (9.47)
Regattnd	0.5525** (8.97)	0.5152** (11.11)	-0.2261** (2.45)
Yearschl	-0.1796** (10.47)	0.0454** (3.25)	0.1052** (5.85)
Exp	-0.9219** (12.07)	-0.4080** (19.67)	-0.0027 (0.34)
Tenure	0.2385** (5.22)	0.0834** (4.04)	-0.0082 (1.18)
AFQT	0.0158** (12.84)	0.0107** (11.46)	0.0011 (0.60)
Mothgrad	0.0465** (5.49)	0.0226** (3.67)	-0.0104 (1.01)
Fathgrad	0.0153**	0.0187**	-0.0018

	(2.36)	(4.04)	(0.22)
Hlthprob	-0.1120	-0.2675**	0.0039
	(0.83)	(2.60)	(0.03)
White	-0.2178**	-0.1489**	-0.0590
	(3.10)	(2.93)	(0.66)
Male	-0.0261	0.0921**	-0.3539**
	(0.49)	(2.35)	(5.05)
Urban	0.0408	0.0025	0.0044
	(0.62)	(0.05)	(0.05)
Married	-1.7458**	-0.9971**	-0.0873
	(14.14)	(16.84)	(1.18)
Catholic	0.0791	0.0752	-0.0167
	(1.06)	(1.09)	(0.16)
Jews	-0.1499	-0.1182	-0.4258
	(0.46)	(0.49)	(0.97)
Protmain	0.0273	-0.0078	-0.0016
	(0.33)	(0.11)	(0.02)
Protbapt	0.0738	-0.0534	-0.1236
	(0.90)	(0.74)	(1.13)
Sample	3027	5740	5451
Log Likelihood	-1545.89	-2852.13	-711.82
χ^2 (df=16)	1086.89	1478.86	103.76

^a The quantities in the parentheses are absolute t values. ** (*)Significant at 5 (10) percent level.

The most interesting result relevant to the test of our proposed hypotheses is the coefficient of Regatnd. As predicted, it assumes a statistically significant positive coefficient in both younger adult samples of 1979 and 1982, and a negative coefficient in the 2000 sample of middle-age adults. In other words, church attendance improves school attendance among younger adults, but lowers the chances of school attendance among middle-age adults. This is exactly what we claimed in the introductory section. The empirical evidence thus validates our first hypothesis that school attendance is related to church attendance differently for younger and middle-age adults.

School Attendance and Fulltime Employment: Test of Hypothesis 2

To test the hypothesis that fulltime employment status (F) is related negatively to school attendance (Schlatnd = SA), especially among younger adults, we estimated fulltime employment status equations by probit from all three samples with SA as one of the explanatory variables. These results are reported in Table 3. As expected, most of the variable coefficients assume very similar signs and significance levels in both younger adult equations of 1979 and 1982, whereas they are partly different in the older adult equation of 2000. The variable of interest in this table is Schlatnd which, as expected, assumes statistically significant negative coefficients in both 1979 and 1982 samples and a statistically insignificant coefficient in the 2000 sample. Negative coefficients in the younger adult samples may result from most young-adults attending schools fulltime while working part-time, whereas a statistically insignificant coefficient in the older adult sample may be attributed partly to most of these workers working fulltime while attending schools part-time or not attending school at all. The empirical evidence thus validates our Hypothesis 2.

TABLE 3
PROBIT ESTIMATES OF FULLTIME EMPLOYMENT STATUS (*F*) EQUATIONS FOR
DIFFERENT YEARS.^a

Variables	1979	1982	2000
Constant	-0.6181** (2.84)	-0.2369 (1.52)	0.1649 (1.00)
Schlatnd	-1.9143** (29.72)	-1.1473** (26.83)	-0.1444 (1.25)
Yearschl	0.1133** (5.96)	0.0625** (4.78)	0.0137 (1.14)
Exp	0.4756** (5.63)	0.1393** (7.10)	0.0419** (8.41)
Tenure	-0.1034** (2.06)	0.0574** (2.87)	0.0183** (3.81)
AFQT	-0.0018 (1.34)	-0.0001 (0.10)	-0.0019 (1.62)
Mothgrad	-0.0119 (1.29)	-0.0138** (2.38)	-0.0146** (2.09)
Fathgrad	-0.0180** (2.51)	-0.0070 (1.56)	0.0020 (0.37)
Hlthprob	-0.1327 (0.92)	-0.0525 (0.56)	-0.2596** (3.52)
White	0.0253 (0.33)	0.0819* (1.69)	-0.1613** (2.77)
Male	0.4060** (6.74)	0.3605** (9.48)	0.6590** (13.74)
Urban	-0.1112 (91.52)	-0.0801* (1.72)	-0.0031 (0.06)
Married	0.0574 (0.61)	0.1680** (3.43)	-0.1416** (2.95)
Catholic	0.0360 (0.45)	-0.2021** (3.28)	0.2243** (3.28)
Jews	-0.0172 (0.05)	-0.4728** (2.04)	-0.5687** (2.69)
Protmain	0.0742 (0.83)	-0.1826** (2.94)	0.0354 (0.56)
Protbapt	0.0524 (0.60)	-0.1041 (1.62)	0.2039** (2.96)
Sample size	3027	5740	5451
Log Likelihood	-1199.96	-3059.91	-1959.17
χ^2 (df = 16)	1729.55	1445.21	492.42

^a The quantities in the parentheses are absolute t values.

