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Discussion Paper No. 08-08

June 2008

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April 2008

Abstract. In this paper, we examine the effect of religiosity as measured by attendance at religious services on religious school choice. Particular attention is given to the possibly endogenous relationship between school choice and religiosity. IV probit estimates indicate that religiosity is substantially biased downward in probit estimates of parochial school choice. Data from the National Opinion Research Center's "General Social Survey" are used.

Keywords: Education, Parochial Schools, Endogeneity.

JEL Classification: I2.

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1. Introduction

Although studies on religion and religiosity have been more the purview of other disciplines, economists are increasingly recognizing the importance of these variables on a wide range of behaviors. For example, studies indicate that religiosity has important effects on many outcomes including private school choice, educational attainment, earnings, marriage and family, health, and happiness (Chiswick, 1986 and 1988; Cohen-Zada and Sander, 2008; Freeman, 1986; Gruber, 2005; Lehrer, 1999, 2004a, 2004b; Sander, 2005; Waite and Lehrer, 2003).

One of the shortcomings in the treatment of the effect of religiosity on such behaviors is that religiosity as measured by attendance at religious services is often treated as an exogenous variable. It could be the case that religiosity is a result of some behaviors. For example, parents might be more likely to attend church services if their child attended a school associated with the church. In some cases, higher levels of participation in a church are required for parents of children in parochial schools. Further, is might also be the case that religiosity is correlated with an omitted variable thus biasing the effect of religiosity on some behaviors. This is an important topic for research because religiosity affects educational outcomes and might be confounded with the effects of private schooling if it is not taken into account (Cohen-Zada and Sander, 2008; Sander, 2005).

In this study, we explore the effect of religiosity on parochial school choice. Particular attention is given to the possibly endogenous relationship between the usual measure of religiosity (attendance at religious services) and school choice. It is shown that if religiosity is treated as an exogenous variable in probit estimates of school choice,

its effect is substantially biased downward. IV probit estimates of parochial school choice indicate a much larger religiosity effect.

2. Models and Data

Probit and instrumental variable probit (IV Probit) estimates of parochial school choice are undertaken. The data for this variable indicate if the respondent's child (children) attend (ever attended) such a school. The sample is restricted to respondents who have (had) school-age children. The key right-hand side variable of interest (religiosity) indicates attendance at religious services and is measured as follows: 0=never, 1=less than once a year, 2=once or twice a year, 3=several times a year, 4=once a month, 5=two or three times a month, 6=nearly weekly, 7=weekly, and 8=more than once a week.

The other variables that are used to estimate school choice indicate the characteristics of the respondent including age, education (relative to high school graduate), household income, region (relative to south), black, Hispanic, religion (relative to mainline non-fundamentalist Protestant), whether married, and type of location (twelve largest metropolitan areas, 13-100 largest metropolitan area). The type of location variable is relative to areas outside the 100 largest metropolitan areas in the United States.

The data that are used for this study are taken from the National Opinion Research Center's General Social Survey (GSS): 1998 and 2000. The GSS has been undertaken either annually or biannually since 1972. It consists of a national random sample of men and women eighteen years old and older who live in non-institutional arrangements in the United States. For 1998 and 2000, a question was asked of respondents with children

five and older on the type of school they attend (attended). We use data on students who attended either private schools or public schools. Respondents who were home schooled were excluded.

For the IV Probit estimates religiosity is instrumented. Two additional variables (a measure of happiness and a measure of health) are used for identification. In related studies, it has been shown that religiosity is positively associated with happiness and health (Layard, 2005; Waite and Lehrer, 2003). Thus, measures of happiness and health are potentially good instruments for religiosity. Further, we believe that measures of health and happiness are not likely to have a direct effect on religious school attendance and are thus valid instruments.

We provide both formal and informal indications for our argument. First, we estimate non-sectarian private school choice as a function of our instruments and the other right-hand side variables in our model with and without controls for religiosity. The results indicate that our measures of health and happiness are insignificant in both cases (Table 1). If it were the case that our measures of health and happiness had direct positive effects on private school-choice, we would expect to see this for non-sectarian school attendance as well. Second, we estimate parochial school choice as a function of religiosity, our instruments, and the other right-hand variables of our model (Table 2, Column 1). It shows that once we control for religiosity, happiness and health do not have any independent effect on religious school attendance. Although this is not a formal test it provides some indication that our instruments are valid. Third, below we formally test the validity of the identifying restrictions of our model.

3. Empirical Results

Probit estimates of the probability of attending (having attended) a religious school indicate that religiosity has a significant positive effect (Table 2, Column 2). The other significant determinants of attending a parochial school include positive college, some college, income, metro1, metro2, age, Catholic, Fundamentalist Protestant, and no religion effects and a negative less than high school effect.

IV Probit estimates of religious school attendance are presented in Table 3. Column 1 reports the first-stage results. It shows that both of our instruments have significant positive effects on religiosity. Very Happy is significant at the 1% level and Very Healthy at about the 6% level. Further, the Cragg-Donald statistic equals 21.8 indicating that the instruments are highly relevant (Stock and Yogo, 2005). The second-stage results for parochial school attendance are reported in Column 2. They indicate that the religiosity coefficient more than doubles when religiosity is treated as endogenous. The pattern in the results for the other coefficients is similar to the results in Table 2 with a few modest exceptions. Fundamentalist Protestant is no longer significant while no religion is now significant and negative.

