2007

THE FIRST GRADE PRIVATE SCHOOL SECTOR: TAXONOMY, CHOICE, AND ACHIEVEMENT

Christine Berry Lloyd
University of Kentucky, CB-LLOYD@WIU.EDU

ABSTRACT OF DISSERTATION

Christine Berry Lloyd

The Graduate School
University of Kentucky
2007

THE FIRST GRADE PRIVATE SCHOOL SECTOR: TAXONOMY, CHOICE, AND ACHIEVEMENT

ABSTRACT OF DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Business and Economics
at the University of Kentucky

By
Christine Berry Lloyd

Lexington, Kentucky

Co-Directors: Dr. Christopher Bollinger, Gatton Endowed Professor of Economics
and Dr. William Hoyt, Gatton Endowed Professor of Economics

Lexington, Kentucky

2007

ABSTRACT OF DISSERTATION

THE FIRST GRADE PRIVATE SCHOOL SECTOR: TAXONOMY, CHOICE, AND ACHIEVEMENT

Studies focusing on Catholic schools as a proxy for all private education or all private religious education miss important variances within the private school sector, especially at the first grade level. The implication of this is that the vast majority of secondary school choice studies are incomplete; the elementary schooling decision of the parents should be included for all secondary school choice analyses.

I augment the scope of a household's first grade schooling choice by offering a rich model that includes the public schooling option and the most detailed typology of private schools to date: Catholic, Evangelical or Fundamental Protestant, Mainline Protestant or Other Faith, and Secular.

Upon selecting a school type, I evaluate a student's performance within this selected sector. While critics argue that selection and omitted variable biases generate test score gains for students rather than private school superiority, I include a child's fall kindergarten reading, math, and general knowledge test scores to control for a student's knowledge acquired prior to kindergarten enrollment. I examine whether higher first grade test scores are the result of selection into the private sector or preeminence of the private sector.

I find kindergarten test performance, household income, and parental education are significant and positive factors in selecting a school. Additionally, household religiosity and the denominational composition in the household's home county are also significant determinants of schooling choice. Results from voucher simulations indicate that an increase in private school attendance does not translate to uniform enrollment increases at all types of private schools. White and Hispanic girls display similar patterns for Catholic and Protestant schools while African-American and white girls select Evangelical schools in analogous trends.

Findings suggest that, while a student's ability is the driving force behind first grade achievement, the type of school attended in first grade does affect a child's test score for all three tests. First grade private school enrollment makes below average

achievers in kindergarten into better students in the first grade. Private schools offer no significant benefit for first grade enrollment to high achieving kindergarten students.

KEYWORDS: Private Schools, School Choice, Education Policy, Vouchers, Academic Achievement

Christine Berry Lloyd

August 30, 2007

THE FIRST GRADE PRIVATE SCHOOL SECTOR: TAXONOMY, CHOICE, AND ACHIEVEMENT

By

Christine Berry Lloyd

Dr. Christopher Bollinger

Co-Director of Dissertation

Dr. William Hoyt

Co-Director of Dissertation

Dr. William Hoyt

Director of Graduate Studies

August 30, 2007

RULES FOR THE USE OF DISSERTATIONS

Unpublished dissertations submitted for the Doctor's degree and deposited in the University of Kentucky Library are as a rule open for inspection, but are to be used only with due regard to the rights of the authors. Bibliographical references may be noted, but quotations or summaries of parts may be published only with the permission of the author, and with the usual scholarly acknowledgements.

Extensive copying or publication of the dissertation in whole or in part also requires the consent of the Dean of the Graduate School of the University of Kentucky.

A library that borrows this dissertation for use by its patrons is expected to secure the signature of each user.

Name	Date

DISSERTATION

Christine Berry Lloyd

The Graduate School
University of Kentucky
2007

THE FIRST GRADE PRIVATE SCHOOL SECTOR: TAXONOMY, CHOICE, AND ACHIEVEMENT

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Business and Economics
at the University of Kentucky

By
Christine Berry Lloyd

Lexington, Kentucky

Co-Directors: Dr. Christopher Bollinger, Gatton Endowed Professor of Economics
and Dr. William Hoyt, Gatton Endowed Professor of Economics

Lexington, Kentucky

2007

I dedicate this dissertation to Professor Gail Mitchell Hoyt.

For without her influence on my academic career, I would be a college dropout. Two weeks after enrolling in her Principles of Microeconomics course in the Spring 1996 semester, I declared my economics major and my intent to earn my doctorate as well. Thanks in large part to her outstanding teaching that term, I am a college professor today.

ACKNOWLEDGEMENTS

I would like to thank my co-advisors, Professors William Hoyt and Christopher Bollinger, for their continued guidance and almost unfailing patience. I have learned more from both of your critiques of my work than in all my hours of coursework. The person who I am today is a direct result of working with the two of you. I am grateful for learning to try even if I make mistakes and look like a fool in the process. Thank you for leading, and occasionally pushing, me to complete this dissertation. Thank you for your guidance through this arduous process. I believe that if any of us had known what the past five years would hold, one of us would have developed a "plan B" in effort to save all of us. However, without the luxury of undoing all past misfortunes, I can proclaim that we have made the very best of a horrible situation (or rather, a series of horrible situations). It is my sincere hope that both of you feel the same way.

Thank you to my other committee members, Professors David Wildasin and John Thelin, for their thoughtful comments and support.

This work is proof that miracles do occur. Without the following people in my life in a very real and constant manner, this dissertation would be incomplete.

To Kevin – Thank you for turning a corner and finding out what spousal support entails. Thank you for all of the strength and encouragement you offer to me on a daily basis. You are the love of my life.

To Frankie and Jack – I discovered how much you love me while completing this dissertation. Parental love is truly unconditional. Thank you for the countless sacrifices you have made to support me through these difficult years. I am grateful to have your love and support.

To Karen – Thank you for letting me know the perils of graduate study are universal across all disciplines and degrees. You are an inspiration for how to live life to the fullest every day.

To Professors Frank Scott and Richard Gift – If both of you are proud of me, I have succeeded in life. The respect that I have for you as economists, educators, and men is immeasurable.

To one specific friend who shall remain anonymous – Thank you for forcing me into treatment. Your actions saved my life. I am grateful that you care as much as you do.

To countless friends and family members – I appreciate your understanding. Thank you for allowing me to drop out of contact. Thank you for accepting that I could not return phone calls and emails. I value my life with each of you in it and look forward to reconnecting with you.

In Memory

I would be remiss if I did not acknowledge Professor Mark Berger's influence in this work. As my advisor until his premature death, he offered council on all topics of economics and beyond. I will always remember him leaning back in his chair while crunching an ice chip, apple bite, or pretzel rod. Whether these actions aided his thinking process or not, I do not know. However, when he displayed such habits at a seminar or meeting, I was certain that sharp wit and keen insight would follow in his comments. The loss of him is palpable in my life still to date. He was a great economist and mentor.

This paper is cleared for dissemination outside the research team in accordance with the National Center for Education Statistics restricted-use data policies.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter One:
Introduction

1.1 Motivation

Regardless of the outcome measured used and schooling level examined, Peterson (2003) identifies the downward trend of public education in the United States noting that "students are walking away from public schools…They seem to understand, better than anyone else, that the American schoolhouse is badly in need of reform" (Peterson 2003, p69). All interested factions agree on is the necessity of school reform in the United States. However, diverging opinions emerge once the dialogue shifts focus to the appropriate course of action that this restructuring should take. One popular option cited is school choice; however, an increased choice set among school alternatives does not conjure up identical programs for all parties.

In current policy discussions two distinct forms of school choice are being discussed and, to a lesser extent, implemented. Both of these types of school choice force underperforming schools to improve due to newfound competition from higher performing challengers (Hoxby 1994; Chubb and Moe 1990). Schools must now compete, based on academic achievement, to sustain enrollment levels. First, there are school choice policies designed to heighten competition among public schools with no involvement from the private sector. Examples of this include open enrollment programs, charter schools, and magnet schools. The second school choice approach allows for even greater competition among schools by adding private schools into the choice set.

The use of vouchers for private schools draws controversy primarily in regard to using public funds for students to attend religiously affiliated schools. This criticism continues even after the U.S. Supreme Court upheld the use of government-funded vouchers to attend religious schools in *Zelman v. Simmons-Harris* (2002). In this case, the Cleveland voucher program allowed for a multitude of schooling options including attending a neighboring public school, a religious private school, a secular private school, and remaining at current public school and receiving tutoring assistance (*Zelman v. Simmons-Harris* 2002). Yet, faced with so many options, ninety-six percent of voucher program participants selected to attend a religiously affiliated private school (*Zelman v. Simmons-Harris* 2002). Historically, religious private schools have never been selected at such a high rate.

Catholic schools no longer constitute the majority of religiously affiliated private schools. Catholic school enrollment has declined because of a decrease in Catholic religiosity (Sander 2005). While Catholic has fallen, there has been an increase in private schools, especially conservative Christian private schools (Sander 2005). In 1999-2000, sixty-four percent of total elementary private students attended Catholic schools; however, only forty-eight percent of private first grade enrollment is Catholic (Broughman and Colaciello 2001). Hence, studies focusing on Catholic schools as a proxy for all private education or all private religious education are missing important variances within the private school sector, especially at the first grade level.

Lankford and Wyckoff (1992) acknowledge the tremendous variety within the religious and nonreligious sects, yet recognize data shortcomings for private school taxonomy exist.

> "Although it might be relevant to make fine distinctions between the various types of private schools when analyzing school choice, data typically only identify students as attending public, private religious or private independent schools (p 319)."

In this study, I move beyond simply admitting these private sector differences exist by offering a rich model that incorporates the different types of private schools.[1] In addition to including the public schooling option, I offer the most detailed typology of private schools to date by separating private schools into four distinct categories: Catholic, Evangelical or Fundamental Protestant (Evangelical), Mainline Protestant or Other Faith (Protestant), and Secular.[2]

Focusing on the determinants of school selection enhances the policy forum regarding vouchers, tuition tax credits, and school choice (Lankford, Lee, and Wykcoff 1995). While treating a household's choice between public and private school as simply a choice between public and Catholic schools may have been appropriate when examining the educational choices of households in the 1970s and 1980s. However, since then there have been numerous changes in the composition of private schools, which precipitate the need to examine the effects of attending religious private schools rather than Catholic private schools alone (Chubb and Moe 1990; Gaziel 1997).

School choice proponents assert that competition is required to incite transformation within public schools. The choice-based market-driven approach employed by voucher programs forces underperforming schools to improve due to newfound competition from higher performing challengers (Hoxby 1994; Chubb and

[1] This analysis concentrates on regular elementary schools and children without disabilities. All schools for the disabled and all children with mild to severe disabilities have been eliminated from the data for this essay.

[2] Although public schools may be considered secular as well, through out this essay, secular refers to private secular schools only.

Moe 1990). Some purport that these better performing schools are located in the private sector by reasoning that private schools are forced to be more efficient in their operations and instructional methods, which leads to better schools that yield higher levels academic achievement for students (Bryk, Lee, and Holland 1993; Harris 2000; Hallinan 2000). Some studies call for the incorporation of Catholic school curriculum into the public school system as part of the reform of education system in the United States (Bushweller 1997; Hudolin-Gabin 1994). However, the foundation of these policies is the underlying assumption that private schools, not the abilities or backgrounds of their students, are generating the higher test scores.

The results of previous studies are mixed as to whether private schools yield a positive impact on student outcomes. Critics argue that selection and omitted variable biases generate these observed positive effects for students rather than private school superiority. I address criticisms of previous studies by using test scores from a student's entrance into kindergarten to control for his or her ability as well as other unobservable characteristics.

By controlling for previous test scores, it is possible to disentangle the selection effect. Studies that do not control for prior student ability cannot be regarded as justification in support of or opposition to the existence of a positive private school effect (Peterson and Llaudet 2006). I seek to examine whether these higher first grade test scores are the result of selection into the private sector (i.e., better students enrolling in private schools) or preeminence of the private sector (i.e., private schools are better than public ones).

No studies, to my knowledge, isolate this choice made for first grade attendance or achievement at the beginning of a child's academic career using a rich model of four private schooling options.[3] Examining this decision at the start of a child's schooling years is critical for three reasons. First, a student's academic achievement in the first grade predicts academic achievement in his or her junior year of high school (Cunningham and Stanovich 1997). Second, elementary school test performance is an indicator of labor market productivity (Bishop 1989; Loury and Garman 1995; Murnane, Willett, and Levy 1995). Lastly, evidence suggests that students do not switch between schooling alternatives often once a school type is selected. Thus, this decision for first grade may determine a child's entire schooling path. Lee and Marks (1992) report that nearly one-half of their sample of high school seniors attended the same school since kindergarten while Goldhaber (1996) cites the "actual or perceived deleterious effects on children" (p59) as justification as for why parents are unlikely to switch school sectors.

1.2 Results

When estimating the choice of school to attend, I find kindergarten test performance, household income, and parental education levels are important factors in selecting a school. Additionally, religiosity of the household and denomination membership in a county are significant determinants. The two simulations presented indicate that not all voucher recipients would attend the same type of private school. In particular, the differences appear to follow racial lines. I observe in both simulations that white and Hispanic, in different households and area environments, exhibit very similar predicted enrollment probabilities among varying school types. Evidence suggests that

[3] While none focuses on first grade schooling, recent studies do employ increased schooling options when looking at academic achievement differences among the public and private sectors. For example, see Lubienski and Lubienski (2006) and Kim and Placier (2004).

African-American girls respond differently to school selection than white and Hispanic girls do. The predicted probabilities in the simulations demonstrate that households do not view all private schools as identical. In particular, the probability patterns over a change in income are very different for Evangelical and Protestant school types.

Clearly, an increase in private school attendance does not translate to uniform enrollment increases at all types of private schools. White and Hispanic girls display similar patterns for Catholic and Protestant schools. African-American and white girls select Evangelical schools in analogous trends. Thus, the design of voucher and school choice programs should be examined to accommodate different choices made by different households, especially along racial and ethnic divisions. Findings indicate that a voucher program affects the diversity of student populations in private schools differently depending on the type of private school.

Findings from the achievement estimations indicate that first grade private school enrollment transforms below average achievers in kindergarten into better students in the first grade, relative to their low achieving peers. Yet, private schools offer no significant benefit for first grade enrollment to high achieving kindergarten students. Above average kindergarten students see an increase in their first grade reading scores by attending an Evangelical or Secular school for first grade. High achieving kindergarten students, in many cases, experience a significant decrease in first grade achievement scores because of private school enrollment, especially for Catholic school.

Findings indicate that private school enrollment does not affect all students in the same manner. Enabling private school enrollment for all students, through school choice and voucher programs, as a means of attaining blanket school reform is not optimal. In

effort to obtain higher a student achievement level, evidence suggests that reforms should tailor private school attendance for different student performance levels. High achieving kindergarten students should not attend any type of private school in effort to gain higher first grade test scores. Evangelical and Protestant first grade enrollment benefits students who are above average kindergarten achieving students. Private school attendance in first grade, however, does transform below average achievers in kindergarten into better students in the first grade. Policy reforms should target below average kindergarten students and encourage them to attend Evangelical and Protestant first grade schools while high performing kindergarten students should be enticed to remain in public schools. Further investigation is warranted to investigate the possible explanations for why these different school types affect different students in very different ways.

For a child's first grade math test score, living in a state that requires kindergarten attendance significantly reduced a child's score. I find no significant result for the reading and general knowledge tests. This finding for mandatory kindergarten programs for math tests is surprising since many presume mathematics is what schools teach. Since a child's home environment strongly influences reading ability, research has focused attention to mathematics achievement in effort to capture more of a school's contribution to a child's education (Lubienski and Lubienski 2006; Figlio and Stone 1999; Bryk, Lee, and Holland 1993; Heyneman 2005). This finding suggests that mandatory kindergarten states have kindergarten programs with different emphases than those found in non-mandatory kindergarten states. A comprehensive examination of mathematics curriculum in mandatory and non-mandatory kindergarten programs is needed to explore this further.