** (*) Significant at 5 (10) percent level.

It is interesting to note that the validation of both hypotheses has important implications on the relationship between church attendance and fulltime employment. Since by hypothesis 2, $\partial F / \partial SA < 0$ in the younger adult samples (Table 3) and since it has already been demonstrated in Table 2 that $\partial SA / \partial CA > 0$ for younger adults (hypothesis 1), we can claim that church attendance as predicted by our model has a negative effect on the fulltime work status of younger adults through their higher probability of school attendance ($\partial F / \partial CA < 0$). Interestingly, for the middle-age adults of the 2000 sample, $\partial SA / \partial CA < 0$

(Table 2), and $\partial F/\partial SA \leq 0$ (Table 3),⁹ and consequently for this group of workers, $\partial F/\partial CA \geq 0$. With the evidence of a positive relationship between fulltime employment and wage as shown in Table 1, the difference in the relationship between church attendance and fulltime work ($\partial F/\partial CA$) among younger and older adults has clear implications on why the church attendance-wage relationships among different groups of workers may be different.

A question may arise, “if church attendance affects the fulltime work status of younger adults negatively, why it is not included as a covariate in the fulltime work equation?” To answer this question, we re-estimated the fulltime employment equations of Table 3 with regular church attendance as an additional explanatory variable. Our unreported results indicate that this variable is not statistically significant in any equation,¹⁰ which in turn suggests that regular church attendance does not affect fulltime employment directly. However, it does affect school attendance directly (Table 2) which affects fulltime work status of younger adults negatively (Table 3). Fulltime work thus is related to church attendance only indirectly through its direct effect on school attendance, and consequently this variable is not included in the fulltime employment equation.

Simultaneous Relationship Between School Attendance and Fulltime Work

Table 4 reports the two-stage probit estimates of the school attendance equation from all three samples, whereas Table 5 presents these estimates for the fulltime work status equations.¹¹ The coefficients of the predicted variables Fultimhat and Sclatdhat in both tables clearly indicate that school attendance and fulltime employment in fact are simultaneously related in younger adult samples, but not in the middle-age adult sample. This finding seems reasonable because youths and young adults with a longer working career ahead are often confronted with the dilemma of whether or not they should sacrifice current earnings by attending school in the current period so that they can earn more in future. Consequently, their current school attendance decision and the decision to work fulltime are likely to affect each other simultaneously. Middle-age adults, on the other hand, have a shorter working career ahead and thus have a weaker incentive to invest in further education. Moreover, they may already have completed their desired years of schooling. Consequently, they may attend school part-time, if necessary, while working fulltime, as opposed to young adults who may prefer to work part-time and attend school fulltime. Lack of statistical significance of the predicted explanatory variables indicating presence of no simultaneous relationship between school attendance and fulltime employment in the 2000 middle-age adult sample therefore is not surprising.

TABLE 4
TWO-STAGE PROBIT ESTIMATES OF SCHOOL ATTENDANCE EQUATIONS FOR DIFFERENT YEARS.^a

Variables	1979	1982	2000
Constant	-0.7249** (6.21)	-1.6187** (7.25)	-2.6102** (9.29)
Fultimhat	-1.0742** (14.41)	-1.2957** (14.90)	-0.1718 (1.22)
Regattnd	0.2212** (3.88)	0.2767** (4.54)	-0.2178** (2.35)
Yearschl	0.0154 (1.05)	0.0987** (5.06)	0.1079** (6.00)
AFQT	0.0048** (3.92)	0.0057** (4.51)	0.0008 (0.46)
Mothgrad	0.0089 (1.14)	-0.0042 (0.54)	-0.0129 (1.20)
Fathgrad	-0.0088 (1.39)	0.0019 (0.31)	-0.0013 (0.16)

Hlthprob	-0.1735* (1.69)	-0.2003 (1.40)	-0.0428 (0.30)
White	-0.0526 (0.80)	-0.0079 (0.12)	-0.0847 (0.92)
Male	0.2961** (5.85)	0.4502** (7.81)	-0.2564** (2.05)
Urban	-0.0597 (1.01)	-0.0941 (1.50)	0.0071 (0.09)
Married	-0.8229** (6.24)	-0.4082** (4.25)	-0.1103 (1.46)
Catholic	0.0474 (0.76)	-0.1916** (2.08)	0.0209 (0.19)
Jews	-0.0764 (0.24)	-0.6378** (2.03)	-0.5331 (1.12)
Protmain	0.0565 (0.78)	-0.2173** (2.38)	0.0052 (0.05)
Protbapt	0.0604 (0.81)	-0.1617* (1.71)	-0.0906 (0.79)
Sample size	3027	5740	5451
Log Likelihood	-1545.93	-2867.26	-712.12
χ^2 (df = 15)	1086.80	1448.62	103.15

^a The quantities in the parentheses are absolute t values.

** (*) Significant at 5 (10) percent level.

Results in Table 4 clearly indicate how relationships of different variables with school attendance differ from sample to sample, especially between younger adults and older adults. The variable relevant to the test of our proposed hypothesis that regular church attendance has differential effects on the school attendance decisions of younger and older adults is Regatnd. As expected under our proposed hypothesis, it assumes statistically significant positive coefficients in the younger adult samples of 1979 and 1982, but has a negative coefficient in the 2000 sample. This is exactly what we found in Table 2. Estimates in both Table 2 and Table 4 thus confirm that church attendance motivates young adults and middle-age adults differently, and as a result it may have differential effects on their school attendance decisions.

Table 5 presents two-stage probit estimates of the fulltime employment equations from all three samples considered in this study. Similar to the one-stage estimates of Table 3, these two-stage estimates indicate significant differences in coefficient estimates between younger and older adults. The coefficient of interest, however, is the predicted school attendance (Sclatdhat) which assumes a negative sign and is statistically significant in both young adult samples. As predicted, it is not statistically significant in the middle-age adult sample. This supports the findings of Table 3 and reinforces the argument that for younger adults, a higher school attendance probability lowers their chances of fulltime employment, whereas for middle-age adults, school attendance has no significant effect on their fulltime employment status. The two-stage estimates in Table 4 and Table 5 thus provide further justification to our argument that regular church attendance by enhancing the likelihood of school attendance of younger adults may in fact lower their fulltime employment probability which in turn may lower their current wages.