If our instruments are valid they should be orthogonal to the error term. Since our system is over-identified we are able to formally test the identifying restrictions using the Amemiya-Lee-Newey test. The *p*-value of the chi-square statistic of the Amemiya-Lee-Newey test indicates that our instruments are valid and that the system of equations is well identified.

4. Conclusions

The results of this study indicate that religiosity is an important determinant of private school choice. Further, the effect of religiosity on private school choice is biased downward if it is treated as an exogenous variable. Thus, an exogenous increase (decrease) in religiosity is associated with an increase (decrease) in the demand for private schools.

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Table 1
Probit Esitmates of Non-Sectarian Private School Attendance
(t-statistics in parentheses)

Religiosity	0.01 (0.52)	
Very happy	0.10 (0.86)	0.10 (0.92)
Very healthy	0.09 (0.79)	0.10 (0.82)
Catholic	-0.21 (-1.26)	-0.21 (-1.25)
Jewish	0.50 (1.98)**	0.49 (1.93)*
Fundamentalist Protestant	0.20 (1.51)	0.21 (1.57)
Other Religion		
No Religion	0.37 (2.06)**	0.33 (2.01)**
College	0.42 (2.85)***	0.43 (2.94)***
Some College	0.20 (1.39)	0.20 (1.40)
Less Than High School	-0.13 (-0.67)	-0.13 (-0.72)
Age	0.002 (0.51)	0.002 (0.55)
Black	-0.04 (-0.27)	-0.03 (-0.20)
Hispanic	-0.04 (-0.16)	-0.04 (-0.15)
Married	-0.04 (-0.32)	-0.03 (-0.28)
Metro1	0.17 (1.15)	0.16 (1.13)
Metro2	0.28 (2.23)**	0.28 (2.23)**
Income	0.003 (2.36)**	0.003 (2.33)**
East	0.05 (0.30)	0.04 (0.29)
West	-0.05 (-0.32)	-0.05 (-0.34)
North	-0.12 (-0.85)	-0.12 (-0.87)
Constant	-2.46 (-8.49)***	-2.42 (-8.60)***
N	2,439	2,439

Table 2
Probit Estimates of Parochial School Attendance
(*t*-statistics are in parentheses)

Religiosity	0.10 (6.46)***	.10 (6.73)***
Very happy	0.06 (0.74)	
Very healthy	0.12 (1.44)	
Catholic	0.80 (7.89)***	.80 (7.86)***
Jewish	-0.24 (-0.79)	-.24 (-0.77)
Fundamentalist Protestant	0.22 (2.14)**	.21 (2.09)**
Other Religion	0.40 (0.91)	.41 (0.94)
No Religion	0.25 (1.49)	.25 (1.51)
College	0.17 (1.62)	.19 (1.80)*
Some College	0.28 (2.93)***	.28 (3.02)***
Less Than High School	-0.31 (-2.52)**	-.32 (-2.60)***
Age	0.008 (3.16)***	.008 (3.03)***
Black	-0.06 (-0.49)	-.07 (-0.61)
Hispanic	-0.11 (-0.69)	-.11 (-0.65)
Married	0.01 (0.13)	.03 (0.30)
Metro1	0.21 (2.03)**	.21 (2.04)**
Metro2	0.32 (3.64)***	.32 (3.60)***
Income	0.001 (1.21)	0.002 (1.35)
East	0.10 (0.92)	.09 (0.86)
West	-0.19 (-1.63)	-.19 (-1.66)*
North	0.15 (1.53)	.14 (1.51)
Constant	-2.8 (-12.90)***	-2.7 (-12.83)***
N	2,439	2,439

Table 3
IV Probit Estimates of Parochial School Attendance
(*t*-statistics are in parentheses)

	Religiosity	Parochial School Attendance
	First stage	**IV Probit**
Religiosity		.25 (2.32)**
Very happy	0.65 (5.75) ***	
Very healthy	0.24 (1.91)*	
Catholic	0.37 (2.57)***	.74 (6.73)***
Jewish	-1.31 (-3.57)***	-.03 (-0.10)
Fundamentalist Protestant	0.69 (5.26)***	.11 (0.90)
Other Religion	0.51 (0.83)	.33 (0.72)
No Religion	-2.60 (-14.15)***	.65 (1.97)**
College	1.05 (6.97)***	.02 (0.14)
Some College	0.20 (1.53)	.25 (2.50)**
Less Than High School	-0.70 (-4.80)***	-.21 (-1.39)
Age	0.02 (5.67)***	.005 (1.46)
Black	1.13 (7.50)***	-.24 (-1.42)
Hispanic	0.61 (2.58)***	-.20 (-1.12)
Married	0.59 (5.22)***	-.09 (-0.74)
Metro1	-0.20 (-1.36)	.24 (2.25)**
Metro2	-0.04 (-0.34)	.33 (3.64)***
Income	-0.004 (-2.31)**	0.002 (1.65)*
East	-0.24 (-1.58)	.13 (1.18)
West	-0.38 (-2.53)**	-.13 (-1.00)
North	-0.03 (-0.26)	.15 (1.59)
Constant	2.1 (8.25)***	-3.0 (-9.12)***
Over-identification (P-value)		0.30
Cragg-Donald F statistic	21.80	
N	2,439	2,439

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level