1.3 Organization

In the first chapter of my dissertation, I offer an introduction to the elementary private schooling sector and provides a discussion of how school choice and student achievement connect to current school reform policies. Increasing student mobility through school choice compels schools to compete for students under the implicit assumption that students select schools based on performance.

Chapter Two surveys select school choice and school performance papers to provide an overview of previous works in these two education research lines. I start by discussing the consensus with the choice and performance areas to highlight where my work fits. Then, I provide a paper by paper synopsis of key choice and performance papers. Within each grouping, I place papers in chronological order since most investigations coincide with new base year or follow up data releases.

I estimate a household's first grade school choice decision in the third chapter using bivariate and multivariate probit models. This analysis employs the restricted-use version of the Kindergarten cohort of the Early Childhood Longitudinal Survey (ECLS-K), a national data set, released by the National Center for Educational Statistics (NCES).[4] Additional county level controls are added to these data from Census 2000 and Religious Congregations and Membership Data 2000. Upon examining the determinants of school selection, I perform a simulation of the impact of receiving a voucher.

I extend my empirical analysis in Chapter Four by regressing school type attended on first grade achievement. I address criticisms of previous studies by using test scores from a student's entrance into kindergarten to control for his or her ability as well as other unobservable characteristics. I investigate whether positive private school first

[4] Additional details regarding ECLS-K are available from NCES at http://www.nces.ed.gov/.

grade test scores are the result of better students or better schools. My dissertation concludes with a fifth chapter discussing general findings from the third and fourth chapters as well as policy implications of these results.

Chapter Two:
Literature Review

2.1 Introduction

Despite being an immense body of literature, for the purposes of my dissertation it is possible to classify studies in the economics of education as either studies on educational performance or educational choice. Studies comparing public and private schooling performances focus on which type of school produces better students as measured by a variety of academic or non-academic outcomes. Research on school choice examines the determinants of decision of enrolling in a public or private school as well as the implications of this selection. *Section 2.2* presents a synopsis of the progression of data and methodologies used in choice and performance papers to provide the context for my dissertation. *Section 2.3* offers detailed examinations of several school choice studies and while *Section 2.4* offers this same discussion format for research pertaining to student achievement within schooling sectors.

2.2 Current Consensus in Literature

This section provides a summation of contemporary works in the choice and performance areas in effort to highlight the contribution of my dissertation within the scope of this recent literature.

2.2.1 School Choice Studies

While there are many investigations into the determinants of private schooling, looking at these papers in chronological order offers an evolutionary perspective in terms of current data, methodologies, and findings. While early studies employ aggregate data to examine the public or private binary decision (for example, see Gemello and Osman

1984), new data and improved computing technology allow for individual-level data for multiple schooling alternatives. Long and Toma (1988) is the earliest micro-data analysis of school choice determinants to model religious and non-religious private education. The authors model school choice using an ordered probit since families will base their choice on cost primarily.

Yet, anchoring this choice in the assumption of a hierarchy of tuition expense proves controversial for three reasons. First, the cost to attend a private school varies greatly from city to city and state to state. There is also substantial variation among school types. It is reported in Table 60 of the Digest of Education Statistics (2004) that the average private elementary school tuition in 1999-2000 equals $3,267 while Catholic elementary school tuition is below this at $2,451 and Secular is substantially higher at $7,884. Other religious school tuition, on average, is $3,503.

Second, Long and Toma (1988) assume that religious school students receive reduced tuition because of their membership at the affiliated sponsor church. Dynamic demographic shifts in student populations at Catholic schools indicates that religious school enrollment no longer follows parent church lines. Students attending Catholic schools in the late 1990s were more likely to be non-Catholic, minority, or pay unsubsidized tuition (Baker and Riordan 1998).

Finally, the third reason that an ordered probit is not the best model to use is that there are several salient reasons for attending a religious school that do not revolve around tuition expense. Religious education as well as cultural and ethnic preservation are cited often as primary reasons for selecting a religious private school (Cohen-Zada 2006; Sander 1996).

Goldhaber (1994, 57) notes that these early school choice efforts need to incorporate "…controls in estimated models for the quality and cost of schools in the chosen and alternative sectors." Lankford and Wyckoff (1992) move toward better controls modeling a binary decision of public or private-religious elementary and high school attendance. While restricting their analysis to New York state households, the authors link individual and family characteristics with school quality and tuition expense. They use additional variables to control for schooling alternatives and estimate this choice using binary logit model, which does not impose the strict ordering as found in Long and Toma (1988).

Lankford, Lee, and Wyckoff (1995) present a multinomial probit model of elementary and high school choice when households decide between three schooling options: public, religious, and secular. They restrict the study to twenty-one states in the New England area since "…there is such great geographic variation in the composition of religious schools" (Lankford, Lee, and Wyckoff 1995, 241).

This diversity within the private sector plagues any attempt to incorporate tuition amounts for these school types. Within this region, Catholic schools represent the majority of religious schools; however, using Catholic schools to proxy all religious schools in general is ill-advised as there are tuition differences for Catholic and other religious schools as noted earlier (Digest of Education Statistics 2004).

Lankford, Lee, and Wyckoff (1995) use National Association of Independent Schools (NAIS) regional tuition averages to proxy non-religious private school tuition. However, Dougherty and Becker (1995) note that while the cost of attending an independent school exceeds the cost of attending a religious school, it is not the case that

all independent schools charge tuitions equal to NAIS tuitions. Dougherty and Becker continue by stating that "less that ten percent of the nation's private school students attend an NAIS school" (1995, 25). Therefore, the use of NAIS tuition data to approximate tuition at all secular schools is not appropriate since this school type encompasses such a wide array of schools. "Because military schools, nondenominational fundamentalist schools, schools for the handicapped and prep schools are all examples of independent schools, the independent school category includes schools with diverse orientations" (Lankford and Wyckoff (1992, 319).

Cohen-Zada and Sander (2006) offer the most recent advancement within the choice literature. The authors expand the choice set of households to include public, Catholic, Protestant, and independent private schools using a multinomial logit model. Employing a nationwide data set, the authors pay particular attention to religion and religiosity of households in that failure to control for these traits leads to biased estimates.

Overall, there is a progression away from using aggregate data and toward micro-level data incorporating multiple private schooling options while imposing no pre-determined ordering of these alternatives. While some studies attempt to approximate tuition for different school types, the measures used do not represent good proxies.

2.2.2 Comparative Performance Studies

The second category of works concentrates on the relative performances of the two school sectors while performance may represent a variety of outcome measures. Surrounding the issue of student performance is the matter of increasing school choice as a means by which to force public schools to improve. Much effort is devoted to increasing the competition of public and private schools in effort to raise public school

achievement levels. Anticipated improvements in student achievement because of private school attendance are often challenged in part as a result of the different scopes of the data sources employed (Greene, Peterson, and Du 1999). Furthermore, the level of aggregation present in the estimation data is one culprit of the myriad of achievement findings in the literature (Jepsen 2002).

With one exception, using High School and Beyond data and any follow up surveys, results fall into one of two possible categories. In the absence of controlling for self-selection into private schools, an observed gain in test score occurs (Coleman, Hoffer, and Kilgore 1981a). Upon controlling for this, the positive results are eliminated or reduced substantially (Noell 1982; Goldberger and Cain 1982); Murnane 1981; Willms 1985; Alexander and Pallas 1985). The exception is Sander's (1996) finding that eight years of Catholic education leads to higher sophomore test scores in the areas of vocabulary, reading, and mathematics even after controlling for self-selection into Catholic schools. Furthermore, results indicate that the recipients of these achievement gains are non-Catholics (Sander 1996), which is important since students enrolled in Catholic schools more likely to be non-Catholic according to Baker and Riordan (1998).

There is no overwhelming evidence to support the hypothesis that religious and non-religious private school students outscore their public school peers using National Educational Longitudinal Study data. While Jeynes (2002a) finds evidence that religious private schools students attain higher achievement levels than non-religious school students, many others support the consensus that private school attendance yields higher student cognitive achievement (for example, see Goldhaber 1996; LePore and Warren 1997; Figlio and Stone 1999). Figlio and Stone (1999) point to environmental reasons

such as religious teaching, disciplinary policies, and peer groups as to why parents pay for private schools.

Most recently, Kim and Placier (2004) concentrate on comparing performance within the private sector to see if Catholic schools outperform non-Catholic ones at the high school level. While evidence suggests a positive non-Catholic effect for reading tests, there are no achievement growth for either private school type in mathematics, social studies, and sciences. Kim and Placier's (2004) findings, using National Educational Longitudinal Study data, quell other reports claiming that Catholic schooling leads to achievement gains. Furthermore, the authors use a variety of subjects to assess student academic performance. Since a child's home environment strongly influences reading ability, research has focused attention to mathematics achievement in effort to capture more of a school's contribution to a child's education (Lubienski and Lubienski 2006; Figlio and Stone 1999; Bryk, Lee, and Holland 1993; Heyneman 2005).

. Peterson (2003) follows a cohort through all three designated National Assessment of Educational Progress testing times to compare test scores for performance purposes and finds no evidence to suggest positive academic achievement growth over time. Lubienski and Lubienski (2005) conclude the higher test scores within the private school sector are the result of students with higher socioeconomic backgrounds selecting into the private sector. Peterson and Llaudet (2007) compare performance on fourth and eighth grade tests in the private sector as a whole and in separate Catholic, Lutheran, and Evangelical Protestant groupings. Once controls are added for student characteristics, there is no positive private school effect observed for fourth graders for reading and math

tests. On the fourth grade math tests specifically, evidence suggests that public schools outperform their private school peers by more than four points.

However, Peterson and Llaudet (2007) are careful to emphasize that these results of higher private school achievement are not indicative of private school attendance benefits or detriments. National Assessment of Educational Progress data are not without shortcomings (Peterson 2003). In particular, since these data do not include an initial student aptitude measure, the authors call for all student performance comparisons using these data to cease.

While not all papers do, many works employ some control, either an exogenous characteristic or statistical method, to account for omitted variable bias due to unobservable traits. While early works using High School and Beyond indicate a statistically significant improvement in the achievement of private school students, later papers demonstrate that these observed gains of private school enrollment are the result of omitted variable bias.

Regardless of data used, upon controlling for self-selection into the private sector, any previously positive findings are reduced or eliminated. In addition to self-selection bias, any observed gains in student achievement because of private school attendance are often challenged in part as a result of the different scopes of the data sources employed (Greene, Peterson, and Du 1999). Furthermore, the level of aggregation present in the estimation data is one culprit of the myriad of achievement findings in the literature (Jepsen 2002).

2.3 Public and Private School Choice

The earliest studies of school choice focused on the binary choice of public or private schools, though in many studies Catholic schooling served as a proxy for private schooling. Examples of these studies include Gustman and Pidot (1973); Stiglitz (1974); Clotfelter (1976); Sonstelie (1979); Sonstelie (1982); and Gemello and Osman (1984). More recently, rather than treating the choice of schools as a binary decision, studies such as Long and Toma (1988); Lankford and Wyckoff (1992); Lankford, Lee, and Wyckoff (1995); and Cohen-Zada and Sander (2006), have expanded the choice of schools to include different types of private and public schools.[5] Usually, these papers draw implications regarding the implementation of a voucher system as means of educational reform.

2.3.1 Binary Decision Studies

Sonstelie (1979) notes household preferences regarding public school quality, measured by expenditure level, are double-peaked. High spending per pupil signals high caliber public school districts to parents and thus these public schools have high enrollment levels while low spending amounts indicate poor quality public schools and high enrollment levels in the private sector. Upon reducing educational spending in California because of imposed spending limits, the author predicts that it is not likely to move toward the low-level equilibrium using census tract data from the 1970 Census in the Los Angeles area specifically.

Gemello and Osman (1984) employ school district data at two different aggregation levels, school district and census tract, to investigate the wide array of

[5] Houston (1999) and Belfield (2004) expand the choice set beyond the public and private schooling sectors with the incorporation of home schooling.

elementary and secondary enrollments in California. Separating the private sector into parochial and non-parochial schools, the authors report that fluctuations in enrollments are not random. Integral factors are socioeconomic status, racial and ethnic composition, and percent Catholic. Speculating that spending per pupil signals school quality to parents, the imposition of public school spending caps in California would increase private school attendance when these limits provided a less than desired expenditure level.

Hamilton and Macauley (1991) exclude both rural and central city areas from their investigation of separate estimations for elementary and secondary schooling levels in New Jersey school districts. Significant results include a positive relationship for the percentage black in the area and a negative finding for the average size of household for the elementary private school attendance level. The authors purport that educational quality measures are not necessary since inference of these are obtained through parental observation. The probability of attending a private elementary school is positively and significantly influenced by increasing the standard deviation of income within a district.

Lee and Marks (1992) expand the school choice issue to examine the decision to attend a single-sex or coeducational nonreligious private school. Data are the 1989 senior classes attending sixty different schools, where schools are evenly distributed between the three school types: boys only, girls only, and coeducational. A student's academic history in kindergarten through sixth grade proves to explain this schooling decision in a highly significant way. The authors contend that families opt for their daughters to attend a single-sex private school is made at the start of her academic career.

Goldhaber (1994) combines these two areas of choice and performance by looking at school sector chosen at the high school level once a child's achievement differential between sectors is included using National Educational Longitudinal Study of 1988 data. Controlling for self-selection into private schools, the author finds no significant improvement in mathematics or reading performances for students enrolled in private schools leading to the conclusion that a voucher system is not a viable educational reform to improve student academic achievement levels. While acknowledging that there are many private schooling options from which to select, the simplifying assumption that parents face a binary public or private choice is made. There are no school quality variables are included since it is assumed that parents include these attributes into their children's expected achievement. A higher socioeconomic status increases the likelihood of attending a private school. Smaller class size does as well.

Sander (2005) uses data from the General Social Survey to explain the decline in Catholic school enrollment by examining the determinants of the choice to attend a Catholic school. Evidence suggests that Catholic religiosity has a large effect on a child's likelihood of attending a Catholic school. Tracking frequency of church attendance since the 1970s shows a downward trend in Catholic religiosity and thus supports the conclusion that Catholic school enrollment is down because of lower Catholic religiosity levels. Implications of this finding are widespread since Catholic religiosity, an omitted explanatory variable in many school choice studies, is a significant and important determinant in selecting to attend Catholic schools. Furthermore, it is determined that Catholic religious membership and Catholic school attendance are not

endogenously related. The author does not incorporate Catholic school tuition or public school quality measures due to data shortcomings.

2.3.2 Multiple Schooling Options

Long and Toma (1988) is the earliest micro-data analysis of school choice determinants to model multiple private schooling alternatives. The authors find that both demand and supply related determinants affect a household's choice to attend a public or private school with the private sector separated into parochial and nonreligious. The authors point out that parents do not view these two types of private schools as the same. Ordered probit estimations for primary and secondary schooling levels are performed as well as a combined estimation for both levels using individual 1970 and 1980 Census data. The authors state that the use of an ordered probit model is correct since families will base their choice on cost primarily. Thus, the tuition expenses of the three school types establishes the ordering of schooling alternatives used as public, religious private, and nonreligious private since religiously affiliated schools receive subsidization from their church sponsors. Determinants relating to the demand factors are household income level, parental educational attainment, and race. The availability and access to private schools is clearly an important supply factor in this school choice analysis. Findings suggest that the effects of race and income have diminished over time from 1970 to 1980.