TABLE 5
TWO-STAGE PROBIT ESTIMATES OF FULLTIME EMPLOYMENT EQUATIONS FOR
DIFFERENT YEARS.^a

Variables	1979	1982	2000
Constant	-0.9232** (11.20)	-0.9881** (6.11)	0.2906 (0.38)
Scatdhat	-0.7115** (5.93)	-0.4860** (7.66)	0.0573 (0.22)
Yearschl	0.0494** (3.62)	0.0650** (5.01)	0.002 (0.07)
Exp	0.2086** (2.53)	0.0645** (2.06)	0.0414** (8.19)
Tenure	-0.0398 (1.00)	0.0656** (3.53)	0.0189** (3.58)
AFQT	0.0004 (0.29)	0.0008 (0.70)	-0.0023** (2.02)
Hlthprob	-0.1373 (1.39)	-0.0727 (0.79)	-0.2651** (3.58)
White	-0.0303 (0.52)	0.0267 (0.58)	-0.1553** (2.51)
Male	0.2747** (6.42)	0.3192** (9.24)	0.6851** (6.23)
Urban	-0.069 (1.33)	-0.0732* (1.72)	-0.0006 (0.01)
Married	-0.3725** (2.55)	-0.0225 (0.28)	-0.1337** (2.63)
Catholic	0.0542 (0.98)	-0.1288** (2.11)	0.2359** (3.44)
Jews	-0.0956 (0.35)	-0.4484** (2.12)	-0.5544** (2.29)
Protmain	0.0505 (0.79)	-0.1395** (2.32)	0.0303 (0.48)
Protbapt	0.0658 (1.00)	-0.0766 (1.25)	0.2109** (2.78)
Sample size	3027	5740	5451
Log Likelihood	-1699.48	-3429.77	-1962.19
χ^2	1086.89	705.48	486.39

^a The quantities in the parentheses are absolute t values.

** (*) Significant at 5 (10) percent level.

VALIDATION OF THE MODEL AND ROBUSTNESS CHECK

The results presented in the last section support the prediction of our model which, under the two hypotheses proposed in this study, provides an explanation of why the church attendance-wage relationship is different for workers of different age-groups. For middle-age adults of the 2000 sample, $\partial F/\partial SA \leq 0$ (Table 3), and consequently with $\partial SA/\partial CA < 0$ (Table 2), the first term of equation (14) is non-negative.¹² With a positive second term, equation (14) thus indicates a positive relationship between church attendance and wage for this group of workers. For younger adults, on the other hand, the coefficient of *SA* (Schlatnd) in the fulltime employment equation (Table 3) is found to be negative (i.e., $\partial F/\partial SA < 0$), and consequently

with $\partial SA/\partial CA > 0$ (Table 2), the first term on the right-hand-side of equation (14) is negative. If this negative relationship between church attendance ($CA = \text{Regattnd}$) and fulltime employment (1st term of equation 14) dominates the positive relationship between church attendance and other wage covariates (2nd term of equation 14), the net effect of church attendance on wage becomes negative. Since both theory and empirical evidence suggest the presence of a strong positive relationship between church attendance and school attendance among younger adults, and since the negative relationship between their school attendance and fulltime work is also found to be statistically significant, we expect the first term of equation (14) to dominate, leading to a negative church attendance-wage relationship among younger workers. This is exactly what we found from the younger adult samples of 1979 and 1982 in the introductory section.

TABLE 6
AVERAGE SCHOOL ATTENDANCE, FULLTIME EMPLOYMENT STATUS AND WAGES OF WORKERS WHO ATTENDED RELIGIOUS SERVICES REGULARLY AND THOSE WHO NEVER ATTENDED.^a

Variable	1979		1982	
	Regularly	Never	Regularly	Never
School Attendance	0.6756 (0.468) [6625]	0.4365 (0.496) [2543]	0.3794 (0.485) [5411]	0.2045 (0.403) [3115]
Fulltime Employment	0.3989 (0.489) [2374]	0.5374 (0.499) [910]	0.6013 (0.489) [3905]	0.6933 (0.461) [2188]
Hourly Wage	3.3322 (2.160) [2374]	3.6245 (1.820) [910]	4.8146 (2.762) [3905]	5.0373 (2.551) 2188

^a Quantities in parentheses are standard deviations and those in square brackets are sample sizes.

Results in Table 6 provide further support to the above conclusion for younger adults. Note that in both 1979 and 1982 samples, the average school attendance probability, as expected, is higher among those who attended religious services regularly compared to those who did not attend these services at all (i.e., $\partial SA/\partial CA > 0$). Average fulltime employment probability, on the other hand, is higher for those who did not attend church services at all (i.e., $\partial F/\partial CA < 0$), and consequently regular church attenders with lower likelihoods of fulltime employment received significantly lower wages than otherwise identical younger adults who did not attend churches (i.e., $\partial W/\partial CA < 0$). A negative coefficient of the church attendance variable in the younger adult wage equations ($\partial W/\partial CA < 0$) thus follows clearly from our empirical findings that $\partial SA/\partial CA > 0$, $\partial F/\partial SA < 0$ and $\partial W/\partial F > 0$ for this group. Table 6 thus provides a robustness check for our claim that church attendance among younger adults by improving their school attendance lowers their chances of fulltime employment, leading to lower wages in the current period.

Note that the three samples used in our study are cross-sectional samples in which all our findings are relevant to the average worker of the sample. In other words, while comparing workers of different samples, we have compared the average younger adults of the 1979 and 1982 samples with the average middle-age adult of the 2000 sample. This may raise doubts on the comparability of our results between time periods because we have not observed exactly the same workers as younger adults and middle-age adults. To see if the result would remain the same if we observe the same workers at these different time periods, we drew a sample of 923 workers from 1979, 1982 and 2000 samples, and estimated three wage equations from those samples. Table 7 reports these results. It is important to note that some of the coefficients of wage covariates in Table 1 lost their statistical significance in Table 7. This loss of significance can be attributed primarily to a significant loss of degrees of freedom resulting from the reduction in the sample size by at least 80 percent in most survey years. In spite of this limitation, it is interesting to note that the sign of the coefficient of regular church attendance (Regattnd) remains unchanged. As in Table 1, the sign of this

coefficient is negative in 1979 and 1982 samples, and is positive in the 2000 sample. As expected, this coefficient is statistically significant in both younger adult samples. Although, it is not statistically significant in the 2000 sample, with a t value of 1.21, the role of church attendance in 2000 cannot be ignored completely. Results in Table 7 thus suggest that our church attendance-wage relationship remains unchanged regardless of whether we use the sample of same workers at different time periods or different samples of workers at different time periods.

TABLE 7
WAGE EQUATION ESTIMATES FOR THE SAME WORKERS FROM DIFFERENT YEARS.^a

Variables	1979		1982		2000	
	β	t	β	t	β	t
Constant	0.4314**	3.8	0.8640**	5.35	0.8104**	3.43
Regattnd	-0.0793**	2.41	-0.1094**	3.49	0.0534	1.21
Catholic	0.0346	0.85	0.0783*	1.92	0.0166	0.38
Jews	0.2729*	1.79	-0.0258	0.17	-0.2671	1.42
Protmain	-0.0163	0.4	0.0222	0.54	-0.0672	1.3
Protbapt	-0.0064	0.15	0.0155	0.37	-0.0713	1.51
Yearschl	0.0555**	5.53	0.0215**	2.11	0.0467**	5.35
Exp	-0.0903	0.68	-0.073	0.91	0.027	1.09
Expsq	0.1381	1.43	0.0345**	2.38	-0.0001	0.08
Tenure	-0.0633**	2.52	0.016	1.43	0.0088**	3.09
AFQT	0.0002	0.23	0.0018**	2.75	0.0053**	6.52
Mothgrad	0.0018	0.39	0.0006	0.13	0.0112**	2.22
Fathgrad	-0.0004	0.11	0.0015	0.43	0.0018	0.43
Hlthprob	-0.0301	0.56	0.0242	0.46	0.0247	0.34
White	-0.0346	0.96	-0.0739**	2.02	-0.0377	0.91
Male	0.1448**	5.03	0.1632**	5.71	0.1734**	4.98
Urban	-0.0023	0.07	0.046	1.5	0.1056**	2.62
Married	0.0089	0.31	0.0286	0.98	0.0484	0.84
Fulltime	0.1818**	5.73	0.1678**	5.2	0.1118**	2.16
R ²	0.1798		0.197		0.3013	
Sample size	923		923		923	

^a The sample includes workers who attend religious services regularly and those who do not attend at all.

The quantities in the parentheses are absolute t values.

** (*) Significant at 5 (10) percent level.

To see if the two hypotheses we proposed in this study are valid for the sample of same workers observed at three different time periods, we re-estimated the school attendance and fulltime work equations separately from all three survey years – 1979, 1982 and 2000. The results are reported in Table 8. It is interesting to note that most of the coefficients of both school attendance and full-time work equations are very similar in 1979 and 1982 samples of younger adults, whereas they are very different in the 2000 sample of middle-age adults. The coefficient of the church attendance variable (Regattnd) in school attendance equations confirm that school attendance is positively correlated with regular church attendance among younger adults, but not among middle-age adults. Similarly, fulltime employment status of a younger adult is negatively related to his/her probability of school attendance, whereas these variables are unrelated among middle-age adult workers. These results are similar to those reported in Table 2 and Table 3 which are obtained from larger independent samples of the same survey years. This confirms that our findings are valid regardless of whether we observe the sample of same workers over different time periods or observe samples of different workers at those time periods. The use of different larger independent samples at

different time periods to draw conclusions for workers of different age-groups therefore is not really problematic in our study.