Using 1980 individual data, Lankford and Wyckoff (1992) estimate the determinants for enrollment in elementary and secondary religious private and public schooling options for white households living in New York State. Excluding New York City, the authors present simulations for the impact of a zero cost religious alternative to public schooling indicating that parents view religious and public schools in urban areas

as substitutes, especially Catholic schools. Findings indicate that academic performance within a school is a significant and positive factor in the decision-making process. Student-teacher ratios and mathematics test scores, proxies for school quality, are important for elementary religious private school selection while only test score results are significant. Specifically, there is a negative relationship observed for the student teacher ratio and a positive one for test scores. In particular, these two findings indicate that it is the quality of the school that parents examine when making their school choice decisions.

Lankford, Lee, and Wyckoff (1995) examine school choice among religious and independent schools as well as their public alternative at the elementary and secondary schooling levels using 1985 Current Population Survey data. Findings indicate that racial demographics of public schools, living in a central city, share of lay teachers in Catholic schools, and the juvenile crime rate all affect school choice decisions. As expected, parental income and educational attainment do as well. Specifically, living in a central city increases a child's probability of attending a religious elementary school by nine percent. Private school tuition and the proxy used for public school quality, spending per pupil, do not significantly impact the school enrollment decision. This study is restricted to white families living in suburban and urban areas located in twenty-one northeast states due to the small sample size of nonwhites in these data and to the heterogeneity present among religious schools through out the entire country. While the majority of the region's religious schools are Catholic, there are other religious private schools that are not explicitly considered.

In many multiple schooling analyses, religious and non-religious schools are separated so that Catholic schools proxy for all religious schools and a particular subset of independent schools proxies for all non-religious schools (for example, see Lankford, Lee, and Wyckoff 1995). For the independent school alternative tuition data gathered from the National Association of Independent Schools (NAIS) serves as tuition data for all non-religious private schools when NAIS affiliates represent only a small portion of all independent schools. In fact, Dougherty and Becker (1995) note that while the cost of attending an independent school exceeds the cost of attending a religious school, it is not the case that all independent schools charge tuitions equal to NAIS tuitions. Dougherty and Becker continue by stating that "less that ten percent of the nation's private school students attend an NAIS school" (1995, 25). Therefore, caution is advised when grouping schools into similar categories based upon religious and non-religious affiliations.

In addition to providing important contributions to the school choice literature, Lankford and Wyckoff (1992) develop a random utility model of school choice. Since Lankford, Lee, and Wyckoff (1995) and Lankford and Wyckoff (1992) use this random utility model, they do not impose a restrictive ordering of schooling alternatives like the ordered probit does in Long and Toma (1988).

While my dissertation seeks to increase the detail within the private schooling sector, Houston (1999) expands the scope of the school choice decision to include home schooling as an alternative to public and private schools. Of interest for this analysis is that Catholic adherents are associated with private schooling enrollment while

Evangelical Protestant denominations are connected with home schooling, while this finding is only significant for Catholic.

Cohen-Zada and Sander (2006) examine private school attendance, with no distinction among schooling levels, using individual observations from the General Social Survey combined with aggregate data from several sources to control for county racial and ethnic populations as well as Catholic adherents and concentration of Secular private schools. While other religious private schools are excluded, the authors employ one of the most detailed breakdowns of the private sector: Catholic, Protestant, and Secular. This work represents the first effort to surpass a model of school choice employing three schooling options: public, religious and non-religious private schools. In addition to incorporating non-Catholic private schools into the analysis, unique to this work is the inclusion of religious membership and religiosity on school choice. Omitting household religiosity from the demand for private schooling causes results to be biased. While religious affiliation is insignificant, religiosity is shown to have a significant positive impact on private school attendance. Also of note is the finding for Catholic adherents in a county, the authors find a significant concave effect suggesting that once a desired threshold level of Catholics attending public school is reached, the demand for Catholic school among Catholics falls.

2.3.3 Policy Extensions of School Choice

Kirby and Darling-Hammond (1988) look at the effect of a tax subsidy for private school tuition on school choice in Minnesota. Findings indicate that high income households locate in high caliber public school districts while low income households seek other schooling options as they are less likely to consider residence relocation as a

possibility. Private school enrollment for low income families is unaffected by tax deductions since these households do not itemize their federal tax returns. Rather, higher income households benefit from the deduction. However, the small size of the deduction signals that it likely to benefit those who would make the same private school decision regardless of the deduction. In addition to private schooling expense, other key factors are parental schooling sector as well as desire for religious education. The authors conclude that a tax subsidy does not provide an increased choice set of schooling alternatives.

West and Palsson (1988) contrast variations in state enrollment levels for the private sector. The share of the population that is Catholic, student teacher ratio, per capita income, and the frequency and duration of teacher strikes significantly affect parental selection of private schooling.

While most studies examine the decision to select the public or private sector, Schneider, Schiller, and Coleman (1996) seek to explain public school choice to learn who enrolls in public schools of choice and who opts for the residential location assigned public schools for high school using NELS data. Results indicate that minorities and lower income households are more likely to utilize the option to attend public schools of choice. This evidence rebuts the speculation that an increased choice set benefits white and higher income households only.

Hoyt and Lee (1998) examine the impact of a voucher system. Under certain assumptions, vouchers may prove beneficial for all households in a given community, even low income families. If a poor household is accepted into the voucher program, then a child benefits from private school attendance. Households that are least likely to

participate in the voucher program still benefit from a voucher program by paying less in taxes. A voucher equaling one thousand dollars will reduce taxes in every state provided the voucher causes a decrease in public school enrollments of just over five percent.

Epple and Romano (1998) present a theoretical model of the impact of vouchers on public and private school enrollments. Specifically, the incorporation of a voucher program increases access to private schooling by increasing the number of private schools in the area. Connecting vouchers to student achievement, the authors demonstrate that vouchers and the associated private school attendance lead to increased cognitive performance for students. Students who remain in the public sector are made worse off as a result of a increased school competition between schooling sectors.

2.4 Educational Performance

This portion of the review of the literature concentrates on academic outcomes and is arranged by data set used in the analysis. The first three data sets discussed below are High School and Beyond, National Education Longitudinal Study of 1988, and National Assessment of Educational Progress. These are nationwide data sets governed by the National Center for Education Statistics (NCES). The fourth grouping of data discussed below is a catchall category highlighting the many different and unique data sets studies have used that are not NCES affiliated.

2.4.1 High School and Beyond

One of the first works to compare cognitive performance in different school sectors is Coleman, Hoffer, and Kilgore (1981a).[6] Coleman, Hoffer, and Kilgore's examination of achievement differences in public and private schools finds the private

[6] A very similar version of Coleman, Hoffer, and Kilgore (1981a) was published as Coleman, Hoffer, and Kilgore (1982).

sector outperforms the public one before and after controlling for parental educational attainment, race, and socioeconomic status. The authors credit these gains to the private sector's increased emphasis on challenging homework assignments, applying disciplinary actions, and employing engaged teachers.

Although the intention of this report was to enable a critical evaluation of private school involvement in public school reform, the main outcome of this work is the rebuttals invoked because of the report's dissemination, primarily due to the statistical and inference methods they employed in reaching sweeping conclusions. Several of these works are featured below, prompted the authors to issue a response (Coleman, Hoffer, and Kilgore 1981b).

Catterall and Levin (1982) find that minority and low income households are less likely to take advantage of tuition tax credits than white and high income families. The authors then suggest that private schools would also take measures to dissuade the use of these credits.

Noell (1982) comments on the lack of controls used in Coleman et. al. (1981a) by noting that gender, disability status, region of residence, and college enrollment expectations are all likely associated with selection into Catholic school. Once these additional controls are added, the author finds no impact of Catholic school attendance on test scores. This analysis is restricted to public and Catholic schools only as the twenty-seven non-Catholic schools constitute too small of a sample for estimation purposes.

Goldberger and Cain (1982) assert that there are no sensible conclusions to reach from Coleman et. al. (1981a) findings due to inept conduct of standard research

procedures and failure to present evidence from empirical work shoring up their conclusions.

While Murnane (1981) dismisses the findings and the report as inadequate due to lack of control for self-selection into private schools, Finn (1981) and Heyns (1981) advocate a qualified interpretation of the report. While contributing to the public and private school forum on a descriptive basis, it is unable to address critical policy implications with its findings due to data shortcomings.

Braddock (1981) contends that public schools are too diverse in their missions and outlooks. Private schools succeed in improving academic achievement of students since the majority of these schools are college preparatory for the middle class. Bryk (1981) presents evidence that Coleman et. al. (1981a) should not make nation-wide claims based on their findings due to the two stage sapling procedures used by the NCES as they so not guarantee a nationally representative sample. Guthrie and Zusman (1981) charge a private school would have to abandon it central mission, religious connection, and physical disciplinary policy only to abide by government sanctioned educational methods and standards to transform into, or rather behave like, a public school.

Willms (1985) employs HSB data to examine academic performance for a student's junior and senior years of high school. Controlling for tenth grade test scores as well as student and family characteristics, achievement gains on reading, vocabulary, writing, and mathematics tests for Catholic school students are not observed, yet these are very small in magnitude. For the science and civics subject tests, public school students score slightly higher than their private school peers do.

Using HSB data, Alexander and Pallas (1985) find that the best evaluation of tenth to twelfth grade academic achievement is less than one year's improvement, which leads the authors to label this small effect as inconsequential and irrelevant as a topic of school reform within the public policy arena.

Greeley (2002) investigates minority achievement levels in Catholic and public schools. Upon controlling for family and student characteristics, Hispanic and African-American students outperform their public school counterparts. Incorporating additional control variables for religious affiliation, school discipline, and instruction quality, these observed gains are stamped out. Greeley concludes that there Catholic schools are better than public schools at educating minority students.

Chubb and Moe (1990) maintain ruling educational administrations are inept, so as a result any school reforms that are enacted are doomed to failure by association. To revolutionize the public school system, the authors affirm that the private sector possesses the solutions. Specifically, the universal remedy to all educational problems including low student achievement is school choice.

Sander and Krautmann (1995) use the third follow up of HSB data and devote careful attention to the issue of selection into Catholic schools. The authors find that Catholic school attendance increases the likelihood of graduating from high school, but has no positive impact on post-secondary schooling attainment.

Sander (1996) examines the effect of elementary Catholic school attendance on high school test scores using HSB data. Eight years of Catholic education leads to higher sophomore test scores in the areas of vocabulary, reading, and mathematics. Upon controlling for self-selection into Catholic schools, results indicate that the recipients of

these achievement gains are non-Catholics. Thus, non-Hispanic white Catholics enrolled in Catholic schools do not experience higher academic achievement because of their school choice. The author suggests the appeal of Catholic school for these families is one of religious-based instruction.

2.4.2 National Educational Longitudinal Study

Focusing specifically on urban areas, Gamoran (1996) finds that Catholic schools have a positive impact on mathematics achievement while non-religious private schools do not offer any achievement advantage. The author also includes public magnet schools as a schooling alternative in addition to regular public schools and controls for student and family background characteristics. For reading, social studies, and science tests, the public magnet school students experience achievement gains.

Goldhaber (1996) concludes that private school students do not have higher achievement levels than public school students. There is no positive private school effect on student academic achievement for reading or mathematics when looking at the private sector as a whole. Dividing private schools into two sections, Catholic and non-Catholic, does not affect these results.

LePore and Warren (1997) find no significant evidence that single-sex Catholic schools offer an academic boon to students in the form of higher test scores. Initial achievement measures and background characteristics significantly explain the variation in student scores.

Accounting for selection into Catholic and independent private schools, Lee, Chow-Hoy, Burkam, Geverdt, and Smerdon (1998) find that Catholic schools dictate an authoritative and controlling stance for student course selection. Students attending

private schools enroll more often in advanced math classes compared to their public school peers. It is the program of study that Catholic schools follow that leads to higher mathematics achievement among its students.

Upon finding no evidence of religious and non-religious private schools outscoring their public school peers, Figlio and Stone (1999) point to environmental reasons such as religious teaching, disciplinary policies, and peer groups as to why parents pay for private schools. Acknowledging that private schools are not homogeneous, the authors perform unique selections into each private school type.

While other works focus on test score performance, Grogger and Neal (2000) investigate the effect of Catholic schooling on high school graduation and college enrollment rates. Minority and white students living in urban areas are significantly more likely to graduate from high school when they attend Catholic high schools while only minority urban students experience a significant increase in college attendance rates.

Jeynes (2002a) finds evidence that religious private schools students attain higher achievement levels than non-religious school students. Continuing this query, Jeynes (2002b) outlines and tests five criteria, including homework assignments, increased security measures, disciplinary codes, and religious teachings, as explanations for this phenomenon. While the author views each of these principles as distinct, it is reasonable to categorize all of them as part of the environment within a religious private school. The author concludes that religious private schools provide all five characteristics better than public schools. Thus, the students attending private schools are enables to excel and reach higher achievement scores.

Kim and Placier (2004) concentrate on comparing performance within the private sector to see if Catholic schools outperform non-Catholic ones at the high school level using National Educational Longitudinal Study of 1988 (NELS) data. While evidence suggests a positive non-Catholic effect for reading tests, there are no achievement growth for either private school type in mathematics, social studies, and sciences. The authors determine that a child's gender as well as active parent participation and Catholicism are significant. These findings quell other reports claiming that Catholic schooling leads to achievement gains. Furthermore, the authors use a variety of subjects to assess student academic performance whereas many studies examining the existence of a Catholic schooling effect use mathematics only.

2.4.3 National Assessment of Educational Progress

Peterson (2003) states that National Assessment of Educational Progress (NAEP) data are not without shortcomings, yet there is something to be learned from a student's performance on its reading, math, and science tests administered at ages nine, thirteen, and seventeen. Furthermore, these data offer the opportunity to perform an across-the-board examination of many students in many schools. Observed gains at any particular age is not evidence of cognitive growth. It is necessary to follow a cohort through all three testing times to compare test scores for performance purposes. When the age seventeen, in 1996, cohort is tracked through all three testing phases, there is no evidence to suggest positive academic achievement growth over time.

Lubienski and Lubienski (2005) conclude that while, on average, private school test scores are higher than public school test scores, this is not the result of better schools

in the private sector. Rather, it is the result of students with higher socioeconomics backgrounds selecting into the private sector.

Peterson and Llaudet (2007) compare performance on fourth and eighth grade NAEP tests in private schools to public schools. In addition to the private sector as a whole, the authors separate private schools into Catholic, Lutheran, and Evangelical Protestant groupings. Once controls are added for student characteristics, there is no positive private school effect observed for fourth graders for reading and math tests. On the fourth grade math tests specifically, evidence suggests that public schools outperform their private school peers by more than four points. Evangelical Protestant schools are above public ones for reading; however, they are on par with public schools in math. Upon presenting these findings, the authors are careful to emphasize that these results of higher private school achievement are not indicative of private school attendance benefits or detriments. Since there is no initial student aptitude measure included, the authors assert that NAEP data cannot ensnare performance comparisons.

Continuing in their critique of NAEP data, the authors find these data prone to classification bias as well as school influence bias. The incentives that lead public schools to overstate the share of disadvantaged students for government assistance actually work in the opposite direction for private schools. Consistency of groupings must be maintained in order to avoid classification bias. It is possible to conceive of a situation in which a school directly influences the number of books in a child's home. As a result of this, the variable is biased due to school influence.

2.4.4 Studies using Other Data Sources

Looking at data for Illinois, Sander (1999) finds that the concentration of private schools provides no increase to public school achievement levels. The author concludes that the gain in public school student performance cancels the negative impact of "cream skimming" performed by private schools on public school achievement, resulting in what appears to be a nil effect on public school achievement.

While this review focuses on academic outcomes, it is possible that schools affect a student's nonacademic conduct as well. Specifically, Evans, Oates, and Schwab (1992) examine teenage pregnancy and high school drop out rates using National Longitudinal Survey of Youth of 1979 (NLSY) data.[7] The impact of a student's peer group provides statistically significant decreases in the probability of teenage pregnancy and high school drop out rates when the number low income peers is small. However, the decision of where to live is made at the same time as the selection of one's peer group and other locally provided programs. Controlling for this endogeneity issue by simultaneous equation estimation, the results are stamped out. The significant single estimation results are driven by households selecting schools with a small number of low income peers. Of particular importance for this review is the reversal of these findings because of selection prompts caution when studying choices made by households. In many situations, households are able to apply leverage in order to achieve their desired outcomes.