TABLE 8
PROBIT ESTIMATES OF SCHOOL ATTENDANCE AND FULLTIME WORK EQUATIONS
WITH SAME WORKERS.^a

Variables	<u>School Attendance Equations</u>			<u>Fulltime Work Equations</u>		
	1979	1982	2000	1979	1982	2000
Constant	1.945** (4.93)	-1.699** (3.43)	-2.379** (3.23)	-0.950** (2.11)	0.296 (0.65)	-0.24 (0.50)
Regattnd	0.682** (6.16)	0.510** (4.19)	0.188 (0.75)	-----	-----	-----
Schlatnd	-----	-----	-----	-1.934** (16.61)	-1.217** (10.50)	-0.353 (1.30)
Yearschl	-0.263** (7.79)	0.136** (3.47)	0.138** (3.08)	0.130** (3.40)	0.01 (0.28)	0.035 (1.10)
Exp	-1.292** (8.24)	-0.659** (9.92)	-0.047** (2.15)	0.592** (3.44)	0.193** (3.05)	0.034** (2.14)
Tenure	0.373** (3.85)	0.053 (1.24)	-0.004 (0.26)	0.037 (0.36)	0.012 (0.30)	0.037** (3.19)
AFQT	0.017** (7.23)	0.013** (5.04)	-0.0002 (0.05)	-0.005* (1.93)	-0.003 (1.17)	-0.002 (0.59)
Mothgrad	0.058** (3.56)	0.035** (1.96)	-0.002 (0.08)	-0.025 (1.38)	-0.008 (0.49)	-0.025 (1.24)
Fathgrad	0.001 (0.05)	0.022* (1.67)	-0.027 (1.30)	-0.009 (0.67)	-0.008 (0.63)	0.009 (0.66)
Hlthprob	-0.347* (1.84)	-0.443* (1.89)	0.1 (0.29)	0.134 (0.68)	-0.107 (0.57)	-0.084 (0.35)
White	-0.305** (2.45)	-0.286** (2.07)	0.063 (0.28)	0.009 (0.06)	-0.063 (0.49)	-0.062 (0.41)
Male	0.113 (1.15)	0.105 (1.00)	-0.266 (1.50)	0.290** (2.58)	0.256** (2.56)	0.814** (6.56)
Urban	0.095 (0.89)	-0.058 (0.51)	-0.328* (1.66)	-0.011 (0.09)	0.086 (0.78)	-0.194 (1.24)
Married	0.239** (2.37)	0.205* (1.84)	0.073 (0.24)	0.179 (1.56)	0.155 (1.49)	-0.035 (0.18)
Catholic	0.146 (1.03)	-0.221 (1.46)	0.097 (0.40)	0.127 (0.80)	-0.088 (0.62)	0.363** (2.31)
Jews	0.512 (0.99)	-0.269 (0.48)	-5.515 (0.00)	-0.246 (0.40)	-0.619 (1.27)	-0.183 (0.26)
Protmain	-0.104 (0.75)	-0.341** (2.27)	0.072 (0.26)	-0.001 (0.01)	0.017 (0.12)	-0.125 (0.73)
Protbapt	-0.174 (1.22)	-0.255 (1.59)	0.069 (0.26)	0.091 (0.56)	0.018 (0.12)	0.347** (2.00)
Sample	923	923	923	923	923	923
Log L	-472.8	-398.2	-122.4	-347.7	-439.6	-289.2
χ^2 (df=16)	330.3	255.2	26.48	569.3	220.3	107.8

^a The quantities in the parentheses are absolute t values.

** (*) Significant at 5 (10) percent level.

In the introductory section, we have claimed that church attendance is related to school attendance, which in turn is related to fulltime work decision. This suggests that church attendance and fulltime work play different roles in a typical wage regression. The fulltime variable is expected to capture the direct effect of fulltime work on wage, whereas church attendance, while acting as a proxy for numerous unobserved behavioral variables, is likely to capture the indirect effect of fulltime work through school attendance. To test the validity of this claim, we followed an alternative strategy by excluding one of the two variables - fulltime work in this case - from the wage equation and then examining its effect on the coefficient of the included variable, church attendance. If our hypothesis just mentioned in this paragraph is correct, we should expect the coefficient of church attendance to be larger in absolute value when the fulltime variable is omitted from the wage regression because it is likely to absorb a part of the effect of fulltime employment on wage. To demonstrate this, we re-estimated all wage equations of Table 1 by excluding fulltime employment status from the set of explanatory variables. The results of relevant coefficients are reported in Table 9.

TABLE 9
WAGE EQUATION ESTIMATES WITHOUT FULLTIME STATUS.^a

Variables	2000	1982	1979
Constant	0.9329** (14.55)	0.7875** (17.60)	0.2631** (4.64)
Regattnd	0.0637** (3.16)	-0.0610** (5.05)	-0.0882** (4.87)
Yearschl	0.0628** (17.32)	0.0328** (8.93)	0.0639** (12.64)
Fulltime	No	No	No
Other Variables	Yes	Yes	Yes
R ²	0.3427	0.192	0.2317
Sample size	5451	5740	3027

^a The number in the parenthesis is the absolute t-ratio.

** (*) Significant at 5 (10) percent level.

A comparison of the coefficients of church attendance (Regattnd) in the wage equations of Table 1 and Table 9 indicates that exclusion of the fulltime employment variable from Table 9 as expected has led to an increase in the absolute value of this coefficient by approximately 27 percentage points in 1979 and 17 percentage points in 1982 samples. This confirms that church attendance to some extent represents the indirect effect of fulltime work on the worker's wage. In the 2000 sample, however, this increase is 1.7 percentage points only. This smaller change associated with the 2000 sample indicates that the indirect link between church attendance and fulltime work through school attendance is very weak among older adults whose school attendance probability is much lower than that of younger adults. It is interesting to note that the relationship between church attendance and wage in Table 9 remains exactly the same as that in Table 1. The findings of this study thus remain robust to changes in variable specification of the wage equation.¹³

POLICY IMPLICATIONS

A question may arise, "In the face of a negative relationship between church attendance and wage, is it wise for younger adults to attend churches regularly?" Clearly, based on the current wage, church attendance among younger adults does not seem sensible. However, viewed from the angle of future earnings, our results indicate that it is highly desirable. Note that one of the variables that is positively related to wage in Table 1 is the worker's "years of schooling." This indicates that any variable which increases the years of schooling is likely to have a positive effect on the worker's wage. Since regular church attendance during youth, as demonstrated in this study, improves the school attendance in the same

period, we predict that it is likely to enhance the years of schooling in later years, leading thereby to higher future earnings. To test this hypothesis, we conducted following Mohanty (2016) a propensity score matching (PSM) analysis to obtain average treatment effects (ATE) of church attendance in 1979 or 1982 on years of schooling in some arbitrarily chosen future years: 1985, 1990, 1996, 2000 and 2006.¹⁴ First, the church attendance equations were estimated by probit using data from 1979 and 1982 samples to obtain propensity scores, which were then used to match individuals from control group (those who did not attend church in that year) and the treatment group (those who attended). For each matched pair, their years of schooling were observed in several future years just mentioned to estimate any differences. The average of these differences provides an estimate of the average treatment effect (ATE) of church attendance during youth on years of schooling later in life. These results are reported in Table 10 and Table 11.