Wolfe (1987) lengthens the time horizon to examine the effects of Catholic school enrollment using the National Longitudinal Study of the High School Class of 1972 (NLS) data and finds evidence of a loss in mathematics achievement for Catholic school

[7] For other papers examining Catholic schooling effects on student behavior, see Figlio and Ludwig (2000) and Mocan, Scafadi, and Tekin (2002).

students. There is no positive or negative long-term impact linked to Catholic school attendance for vocabulary performance.

In opposition to the assertion made by many authors that Catholic schools constitute the most homogeneous schools within the private sector (for example, see Braddock 1981; Grogger and Neal 2000), Riordan (1985) contends that there are distinct types of Catholic schools: coeducational and single-sex. Using NLS data, findings indicate that males and females attending single-sex Catholic schools have higher achievement levels in mathematics and vocabulary when compared to their peers attending coeducational Catholic schools as well as public schools.

Jepsen (2005) uses *Prospects* data and finds little to connect teacher experience and first grade gains in student performance. Findings suggest "that teacher characteristics are not strongly associated with teacher effectiveness" at the first grade level in general and for reading in particular (p 312).

According to Hoxby (2000), reducing the student teacher ratio is one public school reform that finds backing among parents, teachers, school administrators, and teacher unions in spite of a no preponderance of evidence lending support. Using Connecticut data on elementary public schools, there is no effect on test score performance when class size is reduced. The author concludes that lowering class size is an example of increasing expenditure for a public school resource that does not improve cognitive growth.

Some achievement studies use random experiment data collected during the implementation of a voucher plan. These data do not suffer from selection bias since the distribution of vouchers is random. Greene, Peterson, and Du (1999) find achievement

gains because of participation in Milwaukee's school choice program, which offered only a small increase in a household's schooling choice set due to many limitations on school participation.

Howell and Peterson (2002) observe significant achievement gains for African American students who participate in the School Choice Scholarships Foundation in New York City, another randomized field trial. Krueger and Zhu (2004a) find that relaxing the requirements of membership within different racial categories, from both parents to either parent, diminishes the strength of Howell and Peterson's results. Peterson and Howell (2004a) dismiss these contradictory findings citing that results maintain significance and positive sign with the more relaxed racial determination scheme. The authors accuse Krueger and Zhu of running "barefoot through data in hopes of finding desired results" (Peterson and Howell 2004a, 702). The firestorm continues to rage and generate response from both sides (Krueger and Zhu 2004b; Peterson and Howell 2004b).

Campbell, West, and Peterson (2005) use a national sample of voucher applicants to estimate both stages of the voucher process: application and utilization. Evidence suggests that at both stages of the voucher process, religiosity and religion are significant.[8] Families who attend a religious service frequently are significantly more likely to petition as well as use a voucher. Attending a school within the private sector is very attractive to Catholic or Evangelical Protestant households. It is the household's religious beliefs and habits more than income level or educational attainment that differentiates voucher participants from all eligible households.

[8] The authors use "religious commitment" to indicate the church attendance whereas "religion" signifies the religion practiced by the household.

2.5 Conclusion

In modeling and estimating school choice, current research uses micro-level data incorporating multiple private schooling options while imposing no pre-determined ordering of these alternatives. While some studies attempt to approximate tuition for different school types, the measures used do not represent good proxies.

When using any one of three nationwide data surveys and controlling for self-selection into the private sector, current literature supports the conclusion that any positive test score results for private school attendance are due to better students attending private schools. In addition to self-selection bias, any observed gains in student achievement are often challenged in part as a result of the different scopes of the data sources employed (Greene, Peterson, and Du 1999). Furthermore, the level of aggregation present in the estimation data is an additional culprit of the myriad of achievement findings in the literature (Jepsen 2002).

Chapter Three:
An Empirical Analysis of Schools Selected by Households at the First Grade Level: Who Takes the Voucher Bait and Where Do They Go?

3.1 Introduction

Education choices made at first grade are particularly important as they may condition decisions and outcomes throughout a child's academic career. While most Catholic schooling is undertaken at the elementary school level, the focus of academic research on the effects of private schools on performance and measures of educational outcomes has been primarily on Catholic high schools (Sander 1996). The implication of this is that the vast majority of secondary school choice studies are incomplete; the elementary schooling decision of the parents should be included for all secondary school choice analyses.

Evidence suggests that a child's elementary school years are critical school years in which a child learns the foundational information of history, science, and fine arts as well as other school subjects (Peterson 2003). Furthermore, Peterson (2003) continues that it is within these years that a child learns how to relate and connect to others and their surrounding environment. First grade academic achievement predicts cognitive performance in a child's junior year of high school (Cunningham and Stanovich 1997). A child's elementary educational history is an important determinant in the decision to attend a single-sex or coeducational independent private secondary school (Lee and Marks 1992). Thus, it is plausible to expect that a child's elementary education play an important role in school selection overall.

In this essay, I examine the issue of school choice at the first grade level. Upon determining the relevant factors of school selection, it is possible to evaluate the potential

effects of implementing a voucher program at this schooling level. No studies, to my knowledge, isolate this choice made for first grade attendance at the beginning of a child's academic career using a rich model of private schooling options.[9]

Evidence suggests that students do not switch between schooling alternatives often. Lee and Marks (1992) report that nearly one-half of their sample of high school seniors attended the same school since kindergarten while Goldhaber (1994, 59) cites the "actual or perceived deleterious effects on children" as justification as to why parents are unlikely to switch school sectors. My sample supports the claim that students do not switch school types. As shown in Table 3.1, there are only two hundred twenty-five children who switch to a different school type from kindergarten to first grade out of nearly eight thousand children for which kindergarten and first grade school types are known.

Within the school choice literature, some papers focus on the elementary and secondary levels combined (for example, see Long and Toma 1988; Lankford, Lee, and Wykoff 1995; Lankford and Wykoff 1992) while others restrict their analyses to the secondary level only (for example, see Goldhaber 1996). While Goldhaber (1996) evaluates the private versus public school choice using an all-inclusive private school variable, others have enriched the choice framework by incorporating various types of private schools such as parochial and non-parochial (for example, see Long and Toma 1988) and religious and independent (for example, see Lankford, Lee, and Wykoff 1995). Others have looked at public schools versus Catholic schools and ignored other types of private schools (for example, see Noell 1982; Jensen 1986; Greeley 2002; Sander 2005).

[9] While none focus on the first grade schooling level, recent studies do employ increased schooling options when looking at academic achievement differences among the public and private sectors. For example, see Lubienski and Lubienski (2006) and Kim and Placier (2004).

Table 3.1: School Type Switchers from Kindergarten to First Grade[a]

School Type, K	School Type, First: Public	Catholic	Evangelical	Protestant	Secular	Total, by row
Public	5,900	30	15	0	5	5,950
Catholic	30	1,055	5	0	0	1,090
Other Religious[b]	25	0	340	135	5	505
Secular	65	25	0	20	140	250
Undetermined	530	85	25	15	10	665
Total, by column	6,550	1,195	385	170	160	8,460

Source: Data are from the retricted use ECLS-K, 1999-2000.
Sample sizes are rounded to comply with NCES restricted use data reporting standards.

[a]There are 665 students for which kindergarten school type is undertermined. It is impossible to know if these students switched school types in between kindergarten and first grade.

[b] A detailed breakdown of other religious schools is unavailable. Additional information on this is provided in footnote 29.

While treating a household's choice between public and private school as synonymous with a choice between public and Catholic schools may have been appropriate when examining the educational choices of households in the 1970s and 1980s, since then there have been numerous changes in the composition of private schools, which precipitate the need to examine the effects of attending religious private schools rather than Catholic private schools alone (Chubb and Moe 1990; Gaziel 1997). Catholic schools no longer constitute the majority of religiously affiliated private schools. Catholic school enrollment has declined because of a decrease in Catholic religiosity (Sander 2005). While Catholic has fallen, there has been an increase in private schools, especially conservative Christian private schools (Sander 2005).

With the exception of Cohen-Zada and Sander (2006), who separate private schools into Catholic, Protestant, and secular classifications, there has been no effort to

estimate private school choice using three private schooling alternatives in addition to public. There is a void in the school choice literature regarding the determinant of demand for other religious education (Cohen-Zada and Sander 2006). As the authors note, it is incorrect to treat all private schools as homogeneous since distinctions among private sector schooling options exist. Even within Catholic schools, long considered the most homogeneous schools within the private schooling sector, there have been compositional changes since 1970 (Goldhaber 1994). Students attending Catholic schools in the late 1990s were more likely to be non-Catholic, minority, or pay unsubsidized tuition (Baker and Riordan 1998). While elementary Catholic schools typically have a lower non-Catholic enrollment than is found at the secondary schooling level, the southeast Catholic elementary enrollment is one-third non-Catholic (Baker and Riordan 1998).

While only using parochial and non-parochial school types, Long and Toma (1988) do recognize the myriad of schools available, especially religiously affiliated non-Catholic schools. In a similar vein, Lankford and Wyckoff (1992, 319) acknowledge that "although it might be relevant to make fine distinctions between the various types of private schools when analyzing school choice, data typically only identify students as attending public, private religious or private independent schools."

In this study, I move beyond admitting these private sector differences are present to augment the scope of this choice by offering a rich model that incorporates the different types of private schools.[10] In addition to including the public schooling option, my essay offers the most detailed typology of private schools to date by separating

[10] This analysis concentrates on regular elementary schools and children without disabilities. All schools for the disabled and all children with mild to severe disabilities have been eliminated from the data for this essay.

private schools into four distinct categories: Catholic, Evangelical or Fundamental Protestant (Evangelical), Mainline Protestant or Other Faith (Protestant), and Secular.[11]

Private school enrollment at the first grade level is different from the elementary private sector level as a whole. Lankford, Lee, and Wykcoff (1995) emphasize that focusing on the determinants of school selection enhances the policy forum regarding vouchers, tuition tax credits, and school choice. When a household is presented with a voucher to attend a private school of its choice, it is of interest to know what school is selected. It is important to know if not only households will accept the voucher, but also how they will use them. With the exception of Campbell, West, and Peterson (2005), there has been little empirical estimation of voucher usage. This essay seeks to examine school choice using a detailed private school typology and then apply the choice made to voucher policy participation to see if the household's decision changes.

I find kindergarten test performance, household income, and parental education levels are important factors in selecting a school. Additionally, religiosity of the household and denomination adherents in a county are significant determinants. The two simulations presented indicate that not all voucher recipients would attend the same type of private school. In particular, the differences appear to follow racial lines. I observe in both simulations that white and Hispanic, in different households and area environments, exhibit very similar predicted enrollment probabilities among varying school types. Evidence suggests that African-American girls respond differently to school selection than white and Hispanic girls do. The predicted probabilities in the simulations demonstrate that households do not view all private schools as identical. In particular,

[11] Although public schools may be considered secular as well, through out this essay, secular refers to private secular schools only.

the probability patterns over a change in income are very different for Evangelical and Protestant school types. Clearly, an increase in private school attendance does not translate to a uniform enrollment increase at all types of private schools.

The section that follows highlights some recent shifts in private schools. After this, I present a brief discussion of the model used in this essay. *Section 3.4* offers a description of the data I use while the fifth section presents the estimation results and policy simulations based on these findings. Finally, this essay rounds out with a few concluding remarks.

3.2 Trends in Private Schooling

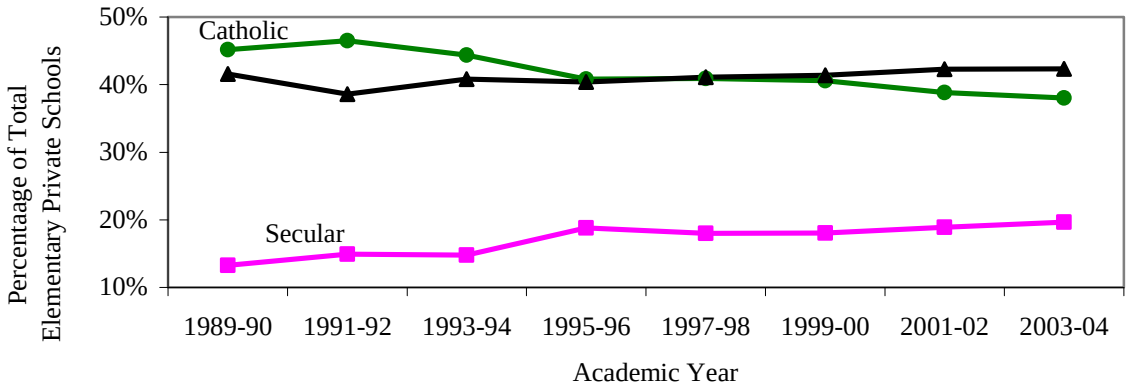
This section provides an in-depth look at trends in private school enrollment and supply in the United States during the past fourteen years from 1989 - 2003. My source of data, The Private School Universe Survey (PSS), is a survey conducted every two years by the U.S. Census Bureau for the National Center for Education Statistics (NCES). The initial round for this survey was first undertaken during the 1989-1990 academic year. In this survey, private schools are categorized by religious and secular sects as well as grade-level instruction: elementary, secondary, or combined.[12]

Figure 3.1 illustrates the number of private elementary schools by orientation, expressed as a percentage of total private elementary schools. Catholic schools comprise thirty-eight percent of all private elementary schools in 2003 - 2004. This is down from a high of forty-six percent in 1991 - 1992. Other religious schools have remained stable at approximately forty percent for its share of elementary private schools. Secular schools

[12] Prior to 1995, PSS defines the elementary schooling level as Pre-kindergarten – 6th grade. Starting in 1995, PSS includes terminal kindergarten programs in the elementary schooling level. PSS defines the secondary schooling level as 6th grade – 12th grade. Additionally, the secondary schooling level includes schools with some combination of these elementary and secondary grade levels.

experience an increase from thirteen percent of schools in 1989 - 1990 up to twenty percent of private schools in 2003 - 2004.

Figure 3.1: Elementary Private Schools by Orientation



As shown in Table 3.2, first grade enrollment in the private sector constitutes approximately ten percent of total private school enrollment while twelfth grade enrollment is below six percent for all academic years provided except one. In 2000 - 2001, six percent of total private school enrollment is at the twelfth grade level. It is useful to look at a particular class of students and follow the enrollment trends as these students progress through secondary education. Reflecting back to when these seniors enrolled in first grade, ten percent of total private school enrollment was at the first grade level during 1989 - 1990. This downward trend indicates that there is some attrition from the private school sector as students continue their elementary and secondary educations. As Table 3.2 indicates, the percentage of students enrolled in private school has remained relatively stable over time for a particular grade level. It is the composition of school types within the private sector that has changed.

Table 3.2: Private School Enrollment as Percentage of Total Private Enrollment by Grade Level and Academic Year

	School Year							
	1989-90	**1991-92**	**1993-94**	**1995-96**	**1997-98**	**1999-00**	**2001-02**	**2003-04**
Kindergarten	9.5%	9.6%	10.1%	10.6%	10.1%	9.9%	9.7%	9.2%
1st Grade	9.8%	9.8%	9.7%	9.8%	9.6%	9.3%	9.1%	8.7%
2nd Grade	9.3%	9.1%	9.1%	9.0%	9.1%	8.9%	8.6%	8.4%
3rd Grade	8.8%	8.7%	8.7%	8.5%	8.6%	8.6%	8.4%	8.2%
4th Grade	8.5%	8.4%	8.2%	8.1%	8.2%	8.4%	8.2%	8.0%
5th Grade	8.1%	8.1%	7.9%	7.9%	7.8%	8.0%	8.0%	7.9%
6th Grade	7.7%	8.0%	8.0%	7.8%	7.8%	7.9%	8.1%	8.0%
7th Grade	7.4%	7.6%	7.7%	7.5%	7.6%	7.6%	7.7%	7.8%
8th Grade	7.0%	7.2%	7.4%	7.3%	7.3%	7.3%	7.4%	7.8%
9th Grade	6.4%	6.5%	6.5%	6.6%	6.6%	6.6%	6.7%	7.0%
10th Grade	6.0%	6.0%	6.0%	6.2%	6.2%	6.2%	6.4%	6.6%
11th Grade	5.7%	5.7%	5.6%	5.6%	5.7%	5.8%	6.0%	6.3%
12th Grade	5.8%	5.4%	5.2%	5.2%	5.4%	5.5%	5.6%	6.0%

Looking specifically at private school elementary enrollment by school orientation for the academic year of my data, Figure 3.2a shows over sixty percent of elementary private school students attend a Catholic school. Enrollments in secular as well as non-Catholic religious schools represent nine percent and twenty-six percent of total private school enrollment in 1999 - 2000, respectively. The composition of private school enrollment at the elementary level as a whole is different than at the first grade level. When isolating the first grade private school enrollment, the enrollment shares by school type are different as Figure 3.2b indicates.

Figure 3.2a: Private Elementary School Enrollment 1999-2000

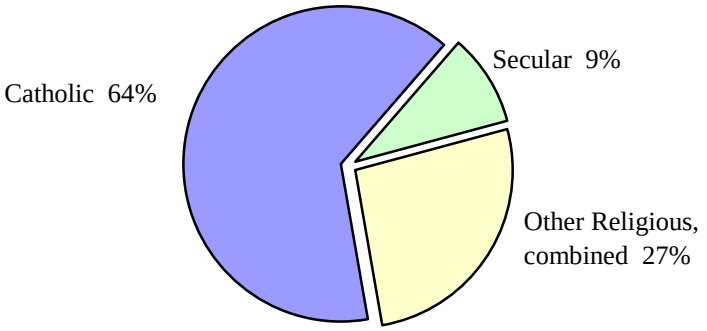
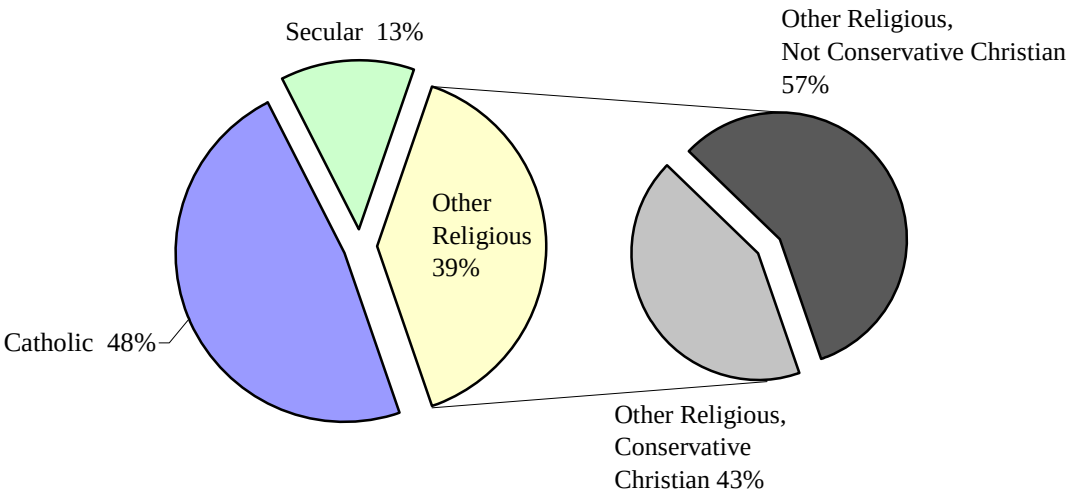


Figure 3.2b: Private First Grade Enrollment 1999-2000



Note: For the purposes of this essay, the terms "conservative Christian" and "Evangelical Protestant" are synonymous. The Department of Education prefers to use the former while I believe that the latter better categorizes this schooling type. Campbell, West, and Peterson (2005) also note this nomenclature disparity and support to my decision to use Evangelical Protestant.

While sixty-four percent of total elementary enrollment was in Catholic schools in 1999 – 2000, only forty-eight percent of private first grade enrollment was Catholic. Hence, studies focusing on Catholic schools as a proxy for all private education or all private religious education, especially at the first grade level, are missing important variances within the private school sector. Secular schools possess thirteen percent while non-Catholic religious schools represent thirty-nine percent of first grade private school enrollment. Of the non-Catholic religious schools, Conservative Christian denominations experience an enrollment share of seventeen percent in 1999 - 2000. Schools affiliated with Conservative Christian denominations have experienced a stable upward trend in enrollment share from thirteen percent in 1989 - 1990 to seventeen percent in 2003 – 2004.

3.3 Model

First, I posit a model of household behavior and school choice that is used in Lankford, Lee, and Wyckoff (1995). While this model does not provide any particular theoretical insights, it does provide a framework to motivate and structure the empirical model I generate later in this essay.

In this model, each household surveys its finite set of mutually exclusive schooling options and then selects the school that maximizes its utility. Allow there to be J school types where U_{mj} , j = 1,2,…,J, is the utility of the m^{th} household if the j^{th} schooling option is chosen. Schooling alternative i is selected only if $U_{mi} > U_{mk}$ for all $k \neq i$. Let the utility of household m with one child enrolled in first grade at schooling option j be given by

$$U_{mj} = U(Z_m, E_j, A_m, \varepsilon_{mj}) = U^Z(Z_m, C_m) + U^E(E_j, C_m) + U^A(A_m, C_m) + \varepsilon_{mj} \qquad (3.1)$$

where Z is a composite commodity (non-educational private consumption); E is a vector of educational attributes; A is a vector of location (county) amenities and characteristics; and C is a vector of background characteristics for the child and his or her family[13]. The error term, ε_{mj}, is assumed to be normally distributed to yield a multinomial probit model.

I assume that the child's parents make decisions to maximize their utility. Then the observed type of school selected by the parents maximizes their utility, given available information and the constraints they face[14]. Since both U_{mj} and ε_{mj} are random variables, the probability that the m^{th} household chooses the i^{th} schooling option is $P_{mi} = P(U_{mi} \geq U_{mk}$, for all $k \neq i)$. In this study, there are five categories of schooling options representing all of the different school classifications in this model: public, Catholic, Evangelical, Protestant, and Secular.

3.4 Data Description

While there has been virtually no effort to dissect the private sector in greater detail for school choice investigations, highly specified school type separations have been performed recently for achievement differential purposes (Kim and Placier 2004; Lubienski and Lubienski 2006).[15]

This analysis employs the restricted-use version of the Kindergarten cohort of the Early Childhood Longitudinal Survey (ECLS-K), a national data set, released by the

[13] I do not include any school or teacher specific variables for the school attended. Parents have already included the impacts of these variables into their schooling decision as well as their child's expected academic achievement (Goldhaber 1994).

[14] I acknowledge the possibility of endogeneity regarding the residential and schooling decisions of the household. In metropolitan areas, a resident's ability to relocate is cited as incentive for public schools to compete (Tiebout 1956). Thus, a household can select to live in a schooling area reflective of its preferences. This implies that local public school characteristics may not be exogeneous. Data and computational limitations prevent further investigation of the concern.

[15] A noted exception to this, Cohen-Zada and Sander (2006) divide the private school sector into Catholic, Protestant, and Secular categories for their school choice analysis.

National Center for Educational Statistics (NCES).[16] Coupling the Private School Survey's (PSS) detailed religious affiliation data and Glenmary Research Center's categorizations of all religious affiliations, private schools in my data are grouped as follows: Catholic, Evangelical, Protestant, and Secular schools.[17] Matching the child's home zip code from ECLS-K to area characteristics for the child's home county, I add additional explanatory variables from Census 2000 and Religious Congregations and Membership Data 2000 at the county level. The estimation sample size is 8,460 student-level observations.[18]

3.4.1 Description of Sample

Table 3.3 offers definitions, sources, and means of variables in my data.[19] Overall sixty-six percent of these data are white. The percent white for public as well as Secular schools is similar to this average for the overall sample. All of the religiously affiliated private schools are at least seventy-five percent white. While fifteen percent of students attending a public school are African-American, only five percent of African-American students attend a private school.

For all six tests administered, public school students have the lowest number of correctly answered questions on average while Secular school students boast the highest averages. On average, test scores for private school students exceed their public school peers' scores by over one point for each test. Eighteen percent of the mother's of public school students possess a college Bachelor's degree compared to over thirty percent of

[16] Additional details regarding ECLS-K are available from NCES at http://www.nces.ed.gov/.
[17] Glenmary Research Center's grouping of affiliations is consistent with the American Religion Data Archive's taxonomy. Refer to Appendix A for a detailed list of affiliations within each category.
[18] Since these data are nested, Tables B.1a and B.1b in Appendix B offer additional information regarding the number of students, schools, counties and states used in this essay.
[19] Table B.2 in Appendix B provides variable means once Other Religious schools is separated into Evangelical and Protestant categories. Table B.3 in Appendix B provides maximum and minimum values for all variables that are continuous.

private school students' mothers. Private school students, on average, have mothers and fathers with higher educational attainment than public school students. Nearly forty percent of Secular fathers hold an advanced degree whereas only nine percent of public school fathers do. *Religiosity, Head* is sixty percent for all religious private school students while public and Secular are thirty-six percent and twenty-eight percent, respectively.

There is a much higher concentration of Other Religious schools in the Midwest and South while nearly half of all Secular schools are in the West. Thirty-eight percent of Catholic schools are located in the Midwest, which is unusual. To reduce the vast diversity present in the private schooling sector, some papers restrict their analysis to a specific area or region (for example, see Gemello and Osman 1984). Frequently, studies look at Catholic schools specifically focusing on New England due to the large number of Catholic schools in that area (Lankford and Wyckoff 1992; Lankford, Lee, and Wyckoff 1995). Sander (2005) and LePore and Warren (1997) restrict their investigations to Catholic schooling while Lee and Marks (1992) use students attending National Association of Independent Schools affiliates. My data are not restricted to urban areas. Yet, seventy-six percent of students live in an urban or suburban area compared to a small town or rural area indicates that the majority of my sample is urban. There is a larger portion of Other Religious schools in rural and small town areas since only seventy-seven percent of these schools were located in urban areas.

Table 3.3: Data Definitions and Means[a]

Variable	Variable Description	Overall	Public	Private	Catholic	Other Religious	Secular
Male	Equals one if student is male, zero otherwise	0.49	0.49	0.48	0.48	0.48	0.41
		(0.50)					
White	Equals one if student is white, zero otherwise	0.66	0.63	0.76	0.76	0.81	0.64
		(0.47)					
Black	Equals one if student is Black, zero otherwise	0.13	0.15	0.05	0.04	0.07	0.06
		(0.33)					
Hispanic	Equals one if student is Hispanic, zero otherwise	0.12	0.12	0.10	0.11	0.07	0.11
		(0.32)					
Asian	Equals one if student is Asian, zero otherwise	0.05	0.05	0.05	0.05	0.02	0.14
		(0.22)					
Multiracial	Equals one if student is Multiracial or Other race, zero otherwise	0.05	0.05	0.04	0.04	0.03	0.06
		(0.21)					
Fall Reading, K	Reading test, administered during fall of Kindergarten year (Maximum: 20)	6.52	6.16	7.75	7.41	7.74	10.31
		(3.98)					
Spring Reading, K	Reading test, administered during spring of Kindergarten year (Maximum: 20)	10.88	10.56	12.01	11.70	12.12	13.92
		(3.87)					
Fall Math, K	Math test, administered during fall of Kindergarten year (Maximum: 16)	5.32	5.05	6.27	6.17	6.26	7.14
		(2.95)					
Spring Math, K	Math test, administered during spring of Kindergarten year (Maximum: 16)	8.24	7.97	9.18	9.02	9.34	9.81
		(3.03)					

Table 3.3: Data Definitions and Means[a] (continued)

Variable	Variable Description	Overall	Public	Private	Catholic	Other Religious	Secular
Fall General, K	General Knowledge test, administered during fall of Kindergarten year (Maximum: 12)	5.40 (2.93)	5.09	6.44	6.39	6.44	6.81
Spring General, K	General Knowledge test, administered during spring of Kindergarten year (Maximum: 12)	7.06 (2.81)	6.80	7.92	7.87	7.86	8.53
Siblings	Number of siblings student has	1.49 (1.08)	1.51	1.43	1.49	1.45	0.99
Mother, Some High School	Equals one if student's mother completed some high school or less, zero otherwise	0.08 (0.27)	0.10	0.01	0.01	0.01	0.02
Mother, High School	Equals one if student's mother completed high school or equivalent, zero otherwise	0.27 (0.44)	0.29	0.18	0.19	0.19	0.09
Mother, Some College	Equals one if student's mother completed some college, zero otherwise	0.34 (0.47)	0.34	0.35	0.35	0.36	0.25
Mother, BA	Equals one if student's mother has Bachelor's degree, zero otherwise	0.22 (0.41)	0.18	0.33	0.34	0.31	0.32
Mother, Advanced	Equals one if student's mother has an advanced degree, zero otherwise	0.08 (0.26)	0.06	0.12	0.09	0.13	0.28
Father, Some High School	Equals one if student's father completed some high school or less, zero otherwise	0.07 (0.25)	0.08	0.02	0.03	0.02	0.02
Father, High School	Equals one if student's father completed high school or equivalent, zero otherwise	0.23 (0.42)	0.24	0.19	0.20	0.20	0.06

Table 3.3: Data Definitions and Means[a] (continued)

Variable	Variable Description	Overall	Public	Private	Catholic	Other Religious	Secular
Father, Some College	Equals one if student's father completed some college, zero otherwise	0.23 (0.42)	0.22	0.24	0.27	0.22	0.16
Father, BA	Equals one if student's father has Bachelor's degree, zero otherwise	0.18 (0.39)	0.16	0.26	0.26	0.26	0.25
Father, Advanced	Equals one if student's father has an advanced degree, zero otherwise	0.11 (0.31)	0.09	0.18	0.15	0.17	0.37
Religiousity, Head	Equals one if head of student's household attends religious services at least once per week, zero otherwise	0.41 (0.49)	0.36	0.57	0.59	0.61	0.28
Religiosity, Spouse	Equals one if spouse or partner of head of student's household attends religious services at least once per week, zero otherwise	0.27 (0.44)	0.22	0.43	0.44	0.48	0.18
Single Parent	Equals one if student lives in a single parent household, zero otherwise	0.21 (0.40)	0.23	0.12	0.10	0.14	0.17
Northeast	Equals one if student lives in New England, zero otherwise	0.19 (0.39)	0.18	0.21	0.25	0.14	0.14
Midwest	Equals one if student lives in Midwest, zero otherwise	0.29 (0.45)	0.27	0.35	0.38	0.38	0.07
South	Equals one if student lives in South, zero otherwise	0.31 (0.46)	0.34	0.21	0.16	0.28	0.30

Table 3.3: Data Definitions and Means[a] (continued)