TABLE 10
AVERAGE TREATMENT EFFECT (ATE) OF RELIGIOUS ATTENDANCE IN 1979 ON
YEARS OF SCHOOLING IN LATER PERIODS (PROBIT ESTIMATES FOR
PROPENSITY SCORE MATCHING ANALYSIS).^a

Variables	1985	1990	1996	2000	2006
Constant	0.966 (1.21)	1.008 (1.25)	0.982 (1.20)	1.398* (1.84)	1.319* (1.70)
Age	-0.147** (7.27)	-0.145** (6.99)	-0.152** (6.47)	-0.158** (6.68)	-0.142** (5.43)
Yearschl	0.139** (6.09)	0.134** (5.72)	0.133** (4.96)	0.136** (5.03)	0.114** (3.79)
AFQT	-0.001 (0.65)	0.0003 (0.26)	-0.001 (0.71)	-0.001 (0.67)	-0.0003 (0.27)
Hlthprob	0.065 (0.45)	0.01 (0.07)	0.114 (0.73)	0.035 (0.22)	0.0003 (0.00)
Urban	0.021 (0.30)	0.02 (0.29)	0.101 (1.32)	0.157** (2.00)	0.145* (1.68)
Married	0.281** (2.84)	0.261** (2.59)	0.351** (3.14)	0.357** (3.09)	0.359** (2.78)
Employed	0.402 (0.54)	0.449 (0.60)	0.454 (0.60)	0.219 (0.32)	0.166 (0.24)
Family Size	0.085** (5.94)	0.074** (5.12)	0.096** (5.89)	0.079** (4.78)	0.081** (4.56)
Family Income	-0.0001 (0.07)	0.002 (1.08)	0.0004 (0.15)	0.0002 (0.07)	-0.001 (0.22)
Mothgrad	0.004 (0.39)	0.007 (0.76)	0.01 (1.01)	0.008 (0.74)	0.009 (0.78)
Fathgrad	0.005 (0.66)	-0.009 (1.34)	-0.006 (0.70)	-0.008 (0.96)	-0.005 (0.62)
Log L	-1335.6	-1300.6	-1076.5	-1018.4	-891.4
χ^2 (df = 11)	117.9	103.2	100.9	87.4	65.9
Sample	2443	2364	2003	1896	1640
Treated	1813	1753	1503	1427	1228
Control	629	611	500	469	412
ATE	0.604** (8.56)	0.671** (5.21)	0.615** (4.65)	0.630** (5.54)	0.649** (3.90)

^a Numbers in parentheses are absolute t-values.

** (*) Significant at 5 (10) percent level.

Table 10 reports probit estimates of the religious attendance equation coefficients in 1979. Since the actual years of schooling was observed arbitrarily in 1985, 1990, 1996, 2000 and 2006, this table reports 5 sets of variable coefficients necessary for separate propensity score matching for different schooling outcomes in different future periods. Table 11 reports similar results with church attendance observed in 1982. Interestingly, all 10 equations in both tables yield coefficient estimates that are very similar in their signs and significance levels. The bottom panels of both tables report average treatment effects (ATEs) of church attendance during youth (1979 or 1982) on years of schooling acquired in later years. It is interesting to note that the ATEs are positive and statistically significant in all future years in both tables, and that church attendance during youth increases schooling by approximately 0.6 years. Since years of schooling is known to have a positive causal effect on earnings (Card, 1999), we claim without any further test that church attendance during youth through more schooling is likely to have a positive effect on wage during adulthood. The importance of church attendance during earlier years of one's life cannot therefore be underestimated even though it is associated with lower wages during those school-going years. Church attendance may thus be treated as an investment in human capital and higher future earnings rather than a mere determinant of the current earnings. This clearly has important policy implications which call for further research in this direction.

TABLE 11
AVERAGE TREATMENT EFFECT (ATE) OF RELIGIOUS ATTENDANCE IN 1982 ON
YEARS OF SCHOOLING IN LATER PERIODS (PROBIT ESTIMATES FOR
PROPENSITY SCORE MATCHING ANALYSIS).^a

Variables	1985	1990	1996	2000	2006
Constant	-0.432* (1.91)	-0.497** (2.15)	-0.119 (0.47)	-0.08 (0.30)	0.082 (0.29)
Age	-0.101** (9.54)	-0.096** (8.99)	-0.112** (9.63)	-0.105** (8.79)	-0.112** (8.73)
Yearschl	0.218** (14.90)	0.214** (14.08)	0.217** (12.77)	0.205** (11.72)	0.198** (10.41)
AFQT	-0.001 (1.01)	-0.001 (1.12)	-0.001 (1.11)	-0.001 (1.04)	0.0003 (0.31)
Hlthprob	-0.014 (0.13)	-0.046 (0.45)	0.022 (0.19)	0.037 (0.31)	0.067 (0.54)
Urban	-0.008 (0.18)	0.007 (0.15)	0.016 (0.30)	0.041 (0.73)	0.041 (0.69)
Married	0.247** (4.70)	0.217** (4.01)	0.277** (4.62)	0.260** (4.25)	0.251** (3.81)
Employed	0.061 (1.34)	0.063 (1.37)	0.062 (1.25)	0.056 (1.09)	0.058 (1.05)
Family Size	0.075** (7.24)	0.076** (7.20)	0.072** (6.32)	0.060** (5.22)	0.073** (5.87)
Family Income	0.0002 (0.15)	-0.001 (0.44)	-0.001 (0.68)	-0.001 (0.63)	-0.001 (0.86)
Mothgrad	-0.003 (0.51)	0.002 (0.30)	-0.003 (0.40)	-0.004 (0.53)	-0.006 (0.79)
Fathgrad	-0.0002 (0.05)	-0.002 (0.40)	-0.002 (0.39)	-0.002 (0.29)	-0.004 (0.65)
Log L	-2726.7	-2617.4	-2202.8	-2083.6	-1807.2
χ^2 (d.f. = 11)	356	319.7	267.8	215.5	194.5
Sample	4534	4334	3712	3489	3023

Treated	2995	2862	2511	2370	2043
Control	1539	1472	1201	1119	980
ATE	0.448** (7.32)	0.606** (8.86)	0.638** (7.73)	0.632** (7.45)	0.559** (7.24)

^a Numbers in parentheses are absolute t-values.