Variable	Variable Description	Overall	Public	Private	Catholic	Other Religious	Secular
West	Equals one if student lives in West, zero otherwise	0.21 (0.41)	0.21	0.23	0.20	0.20	0.49
Urban	Equals one if student lives in urban or suburban area, zero otherwise	0.76 (0.43)	0.74	0.83	0.84	0.77	0.99
Income, 0-15	Equals one if annual household income is below $15,000, zero otherwise	0.08 (0.27)	0.10	0.01	0.02	0.01	0.00
Income, 15-20	Equals one if annual household income is between $15,000 and $20,000, zero otherwise	0.05 (0.21)	0.06	0.01	0.01	0.01	0.01
Income, 20-25	Equals one if annual household income is between $20,000 and $25,000, zero otherwise	0.05 (0.21)	0.06	0.02	0.01	0.03	0.01
Income, 25-30	Equals one if annual household income is between $25,000 and $30,000, zero otherwise	0.07 (0.25)	0.08	0.04	0.04	0.04	0.04
Income, 30-35	Equals one if annual household income is between $30,000 and $35,000, zero otherwise	0.05 (0.23)	0.06	0.03	0.03	0.04	0.02
Income, 35-40	Equals one if annual household income is between $35,000 and $40,000, zero otherwise	0.07 (0.25)	0.07	0.05	0.05	0.07	0.04
Income, 40-50	Equals one if annual household income is between $40,000 and $50,000, zero otherwise	0.11 (0.31)	0.10	0.12	0.11	0.14	0.06
Income, 50-75	Equals one if annual household income is between $50,000 and $75,000, zero otherwise	0.20 (0.40)	0.19	0.26	0.28	0.25	0.13

Table 3.3: Data Definitions and Means[a] (continued)

Variable	Variable Description	Overall	Public	Private	Catholic	Other Religious	Secular
Income, 75-100	Equals one if annual household income is between $75,000 and $100,000, zero otherwise	0.13 (0.33)	0.11	0.17	0.19	0.13	0.19
Income, 100-200	Equals one if annual household income is between $100,000 and $200,000, zero otherwise	0.10 (0.30)	0.08	0.15	0.15	0.13	0.25
Income, 200+	Equals one if annual household income is above $200,000, zero otherwise	0.03 (0.18)	0.03	0.07	0.05	0.07	0.19
House Value, County [b]	Median house value in student's home county, in dollars	129,128 (66,229)	127,365	135,174	134,114	125,609	175,847
Income, County [b]	Median household income in student's home county, in dollars	44,200 (11,055)	44,070	44,646	44,502	44,076	47,669
White, County [b]	Per capita white population in student's home county	0.71 (0.21)	0.71	0.71	0.72	0.71	0.58
Catholic, County [c]	Per capita Catholic adherents in student's home county	0.24 (0.15)	0.23	0.27	0.28	0.26	0.27
Evangelical, County [c]	Per capita Evangelical or Fundamental Protestant adherents in student's home county	0.14 (0.13)	0.15	0.12	0.12	0.15	0.09
Protestant, County [c]	Per capita Mainline Protestant or Other Faith adherents in student's home county	0.14 (0.09)	0.14	0.14	0.14	0.16	0.13
Student-Teacher, Public [b]	Average student-teacher ratio in public schools in student's home county	15.86 (4.71)	15.69	16.44	16.38	16.32	17.38

Table 3.3: Data Definitions and Means[a] (continued)

Variable	Variable Description	Overall	Public	Private	Catholic	Other Religious	Secular
Black, Public [b]	Average percent Black students enrolled in public schools in student's home county	16.73 (18.87)	16.70	16.83	16.64	17.32	16.54
Hispanic, Public [b]	Average percent Hispanic students enrolled in public schools in student's home county	12.87 (17.07)	12.47	14.23	12.44	14.62	26.11
Free Lunch [b]	Average percent students receiving free or reduced lunch in public schools in student's home county	25.52 (17.68)	25.37	26.03	24.48	27.23	33.44
Number of observations		8460	6550	1910	1195	555	160

Source: Unless otherwise indicated, data are from the restricted use ECLS-K, 1999-2000.

Note: Sample sizes, means, and standard deviations are all the unweighted ECLS-K reporting samples. They are not weighted to represent students and schools nationwide. Sample sizes are rounded to comply with NCES restricted use data reporting standards

[a]Standard Errors of overall sample are in parenthesis

[b] denotes Census 2000 data

[c] denotes Glenmary Research Center's 2000 Religious Congregations & Membership Data

I use a set of eleven dummy variables to represent household income. The majority of lower income students attend public schools up to *Income, 35-40* where at this level the percent of students attending other religious schools equals that of public schools. Fourteen percent of students attend other religious schools at a household income level range of forty to fifty thousand dollars, which exceeds the public school mean of seven percent. Twenty-eight percent of students attend Catholic schools in the fifty to seventy-five thousand dollar income range. One quarter of students attending Secular schools have a household income between one hundred thousand and two hundred thousand dollars.

The means for median house value and income level in a student's home county are lowest for public and other religious private schools. *White, County* is seventy percent for all schools except Secular, which are fifty-eight percent. The Protestant adherents in a student's home county are higher on average for Other Religious schools at a mean of sixteen percent. With the exception of *Black, Public* all of the county level public school characteristics are much higher for students attending Secular schools. For instance, the overall sample average for *Hispanic, Public* is approximately thirteen percent while it is twenty-six percent for Secular schools.

3.4.2 Anticipated Results

Here, I present a brief discussion of anticipated results based on previous empirical findings. I expect *Black* to be negatively related to the probability of attending all types of private schools as past studies have found that whites are more likely to enroll children in religiously affiliated, as well as non-religious, schools (Noell and Myers 1983; Long and Toma 1988).

Educational attainment levels of a child's parents are expected to be positively related to private school enrollment (Long and Toma 1988; Coleman, Hoffer, and Kilgore 1982; Gemello and Osman 1983; Martinez-Vazquez and Seaman 1985). Based on Cohen-Zada and Sander's (2006) findings, I expect Religiosity, Head and Religiosity, Spouse to be positively related to the probability of attending a religious school. As household income rises, I expect the child's likelihood of attending a private school increases (Sander 2005).

Looking at Catholic adherents at the state level, Long and Toma (1988) report a positive relationship to private school enrollment. While controlling for Catholic, Evangelical, and Mainline Protestant adherents separately at the county level, I expect that a positive relationship exists between adherents of a particular group and their affiliated private school type. However, there is a possibility of a negative relationship for same type adherent and school groupings. As observed by Cohen-Zada and Sander (2006), the share of Catholics in the population has a significant concave effect on the likelihood of attending a Catholic school indicating that Catholic households have a positive relationship, increasing the probability of attending a Catholic school, up to a threshold level of Catholic adherents in the total population. Once this threshold level is reached, then households opt to send their children to public school, experiencing a negative probability of Catholic school attendance. It is unclear whether positive or negative relationships exist across the three separate adherent groups and four private school types, especially with the separation of Other Religious schools into two categories. In keeping with Clotfelter's (1976) "white flight" and Betts and Fairlie's

(2001) “immigrant flight”, it is possible that “adherent flight” exists for cross-types of religious memberships and school types.

The above discussion for adherent variables provides insight when the demand side of first grade school choice is considered. However, it is possible to consider the adherents variables as supply side variables. Thus, alternative interpretations of the adherent variables relate to the availability of a certain school type in a given area. The greater the proportion of Catholic adherents in a county indicates that there is a greater likelihood for that county to have at least one Catholic school. The same principle holds for other adherent groups. When this supply perspective is used, the estimations for school choice represent reduced-form equilibrium points.

3.5 Results

I follow the traditional approach in school choice literature and estimate a model in which households simply choose between sending their child to either public or any private school ignoring the distinctions in the type of private school (for example, see Goldhaber 1996). Through out this analysis, the reference individual is a white female who attends public school for kindergarten and first grade.

The results from this probit model are reported in Table 3.4. Also reported in Table 3.4 are the results of a probit in which we examine the choice between public schooling and a single type of private schooling, Catholic, following the works of Sander (2005), Greeley (2002), Jensen (1986), and Noell (1982). This, of course, restricts the sample to students attending public schools or Catholic schools.

As discussed, I expand upon the existing literature by estimating an expanded schooling choice model. Specifically, I estimate several specifications of multinomial

probit models in which the household chooses to send its child to a public school or several alternative types of private schools. The results from estimating these models are reported in Table 3.5. I begin by estimating a model in which a household can send its child to either public school, Catholic, or Non-Catholic. The next model I estimate considers four alternatives: public, Catholic, Other Religious, and Secular Private. In the final model, I divide "Other Religious" into Evangelical and Protestant categories based on the religious affiliation of each school.

3.5.1 Single Private Schooling Options

Table 3.4, model A, reports the results of a probit of public versus private schooling. When I do not distinguish among types of private schools, I find that a child is less likely to attend a private school compared to public school if the child is a minority with this finding significant if the child is African-American or Asian. In addition, *Siblings* significantly reduces the likelihood of a child attending a private school. If the child lives in the South or West, then he or she is less likely to attend a private school than if he or she lived in New England. A positive, yet insignificant, coefficient is found for Midwest. *Income, County* has a significant, negative impact on the child's likelihood of attending a private school.

With the exception of the insignificant negative result for a child's fall math test, the child's fall and spring reading and general knowledge tests have positive impacts on the child's likelihood of attending private school while only significant for fall general knowledge. The educational attainment of the child's mother and father at all levels, relative to not completing high school, are significant positive factors in the probability of the child attending a private school of any type. The coefficients on the religiosity of the

household head and spouse are also positive and significant. An unexpected result is that a child living in a single parent household is more likely to attend a private school than a child living in a two parent household. Perhaps, this relationship is showing an explicit agreement between the child's parents for where the child attends school.

As expected, *Urban* is positive. This significant finding is expected, as it is frequently the case that there are few private schooling options in rural areas. I find the a child's probability of attending a private school is negatively related to *Income, 15-20* and *Income, 20-25*, compared to households with an income of less than fifteen thousand dollars. Income levels above forty thousand dollars are significantly and positively associated with a greater likelihood of private school attendance. Catholic as well as Evangelical and Protestant adherents in a child's home county are positively related while only Catholic adherents in the county are significant. The average student-teacher ratio, the average percentage of students who are African-American, and the average number of students receiving reduced or free lunches are positively related to the child's probability of attending a private school.

For this analysis, the reference individual is a white female who attends public school for kindergarten and first grade with all other variables evaluated at their means. Looking at the marginal effects presented in Table 3.4, model A, the reference individual's probability of attending a private school is eleven percentage points lower if she is black. If her mother possesses an advanced degree, then the reference individual is nineteen percentage points more likely to attend a private school when compared to having a mother who is not a high school graduate. The share of religious adherents influences the reference individual's likelihood of attending private as well. When

Catholic adherents in the county increase by ten percent, the reference individual's probability increases by thirty-four percentage points. When Evangelical adherents in the county increase by ten percent, the reference individual's probability increases by nearly thirteen percentage points.

Table 3.4: Binary Probit Estimates for Private versus Public				
	Model A - Private, All Inclusive		Model B - Private, Catholic Only	
Variable	Coefficient (z-score)	[Marginal Effect] (z-score)	Coefficient (z-score)	[Marginal Effect] (z-score)
Male	-0.025	[-0.007]	-0.012	[-0.002]
	(-0.800)	(-0.80)	(-0.330)	(-0.33)
Black	-0.506	[-0.110]	-0.513	[-0.074]
	(-3.64)***	(-4.36)***	(-2.74)***	(-3.44)***
Hispanic	-0.076	[-0.019]	0.104	[0.020]
	(-0.860)	(-0.88)	(1.070)	(1.02)
Asian	-0.215	[-0.051]	-0.098	[-0.017]
	(-1.72)*	(-1.90)*	(-0.750)	(-0.79)
Multiracial	-0.058	[-0.015]	-0.094	[-0.016]
	(-0.510)	(-0.53)	(-0.710)	(-0.75)
Fall Reading, K	0.011	[0.003]	-0.001	[-0.00012]
	(1.280)	(1.28)	(-0.070)	(-0.07)
Spring Reading, K	0.014	[0.004]	0.008	[0.002]
	(1.430)	(1.42)	(0.710)	(0.71)
Fall Math, K	-0.006	[-0.002]	0.004	[0.0008]
	(-0.600)	(-0.60)	(0.400)	(0.40)
Spring Math, K	0.011	[0.003]	0.005	[0.0009]
	(1.080)	(1.08)	(0.460)	(0.46)
Fall General, K	0.042	[0.011]	0.041	[0.007]
	(3.87)***	(3.75)***	(3.39)***	(3.24)***
Spring General, K	-0.014	[-0.004]	-0.012	[-0.002]
	(-1.140)	(-1.14)	(-0.810)	(-0.81)
Siblings	-0.050	[-0.013]	-0.022	[-0.004]
	(-2.35)**	(-2.33)**	(-1.000)	(-0.99)
Mother, High School	0.370	[0.104]	0.388	[0.079]
	(4.13)***	(3.82)***	(3.92)***	(3.52)***
Mother, Some College	0.553	[0.156]	0.556	[0.114]
	(6.29)***	(5.68)***	(5.48)***	(4.64)***
Mother, BA	0.668	[0.203]	0.702	[0.163]
	(6.78)***	(5.88)***	(6.18)***	(4.84)***
Mother, Advanced	0.602	[0.191]	0.492	[0.115]
	(5.04)***	(4.35)***	(3.60)***	(2.90)***

Table 3.4: Binary Probit Estimates for Private versus Public (Continued)

Variable	Model A - Private, All Inclusive		Model B - Private, Catholic Only	
	Coefficient (z-score)	[Marginal Effect] (z-score)	Coefficient (z-score)	[Marginal Effect] (z-score)
Father, High School	0.327	[0.092]	0.264	[0.053]
	(3.67)***	(3.39)***	(2.48)**	(2.26)**
Father, Some College	0.328	[0.093]	0.283	[0.057]
	(3.59)***	(3.31)***	(2.53)**	(2.30)**
Father, BA	0.361	[0.104]	0.263	[0.054]
	(3.60)***	(3.28)***	(2.21)**	(1.99)**
Father, Advanced	0.357	[0.105]	0.210	[0.043]
	(3.14)***	(2.82)***	(1.610)	(1.47)
Religiousity, Head	0.321	[0.086]	0.383	[0.074]
	(6.22)***	(5.72)***	(6.69)***	(5.52)***
Religiosity, Spouse	0.238	[0.065]	0.199	[0.039]
	(4.27)***	(3.99)***	(3.21)***	(2.93)***
Single Parent	0.388	[0.112]	0.248	[0.050]
	(4.19)***	(3.82)***	(2.22)**	(2.03)**
Midwest	0.181	[0.049]	0.056	[0.011]
	(0.880)	(0.86)	(0.250)	(0.24)
South	-0.192	[-0.049]	-0.426	[-0.071]
	(-0.730)	(-0.75)	(-1.410)	(-1.56)
West	-0.062	[-0.016]	-0.240	[-0.040]
	(-0.210)	(-0.21)	(-0.710)	(-0.79)
Urban	0.338	[0.081]	0.421	[0.068]
	(1.80)*	(1.98)**	(1.92)*	(2.23)**
Income, 15-20	-0.263	[-0.061]	-0.253	[-0.040]
	(-2.29)**	(-2.61)***	(-1.98)**	(-2.33)**
Income, 20-25	-0.147	[-0.036]	-0.286	[-0.044]
	(-1.310)	(-1.39)	(-2.17)**	(-2.53)**
Income, 25-30	0.028	[0.008]	-0.039	[-0.007]
	(0.310)	(0.31)	(-0.370)	(-0.38)
Income, 30-35	0.032	[0.008]	-0.037	[-0.007]
	(0.340)	(0.33)	(-0.330)	(-0.33)
Income, 35-40	0.133	[0.037]	0.052	[0.010]
	(1.550)	(1.47)	(0.490)	(0.48)

Table 3.4: Binary Probit Estimates for Private versus Public (Continued)