** (*) Significant at 5 (10) percent level.

SUMMARY AND CONCLUSION

Using data from the National Longitudinal Survey of Youth, 1979 (NLSY79), this study examines why the relationship between church attendance and wage is negative among younger adults during early 1980s. The evidence suggests that this relationship is positive for middle-age adults, but is negative for youths and young adults. Using evidence from the existing literature, the study provides a theoretical model that explains why such a difference may exist, and tests this claim empirically using three samples from the NLSY79. The tests confirm that a negative relationship between church attendance and wage among younger adults of 1979 and 1982 surveys exists primarily due to the evidence of a positive relationship between church attendance and school attendance and a negative relationship between school attendance and fulltime employment among those workers. For middle-age adults of the 2000 survey, these two relationships assume different signs, and consequently the church attendance-wage relationship for this group remains different from that of younger adults. The study further demonstrates that church attendance in the current period by promoting school attendance during the same period augments years of schooling in future periods which in turn may affect wages in future indirectly through the accumulation of greater human capital endowments.

The study concludes with a few precautionary notes. First, to examine the differences in the church attendance-wage relationship among younger and older adults, it is more appropriate to use cross-sectional samples that consist of both younger and older adults rather than using separate cross-sectional samples for younger and older adults from different time periods. Since all structural parameters remain the same during a given time period, comparison of outcomes for these two groups of workers from a cross-sectional sample is more meaningful. The cross-sectional samples in the NLSY79 data, however, suffer from the limitation that the age range of respondents in a given survey is 8 years only. In other words, our 2000 sample does not have younger adults, whereas the 1979 and 1982 samples do not have middle-age adults. This clearly makes it impossible to compare workers of different age-groups from a cross-sectional sample of the NLSY79. The findings of this study should therefore be interpreted with caution. However, under the assumption that the period leading up to the year 2000 is marked by a similar technological environment, the comparison of results for younger adults in 1979 and 1982 surveys with those for middle-age adults in the 2000 survey from the same longitudinal data is not problematic. Moreover, the purpose of this study is to find an explanation of the negative church attendance-wage relationship among the younger adults of the 1980s, and not the older adults. The 2000 sample of middle-age adults, although not strictly necessary for validating our explanation, is used for the purpose of comparison only. The findings of this study based on the 1979, 1982 and 2000 surveys should not therefore be underestimated.

Second, this study provides only one explanation of the negative relationship between church attendance and wage. There may be other explanations which the study does not refute. The findings of this study should therefore be interpreted carefully. Third, the negative relationship between church attendance and wage among younger adults results from the first term on the right-hand-side of equation (14) dominating the second term. The explanation presented in this study therefore is applicable to the younger adults of early 1980s in the United States for whom the observed relationship is negative. If, on the other hand, the second term dominates the first term when some variables in X_{1t} of equation (14) are influenced by church attendance not only positively but also very strongly, the church attendance-wage relationship in that case may be positive even for younger adults.¹⁵ Our conclusion should not therefore be generalized to younger adults of other time periods for whom the observed church attendance-wage relationship is positive. This calls for future research in this direction.

Fourth, our results are valid for younger adults of the United States. They may, however, be different for younger adults of another country with a different culture. Similarly, due to the lack of religious attendance data for workers from other religions in the NLSY79, the current study focuses on the religious attendance decision of mostly Christians. Our results therefore are valid for Christian workers only. Since the chances of attending school during youth is universally higher almost everywhere, we do not expect very different results for the younger adults of other religions and cultures. However, without further empirical investigation based on their data, we cannot generalize our results to younger adults of all religions and cultures. Further research in this direction therefore is highly recommended.

Finally, all the relationships estimated in this study are simple correlations. They should not be confused with the claim of any causal connection. Our finding should therefore be interpreted accordingly. This should not, however, reduce the importance of our results. In a recent article, Angrist and Pischke (2010, p. 24) have most appropriately pointed out, *“Like most researchers, we have an interest in mechanisms and as well as causal effects. But inconclusive and incomplete evidence on mechanisms does not void empirical evidence of predictive value.”* The robust findings of our study clearly have enough predictive value that deserves further attention of policy makers and future researchers.