Variable	Model A - Private, All Inclusive		Model B - Private, Catholic Only	
	Coefficient (z-score)	[Marginal Effect] (z-score)	Coefficient (z-score)	[Marginal Effect] (z-score)
Income, 40-50	0.316	[0.092]	0.245	[0.051]
	(3.99)***	(3.54)***	(2.60)***	(2.26)**
Income, 50-75	0.348	[0.099]	0.365	[0.077]
	(4.86)***	(4.33)***	(4.34)***	(3.59)***
Income, 75-100	0.352	[0.103]	0.377	[0.082]
	(4.33)***	(3.83)***	(4.02)***	(3.28)***
Income, 100-200	0.381	[0.113]	0.393	[0.087]
	(4.43)***	(3.87)***	(3.80)***	(3.08)***
Income, 200+	0.589	[0.189]	0.478	[0.113]
	(4.59)***	(3.92)***	(3.10)***	(2.46)**
House Value, County [a]	0.000002	[0.0000006]	0.000003	[0.0000006]
	(1.380)	(1.38)	(1.610)	(1.63)
Income, County [a]	-0.00002	[-0.0000063]	-0.00003	[-0.0000064]
	(-2.09)**	(-2.09)**	(-2.52)**	(-2.55)**
White, County [a]	-0.035	[-0.009]	-0.415	[-0.076]
	(-0.060)	(-0.06)	(-0.630)	(-0.63)
Catholic, County [b]	1.297	[0.339]	1.279	[0.235]
	(2.06)**	(2.05)**	(1.81)*	(1.80)*
Evangelical, County [b]	0.492	[0.129]	0.261	[0.048]
	(0.620)	(0.62)	(0.280)	(0.28)
Protestant, County [b]	0.147	[0.039]	-0.604	[-0.111]
	(0.210)	(0.21)	(-0.730)	(-0.73)
Student-Teacher, Public [a]	0.025	[0.007]	0.034	[0.006]
	(1.560)	(1.56)	(1.68)*	(1.71)*
Black, Public [a]	0.002	[0.00047]	-0.001	[-0.00014]
	(0.300)	(0.30)	(-0.110)	(-0.11)
Hispanic, Public [a]	-0.004	[-0.0011]	-0.014	[-0.003]
	(-0.560)	(-0.56)	(-1.66)*	(-1.65)*

Table 3.4: Binary Probit Estimates for Private versus Public (Continued)

Variable	Model A - Private, All Inclusive		Model B - Private, Catholic Only	
	Coefficient (z-score)	[Marginal Effect] (z-score)	Coefficient (z-score)	[Marginal Effect] (z-score)
Free Lunch [a]	0.004	[0.0010]	0.001	[0.00018]
	(0.720)	(0.73)	(0.170)	(0.17)
Constant	-2.712		-1.908	
	(-3.49)***		(-2.27)**	
Observations	8460		7745	
Log Likelihood	-3,817.07		-2,779.59	
Wald chi2(47)	556.16		551.84	
Pseudo R-squared	0.1553		0.1666	

Source: Unless otherwise indicated, data are from the restricted use ECLS-K, 1999-2000.
*p<0.10 ; **p<0.05 ; ***p<0.01
Sample sizes are rounded to comply with NCES restricted use data reporting standards.

[a] denotes Census 2000 data

[b] denotes Glenmary Research Center's 2000 Religious Congregations & Membership Data

Several studies (Sander 2005; Greeley 2002; Jensen 1986; Noell 1982) have focused solely on Catholic schools as the only private school option available. I follow these studies and only consider the choice between public and Catholic schools, discarding any observations where the student chooses another type of private school. These results, reported in Table 3.4, model B, are similar to the all-inclusive private probit results. *Asian*, *Siblings*, and *Father, Advanced* maintain the same sign as in the all-inclusive private probit, but the statistical significance of the explanatory variable disappears. Since the Catholic-only sample is smaller, this is not unexpected.

There are three significant results for attending a Catholic school only that are insignificant for model A, the all-inclusive private school probit discussed earlier. Two of these three variables are related to the public schools in a child's home county. More specifically, the average student-teacher ratio and the average percentage of Hispanic students enrolled in public schools in the child's home county differ in sign, yet both are significant. As the student-teacher ratio in public schools rises, a child is more likely to attend a Catholic school. As *Hispanic, Public* increases, a child is less likely to attend a Catholic school. The third significant finding is a lower probability for attending Catholic when a child's household income level falls between twenty thousand and twenty-five thousand dollars, compared to having a household income below fifteen thousand.

Focusing attention on marginal effects presented in Table 3.4, model B, *West* and *South* reduce the probability that the reference individual attends a Catholic school by four percentage points and seven percentage points, respectively. A ten percent increase in *Protestant, County* lowers the likelihood of attending a Catholic school by eleven

percentage points. *Catholic, County* shows an increase of nearly twenty-four percentage points. Having a father with a college degree, compared to a high school dropout, indicates the child is five percentage points more likely to attend a Catholic school while this increases to sixteen percentage points when it a child's mother holds a college degree, compared to a high school dropout.

3.5.2 Multiple Private Schooling Choices

Most of the early work on school choice, explicitly or implicitly, assumed that the choice was strictly between public schools and Catholic schools for the vast majority of private schools. The first studies to explicitly model heterogeneity in private schools classified private schools as either Catholic and Non-Catholic or Religious and Non-Religious (Loma and Toma 1988; Lankford, Lee, and Wyckoff 1995). Here, as reported in Table 3.5, model C, I replicate these studies by considering these three alternative schooling choices: Public, Catholic, and Non-Catholic.

There are many results that are consistent in sign for both of these groupings of private schools shown in Table 3.5, model C. If the child is African-American, then he or she is significantly less likely to attend a Catholic school as well as a Non-Catholic school. This finding holds if the child is Asian and Multiracial as well although it is only significant for the probability of Asian students attending non-Catholic schools.

A positive and significant result for attending both types of private school types is found for the child's fall general knowledge kindergarten test score. Increasing the number of siblings lowers the probability that the child attends either type of private school while only significant for Non-Catholic. All of the educational attainment variables for the child's mother and the child's father show positive, significant

relationships for increasing the child's probability of attending both types of private schools. *Religiosity, Head* and *Religiosity, Spouse* are positive and significant for attending Catholic as well as Non-Catholic schools. Consistent with the all-inclusive private school probit discussed above, an unexpected and significant positive result is that a child living in a single parent household is more likely to attend both types of private schools than a child living in a two parent household.

For marginal effects, the religiosity of the household head significantly increases the likelihood of a child attending a Catholic school and Non-Catholic school by seven percentage points and one percentage point, respectively. In terms of attending a Non-Catholic school, *Religiosity, Spouse* yields a similar positive impact for both school types of roughly three percent. A child is roughly two percent more likely to attend a Catholic school and twelve percentage points more likely to attend a Non-Catholic one if *Evangelical, County* increases by ten percentage points. When the percentage of protestant adherents in the county increases by ten percentage points, the probability of attending a Catholic school drops by eleven percentage points while the likelihood of attending a Non-Catholic school increases by nearly thirteen percentage points. When Catholic adherents in the county increase by ten percent, a child's likelihood of attending a Catholic school rises by twenty percentage points while the probability of enrolling in a non-Catholic school increases by twelve percentage points. For cross-denomination adherents, there is a positive impact on Catholic and non-Catholic school attendance when there are more Catholic or Evangelical adherents present. There is a negative cross-denomination effect for Protestant adherents and Catholic school enrollment while

a positive relationship is found for Protestant adherents and non-Catholic school enrollment.

In addition to *Protestant, County*, there are several variables have different opposing effects on a child's likelihood of attending one private school type over the other type. A child is significantly less likely to attend a Catholic school when he or she lives in the southern or western regions compared to New England. A child is more likely to attend a Non-Catholic school when he or she lives in the South, West, or Midwest rather than New England. The percentage of the population that is white has a negative impact on the child's likelihood of attending a Catholic school but a positive effect for the probability of the child attending a Non-Catholic school. The average percentage of Hispanic students in public schools in the child's home county yields a significant negative relationship for attending Catholic school and a positive, yet insignificant result for Non-Catholic.

Table 3.5, model D, reports the results of a model in which I decompose private schooling into three categories: Catholic, Other Religious, and Secular. For many years, Catholic schools were the most prevalent private schooling option and in some cases, Catholic schools were the only non-public school choice available. As discussed in *Section 3.2* of this essay, the landscape of private sector schools has changed dramatically. Today there are many private schools, with specific religious affiliation and religious instruction, in addition to Catholic schools. This boom in upstart non-Catholic, religious private schools occurred at the same time that the Catholic schools experienced a decline in enrollments and consolidations across Dioceses. There is no reason to presume that the significant factors in selecting a Catholic school are identical

to those that are salient when choosing another type of religious school. Of course, secular schooling has always been available, which is a particularly diverse portion of the private school sector, including military academies and college preparatory programs among others (Lankford and Wyckoff 1992). Once again, there is no reason to presume that the important reasons for selecting this type of private schooling are the same as factors influencing the choice to attend Catholic schools, Other Religious private schools, or public schools.

If the child is black, he or she is significantly less likely to attend a Catholic or other religious private schools. A negative, yet insignificant result is found between attending a Secular school and *Black*. Hispanic and Asian children are significantly less likely to attend other religious schools.

The child's fall and spring kindergarten reading test scores are positive and significant factors for attending a secular school. Spring kindergarten math test score is positive and significant in deciding to attend an other religious private school. A child's fall kindergarten general knowledge test score is the only test score that significantly impacts the decision to attend a Catholic school; it is positive and significant for attending Catholic as well as other religious schools.

The educational attainment of the child's mother and father are both positive and significant elements in determining if a child attends a Catholic or other religious school. A father with an advanced degree is not significant for attending Catholic. With the exception of a child's mother having her high school degree, there are not significant marginal effects related to parental educational attainment for attending Secular.

Table 3.5: Multinomial Probit Estimates for Public versus Multiple Private Schooling Options

	Model C		Model D			Model E			
	Catholic	**Non-Catholic**	**Catholic**	**Other Religious**	**Secular**	**Catholic**	**Evangelical**	**Protestant**	**Secular**
Variable	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)
Male	-0.016	-0.052	-0.016	-0.014	-0.168	-0.016	-0.020	-0.010	-0.167
	(-0.340)	(-1.000)	(-0.340)	(-0.260)	(-2.080)**	(-0.340)	(-0.320)	(-0.130)	(-2.080)**
	[-0.001]	[-0.005]	[-0.002]	[-0.001]	[-0.001]	[-0.002]	[-0.001]	[-0.00002]	[-0.001]
	(-0.200)	(-0.980)	(-0.280)	(-0.180)	(-1.640)	(-0.280)	(-0.240)	(-0.030)	(0.000)
Black	-0.730	-0.570	-0.735	-0.603	-0.325	-0.746	-0.253	-1.485	-0.346
	(-2.930)***	(-2.640)***	(-2.970)***	(-2.510)**	(-1.030)	(-3.000)***	(-1.020)	(-4.240)***	(-1.090)
	[-0.070]	[-0.034]	[-0.073]	[-0.027]	[-0.001]	[-0.077]	[-0.005]	[-0.004]	[-0.001]
	(-3.390)***	(-2.480)**	(-3.480)***	(-2.360)**	(-0.430)	(-3.690)***	(-0.470)	(-1.870)**	(-0.620)
Hispanic	0.096	-0.401	0.092	-0.464	-0.087	0.088	-0.522	-0.169	-0.078
	(0.730)	(-2.460)**	(0.700)	(-2.450)**	(-0.500)	(0.670)	(-2.410)**	(-0.720)	(-0.460)
	[0.020]	[-0.032]	[0.019]	[-0.028]	[-0.0003]	[0.017]	[-0.021]	[-0.001]	[-0.0003]
	(1.070)	(-3.020)***	(1.000)	(-2.980)***	(-0.380)	(0.910)	(-2.940)***	(-0.680)	(-0.360)
Asian	-0.160	-0.445	-0.168	-0.864	0.048	-0.171	-1.084	-0.452	0.050
	(-0.900)	(-1.870)*	(-0.950)	(-3.280)***	(0.170)	(-0.970)	(-3.200)***	(-1.510)	(0.180)
	[-0.014]	[-0.031]	[-0.014]	[-0.038]	[0.001]	[-0.016]	[-0.028]	[-0.002]	[0.001]
	(-0.670)	(-2.200)**	(-0.650)	(-4.360)***	(0.500)	(-0.730)	(-4.540)***	(-1.610)	(0.490)
Multiracial	-0.097	-0.097	-0.102	-0.125	0.021	-0.102	-0.101	-0.088	0.017
	(-0.540)	(-0.550)	(-0.570)	(-0.650)	(0.080)	(-0.570)	(-0.470)	(-0.380)	(0.060)
	[-0.011]	[-0.007]	[-0.012]	[-0.007]	[0.0004]	[-0.013]	[-0.004]	[-0.0004]	[0.0003]
	(-0.500)	(-0.490)	(-0.530)	(-0.610)	(0.220)	(-0.560)	(-0.410)	(-0.280)	(0.190)
Fall Reading, K	0.004	0.028	0.004	0.013	0.079	0.004	0.007	0.023	0.080
	(0.290)	(1.770)*	(0.300)	(0.710)	(5.160)***	(0.310)	(0.340)	(1.040)	(5.200)***
	[-0.000004]	[0.0026]	[0.0002]	[0.0008]	[0.0005]	[0.0003]	[0.0003]	[0.0002]	[0.0005]
	(0.000)	(1.730)*	(0.140)	(0.630)	(2.420)**	(0.190)	(0.250)	(0.870)	(2.450)**
Spring Reading, K	0.011	0.030	0.011	0.025	0.030	0.011	0.042	-0.013	0.028
	(0.720)	(1.680)*	(0.710)	(1.280)	(1.570)	(0.700)	(1.910)*	(-0.570)	(1.450)
	[0.001]	[0.003]	[0.001]	[0.002]	[0.0001]	[0.001]	[0.0020]	[-0.0001]	[0.0001]
	(0.470)	(1.570)	(0.530)	(1.170)	(1.220)	(0.490)	(1.770)*	(-0.870)	(1.100)
Fall Math, K	0.006	-0.030	0.006	-0.032	-0.024	0.007	-0.069	0.034	-0.019
	(0.380)	(-1.530)	(0.370)	(-1.480)	(-0.740)	(0.440)	(-2.950)***	(1.270)	(-0.580)
	[0.0013]	[-0.0029]	[0.001]	[-0.0024]	[-0.0001]	[0.002]	[-0.0036]	[0.0003]	[-0.0001]
	(0.680)	(-1.600)	(0.640)	(-1.510)	(-0.650)	(0.800)	(-2.490)**	(1.340)	(-0.450)

Table 3.5: Multinomial Probit Estimates for Public versus Multiple Private Schooling Options (Continued)