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ENDNOTES

1. Although the church attendance data is available in the 2014 survey, the non-response rate is so high that the sample is unrepresentative of the US population. In fact, approximately 300 out of more than 7000 respondents responded to the church attendance question in 2014, and consequently, this sample is not considered in this study.
2. In the 1982 survey, the respondents were aged between 17 and 25.
3. Due to the advancement of computer technology, the 2012 survey may belong to a structurally different time period as opposed to those in the pre-2000 era.
4. In the 2000 survey, the respondents were aged between 35 and 43 and therefore are considered as middle-age adults. Note that traditionally, middle-age adults include those aged between 36 and 55.
5. The smaller size sample in 1979 indicates fewer youths working when they are aged between 14 and 21. The smaller size samples in 2000, on the other hand, indicate larger non-response rates in later surveys of the NLSY79.
6. It is important to note that older adults may choose to enroll in schools due to some special reasons, for example for promotion or self-enrichment, which are clearly different from the long-run human capital investment motive of most of the younger adults.
7. By assumption, $\frac{\partial X_{2t}}{\partial CA_t} = 0$.
8. Our simultaneous equations model represents Maddala's Model 6 in which both dependent variables are binary (Maddala, 1983, p. 246).
9. With an absolute t-value of 1.25, the importance of the school attendance variable in the 2000 sample cannot be ignored completely.
10. These results not reported here to save space may be obtained from the author on request.
11. The first stage estimates can be obtained from the author on request. All the explanatory variables used in estimating wage equations were also used in the estimation of both fulltime employment and school attendance equations. For identification purposes and to avoid convergence problems, however, we excluded the variables “experience” and “tenure” from the structural school attendance equation, and “mothgrad” and “fathgrad” from the structural fulltime employment equation. Although these variable restrictions may seem

arbitrary, they make sense intuitively. The current school attendance decision depends to a large extent on the current level of schooling, desire for further human capital accumulation, and opportunity for such advancement, regardless of whether or not the worker has longer work experience or tenure with the current employer. Similarly, decision to work fulltime depends to a large extent on one's own current conditions, and not necessarily on the schooling of his/her parents.

12. The validation of both the hypotheses proposed in this study determines the sign of the first term of equation (14) only.
13. Our unreported results indicate that sign and statistical significance of the coefficient of regular church attendance remain unchanged in all samples regardless of the variable specifications used in the wage regression.
14. For details of this approach, see Rosenbaum and Rubin (1983). For computation of ATE, we used the econometric software LIMDEP, version 11, E57 (Greene, 2016): E1359-E1380.
15. For example, church attendance may improve positive attitude which in turn may enhance productivity and wages (Mohanty, 2009, 2012).

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APPENDIX 1
DEFINITIONS OF VARIABLES, THEIR MEANS AND STANDARD DEVIATIONS

Variables		2000	1982	1979
Regattnd	= 1, if the worker attends church at least once a month	0.867 (0.34)	0.644 (0.47)	0.728 (0.44)
Catholic	= 1, if the worker is a Catholic	0.244 (0.43)	0.311 (0.46)	0.336 (0.47)
Jews	= 1, if the worker is a Jew	0.008 (0.90)	0.006 (0.08)	0.007 (0.08)
Protmain	= 1, if the worker is a Mainline Protestant	0.279 (0.45)	0.292 (0.45)	0.199 (0.39)
Protbapt	= 1, if the worker is a Baptist Protestant	0.259 (0.44)	0.252 (0.43)	0.233 (0.42)
Yearschl	= completed years of schooling	13.14 (2.38)	12.09 (1.83)	10.97 (1.92)
Exp	= years of work experience	17.17 (5.06)	2.253 (1.21)	0.755 (0.43)
Expsq	= Exp squared	320.6 (151.20)	6.553 (5.59)	0.762 (0.59)
Tenure	= years working with the current employer	5.914 (5.72)	1.141 (1.16)	0.702 (0.64)
AFQT	= Armed Force Qualifications Test score	39.36 (28.02)	42.78 (28.72)	44.44 (28.76)
Mothgrad	= Mother's years of schooling	10.199 (4.01)	10.502 (3.90)	10.524 (3.85)
Fathgrad	= Father's years of schooling	9.39 (5.21)	9.797 (5.13)	9.743 (5.04)
Hlthprob	= 1, if the worker has some health limitations	0.08 (0.27)	0.039 (0.19)	0.041 (0.19)
White	= 1, if the worker is white	0.652 (0.47)	0.713 (0.45)	0.751 (0.43)
Male	= 1, if the worker is a male	0.517 (0.49)	0.527 (0.49)	0.521 (0.49)
Urban	= 1, if the worker lives in an urban area	0.71 (0.45)	0.779 (0.41)	0.785 (0.41)
Married	= 1, if the worker is married with spouse present	0.565 (0.49)	0.216 (0.41)	0.101 (0.30)
Fulltime	= 1, if the worker works at Least 35 hours a week	0.86 (0.35)	0.629 (0.48)	0.426 (0.49)
Logwage	= log of hourly wage (Dependent variable)	2.58 (0.60)	1.487 (0.43)	1.117 (0.46)
Schlatnd	= 1, if the worker attends school	0.032 (0.17)	0.318 (0.46)	0.538 (0.49)
Sample size		5451	5740	3027

^a Quantities in parentheses are standard deviations.

APPENDIX 2
PERCENTAGE OF EMPLOYED WORKERS IN NLSY79 ATTENDING SCHOOL

Year	<u>Percentage attending school</u>		<u>Number of Employed Workers</u>
	Mean	Standard Deviation	
1979	0.5045	0.500	5161
1980	0.4230	0.494	5733
1981	0.3378	0.473	6334
1982	0.2574	0.437	6593
1983	0.1899	0.392	6956
1984	0.1547	0.362	7562
1985	0.1223	0.328	7341
1986	0.1017	0.302	7533
1987	0.0641	0.245	7673
1988	0.0523	0.223	7869
1989	0.0432	0.203	7942
1990	0.0472	0.212	7953
1991	0.0416	0.199	6738
1992	0.0437	0.204	6775
1993	0.0355	0.185	6699
1994	0.0331	0.179	6794
1996	0.0333	0.179	6729
1998	0.0344	0.182	6712
2000	0.0299	0.170	6558
2002	0.0258	0.158	6091
2004	0.0297	0.170	5982
2006	0.0311	0.174	6004
2008	0.0281	0.165	6006
2010	0.0239	0.153	5442
2012	0.0209	0.143	5164
2014	0.0129	0.113	4894