	Model C		Model D			Model E			
Variable	Catholic	Non-Catholic	Catholic	Other Religious	Secular	Catholic	Evangelical	Protestant	Secular
	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)
Spring Math, K	0.007	0.025	0.007	0.040	-0.020	0.007	0.054	0.017	-0.022
	(0.490)	(1.320)	(0.510)	(1.990)**	(-0.710)	(0.470)	(2.510)**	(0.610)	(-0.790)
	[0.0005]	[0.002]	[0.0004]	[0.0028]	[-0.0002]	[0.0004]	[0.0027]	[0.0001]	[-0.0002]
	(0.260)	(1.270)	(0.230)	(1.880)*	(-0.880)	(0.190)	(2.140)**	(0.360)	(-0.960)
Fall General, K	0.056	0.051	0.057	0.059	-0.004	0.056	0.068	0.017	-0.005
	(3.480)***	(2.660)***	(3.500)***	(2.850)***	(-0.120)	(3.480)***	(2.840)***	(0.730)	(-0.170)
	[0.0067]	[0.0037]	[0.0069]	[0.0035]	[-0.0001]	[0.0070]	[0.0029]	[-0.000008]	[-0.0001]
	(3.030)***	(2.060)**	(3.090)***	(2.240)**	(-0.760)	(3.110)***	(2.370)**	(-0.050)	(-0.790)
Spring General, K	-0.016	-0.019	-0.017	-0.038	0.060	-0.017	-0.042	-0.012	0.061
	(-0.860)	(-0.930)	(-0.890)	(-1.810)*	(1.450)	(-0.880)	(-1.660)*	(-0.440)	(1.480)
	[-0.002]	[-0.001]	[-0.002]	[-0.0026]	[0.0004]	[-0.002]	[-0.0020]	[-0.00004]	[0.0004]
	(-0.750)	(-0.790)	(-0.720)	(-1.680)*	(1.480)	(-0.760)	(-1.580)	(-0.210)	(1.500)
Siblings	-0.039	-0.112	-0.038	-0.073	-0.310	-0.037	-0.138	0.063	-0.304
	(-1.310)	(-2.340)**	(-1.280)	(-1.490)*	(-3.920)***	(-1.250)	(-2.740)***	(0.940)	(-3.850)***
	[-0.0031]	[-0.0097]	[-0.0037]	[-0.0046]	[-0.0018]	[-0.0033]	[-0.0065]	[0.0006]	[-0.0018]
	(-0.790)	(-2.190)**	(-0.920)	(-1.280)	(-2.850)***	(-0.820)	(-2.430)**	(1.230)	(-2.810)***
Mother, High School	0.548	0.450	0.547	0.692	-0.133	0.548	0.691	0.707	-0.132
	(4.040)***	(2.450)**	(4.040)***	(3.250)***	(-0.550)	(4.060)***	(3.120)***	(1.940)*	(-0.550)
	[0.0722]	[0.0335]	[0.0695]	[0.0500]	[-0.0018]	[0.0729]	[0.0348]	[0.0050]	[-0.0018]
	(3.250)***	(1.630)	(3.100)***	(2.220)**	(-1.730)*	(3.230)***	(1.990)**	(1.090)	(-1.710)
Mother, Some College	0.786	0.701	0.785	0.952	0.120	0.788	0.886	1.146	0.129
	(5.690)***	(4.070)***	(5.700)***	(4.770)***	(0.510)	(5.740)***	(4.610)***	(2.730)***	(0.560)
	[0.1016]	[0.0541]	[0.0998]	[0.0674]	[-0.0010]	[0.1053]	[0.0417]	[0.0095]	[-0.0010]
	(4.280)***	(2.690)***	(4.170)***	(3.110)***	(-0.930)	(4.360)***	(2.720)***	(1.390)	(-0.830)
Mother, BA	0.971	0.797	0.971	1.068	0.206	0.974	0.935	1.418	0.222
	(6.330)***	(4.330)***	(6.320)***	(5.060)***	(0.840)	(6.360)***	(4.610)***	(3.370)***	(0.900)
	[0.1405]	[0.0627]	[0.1368]	[0.0824]	[-0.0010]	[0.1448]	[0.0447]	[0.0173]	[-0.0009]
	(4.450)***	(2.530)**	(4.290)***	(2.900)***	(-0.900)	(4.500)***	(2.330)**	(1.520)	(-0.760)
Mother, Advanced	0.719	0.894	0.716	1.078	0.436	0.716	0.714	1.607	0.456
	(3.900)***	(4.210)***	(3.890)***	(4.290)***	(1.620)	(3.910)***	(2.650)***	(3.490)***	(1.700)*
	[0.0924]	[0.0945]	[0.0897]	[0.1059]	[0.0006]	[0.1005]	[0.0329]	[0.0378]	[0.0009]
	(2.520)**	(2.600)***	(2.410)**	(2.500)**	(0.290)	(2.630)***	(1.330)	(1.480)	(0.410)

Table 3.5: Multinomial Probit Estimates for Public versus Multiple Private Schooling Options (Continued)

	Model C		Model D			Model E			
	Catholic	**Non-Catholic**	**Catholic**	**Other Religious**	**Secular**	**Catholic**	**Evangelical**	**Protestant**	**Secular**
Variable	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)
Father,	0.395	0.458	0.400	0.487	0.033	0.399	0.562	0.401	0.035
High School	(2.710)***	(3.020)***	(2.740)***	(2.980)***	(0.130)	(2.750)***	(3.380)***	(1.560)	(0.140)
	[0.0478]	[0.0391]	[0.0506]	[0.0337]	[-0.0007]	[0.0518]	[0.0289]	[0.0022]	[-0.0007]
	(2.090)**	(2.200)**	(2.170)**	(2.100)**	(-0.550)	(2.200)**	(2.150)**	(0.900)	(-0.550)
Father,	0.426	0.397	0.428	0.365	0.342	0.427	0.450	0.298	0.347
Some College	(2.800)***	(2.610)***	(2.820)***	(2.250)**	(1.180)	(2.820)***	(2.670)***	(1.130)	(1.200)
	[0.0544]	[0.0312]	[0.0576]	[0.0215]	[0.0013]	[0.0581]	[0.0204]	[0.0012]	[0.0014]
	(2.240)**	(1.850)**	(2.320)***	(1.510)	(0.580)	(2.330)**	(1.720)*	(0.560)	(0.580)
Father,	0.409	0.561	0.413	0.548	0.387	0.410	0.600	0.640	0.392
BA	(2.540)**	(3.250)***	(2.570)**	(2.860)***	(1.380)	(2.560)**	(3.060)***	(2.180)**	(1.390)
	[0.0475]	[0.0522]	[0.0513]	[0.0401]	[0.0015]	[0.0521]	[0.0319]	[0.0050]	[0.0016]
	(1.850)*	(2.360)**	(1.950)*	(2.000)**	(0.640)	(1.960)**	(1.930)*	(1.160)	(0.640)
Father,	0.335	0.639	0.334	0.518	0.716	0.331	0.420	0.699	0.726
Advanced	(1.910)*	(3.210)***	(1.910)*	(2.400)**	(2.420)**	(1.900)*	(1.710)*	(2.570)**	(2.460)**
	[0.0332]	[0.0679]	[0.0386]	[0.0396]	[0.0059]	[0.0415]	[0.0198]	[0.0070]	[0.0064]
	(1.220)	(2.330)**	(1.380)	(1.680)*	(1.150)	(1.450)	(1.090)	(1.270)	(1.190)
Religiosity,	0.527	0.256	0.526	0.353	-0.029	0.521	0.489	0.039	-0.037
Head	(6.750)***	(2.680)**	(6.740)***	(3.550)***	(-0.190)	(6.660)***	(5.300)***	(0.230)	(-0.240)
	[0.0694]	[0.0137]	[0.0695]	[0.0182]	[-0.0011]	[0.0694]	[0.0203]	[-0.0009]	[-0.0012]
	(5.420)***	(1.500)	(5.400)***	(2.230)**	(-1.150)	(5.350)***	(3.190)***	(-0.770)	(-1.210)
Religiosity,	0.275	0.407	0.274	0.474	-0.015	0.277	0.421	0.631	-0.004
Spouse	(3.270)***	(3.830)***	(3.260)***	(4.280)***	(-0.080)	(3.290)***	(4.560)***	(2.830)***	(-0.020)
	[0.0304]	[0.0356]	[0.0311]	[0.0346]	[-0.0008]	[0.0338]	[0.0203]	[0.0052]	[-0.0007]
	(2.420)**	(2.880)***	(2.450)**	(3.130)***	(-0.870)	(2.620)***	(2.990)***	(1.280)	(-0.770)
Single Parent	0.385	0.667	0.388	0.650	0.506	0.388	0.663	0.785	0.518
	(2.540)**	(4.370)***	(2.560)**	(3.730)***	(2.220)**	(2.560)**	(3.870)***	(2.490)**	(2.270)**
	[0.0402]	[0.0663]	[0.0442]	[0.0510]	[0.0025]	[0.0462]	[0.0366]	[0.0071]	[0.0027]
	(1.710)*	(3.150)***	(1.840)*	(2.600)***	(1.050)	(1.900)*	(2.370)**	(1.340)	(1.080)
Midwest	0.070	0.580	0.070	0.550	-0.275	0.072	0.484	0.613	-0.234
	(0.230)	(1.520)	(0.230)	(1.340)	(-0.500)	(0.230)	(1.050)	(1.130)	(-0.430)
	[-0.0027]	[0.0605]	[0.0005]	[0.0458]	[-0.0019]	[0.0031]	[0.0274]	[0.0054]	[-0.0017]
	(-0.070)	(1.360)	(0.010)	(1.190)	(-0.830)	(0.070)	(0.890)	(0.830)	(-0.700)

Table 3.5: Multinomial Probit Estimates for Public versus Multiple Private Schooling Options (Continued)

	Model C		Model D			Model E			
	Catholic	Non-Catholic	Catholic	Other Religious	Secular	Catholic	Evangelical	Protestant	Secular
Variable	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)
South	-0.573	0.213	-0.574	0.053	0.128	-0.568	-0.139	0.784	0.204
	(-1.410)	(0.450)	(-1.410)	(0.100)	(0.240)	(-1.390)	(-0.240)	(1.110)	(0.380)
	[-0.0737]	[0.0312]	[-0.0724]	[0.0120]	[0.0015]	[-0.0724]	[-0.0024]	[0.0105]	[0.0022]
	(-1.740)*	(0.660)	(-1.650)*	(0.310)	(0.400)	(-1.620)	(-0.090)	(1.020)	(0.500)
West	-0.367	0.478	-0.367	0.431	0.143	-0.360	-0.038	1.432	0.233
	(-0.820)	(0.890)	(-0.820)	(0.740)	(0.240)	(-0.800)	(-0.060)	(1.800)*	(0.400)
	[-0.0535]	[0.0599]	[-0.0522]	[0.0435]	[0.0010]	[-0.0508]	[-0.0012]	[0.0330]	[0.0018]
	(-1.200)	(0.910)	(-1.130)	(0.760)	(0.240)	(-1.070)	(-0.040)	(1.080)	(0.360)
Urban	0.569	0.226	0.566	0.182	1.420	0.560	-0.008	1.397	1.433
	(1.900)*	(0.720)	(1.900)*	(0.540)	(2.520)**	(1.890)*	(-0.020)	(2.110)**	(2.560)**
	[0.0638]	[0.0109]	[0.0646]	[0.0048]	[0.0048]	[0.0658]	[-0.0072]	[0.0058]	[0.0050]
	(2.150)**	(0.430)	(2.140)**	(0.220)	(3.130)***	(2.150)**	(-0.380)	(1.950)*	(3.150)***
Income, 15-20	-0.366	-0.316	-0.370	-0.286	-0.417	-0.367	-0.339	-0.158	-0.415
	(-2.060)**	(-1.330)	(-2.080)**	(-1.170)	(-0.950)	(-2.070)**	(-1.220)	(-0.470)	(-0.940)
	[-0.0382]	[-0.0202]	[-0.0400]	[-0.0138]	[-0.0014]	[-0.0406]	[-0.0113]	[-0.0003]	[-0.0014]
	(-2.170)**	(-1.230)	(-2.260)**	(-1.000)	(-0.900)	(-2.260)**	(-1.120)	(-0.160)	(-0.890)
Income, 20-25	-0.377	0.042	-0.380	0.163	-0.650	-0.380	0.166	0.084	-0.637
	(-2.120)**	(0.200)	(-2.140)**	(0.790)	(-1.250)	(-2.140)**	(0.800)	(0.210)	(-1.240)
	[-0.0439]	[0.0104]	[-0.0461]	[0.0194]	[-0.0021]	[-0.0464]	[0.0141]	[0.0012]	[-0.0021]
	(-2.570)**	(0.510)	(-2.670)***	(1.010)	(-1.890)*	(-2.630)***	(1.010)	(0.310)	(-1.840)*
Income, 25-30	-0.032	0.144	-0.034	0.109	0.230	-0.032	0.032	0.256	0.237
	(-0.230)	(0.820)	(-0.240)	(0.580)	(0.840)	(-0.230)	(0.160)	(0.830)	(0.870)
	[-0.0070]	[0.0149]	[-0.0066]	[0.0088]	[0.0017]	[-0.0057]	[0.0016]	[0.0024]	[0.0018]
	(-0.390)	(0.810)	(-0.360)	(0.570)	(0.650)	(-0.310)	(0.150)	(0.630)	(0.690)
Income, 30-35	-0.023	0.133	-0.021	0.147	-0.079	-0.022	0.127	0.048	-0.074
	(-0.150)	(0.840)	(-0.140)	(0.910)	(-0.230)	(-0.140)	(0.730)	(0.190)	(-0.220)
	[-0.0056]	[0.0137]	[-0.0051]	[0.0121]	[-0.0005]	[-0.0045]	[0.0073]	[0.0003]	[-0.0005]
	(-0.290)	(0.830)	(-0.260)	(0.890)	(-0.300)	(-0.220)	(0.730)	(0.160)	(-0.260)
Income, 35-40	0.087	0.320	0.087	0.330	0.151	0.089	0.192	0.776	0.170
	(0.610)	(2.240)	(0.610)	(2.260)**	(0.520)	(0.630)	(1.200)	(3.840)***	(0.590)
	[0.0050]	[0.0325]	[0.0060]	[0.0270]	[0.0006]	[0.0077]	[0.0086]	[0.0111]	[0.0007]
	(0.260)	(1.840)*	(0.300)	(1.770)*	(0.270)	(0.380)	(0.870)	(1.400)	(0.330)

Table 3.5: Multinomial Probit Estimates for Public versus Multiple Private Schooling Options (Continued)

	Model C		Model D			Model E			
	Catholic	**Non-Catholic**	**Catholic**	**Other Religious**	**Secular**	**Catholic**	**Evangelical**	**Protestant**	**Secular**
Variable	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)
Income, 40-50	0.367	0.512	0.368	0.536	0.208	0.371	0.509	0.645	0.217
	(2.920)***	(3.940)***	(2.940)***	(4.200)***	(0.660)	(2.960)***	(3.590)***	(4.030)***	(0.690)
	[0.0426]	[0.0489]	[0.0451]	[0.0417]	[0.0003]	[0.0481]	[0.0267]	[0.0059]	[0.0004]
	(2.060)*	(2.680)***	(2.140)**	(2.720)	(0.140)	(2.240)***	(2.240)	(1.270)	(0.190)
Income, 50-75	0.514	0.382	0.512	0.381	0.264	0.513	0.422	0.367	0.264
	(4.570)***	(3.060)***	(4.550)***	(3.000)***	(1.090)	(4.570)***	(2.890)***	(2.090)	(1.090)
	[0.0700]	[0.0273]	[0.0722]	[0.0213]	[0.0006]	[0.0738]	[0.0173]	[0.0017]	[0.0006]
	(3.490)***	(1.940)*	(3.550)***	(1.840)	(0.370)	(3.590)***	(1.720)*	(0.880)	(0.370)
Income, 75-100	0.541	0.351	0.537	0.274	0.582	0.538	0.268	0.387	0.580
	(4.300)***	(2.600)***	(4.270)***	(2.110)**	(2.050)**	(4.280)***	(1.780)*	(2.420)**	(2.060)**
	[0.0778]	[0.0233]	[0.0806]	[0.0110]	[0.0037]	[0.0823]	[0.0069]	[0.0020]	[0.0037]
	(3.300)***	(1.550)	(3.360)***	(1.040)	(1.040)	(3.400)***	(0.800)	(1.030)	(1.040)
Income, 100-200	0.556	0.429	0.551	0.314	0.577	0.550	0.283	0.382	0.574
	(4.080)***	(3.170)***	(4.060)***	(2.430)**	(2.190)**	(4.060)***	(1.810)*	(2.540)**	(2.190)**
	[0.0789]	[0.0321]	[0.0831]	[0.0142]	[0.0036]	[0.0853]	[0.0076]	[0.0019]	[0.0037]
	(3.070)***	(1.990)**	(3.170)***	(1.290)	(1.120)	(3.210)***	(0.810)	(1.050)	(1.120)
Income, 200+	0.702	0.839	0.697	0.662	1.161	0.700	0.393	0.806	1.168
	(3.490)***	(4.330)***	(3.470)***	(3.190)***	(3.470)***	(3.470)***	(2.020)**	(3.470)***	(3.520)***
	[0.0926]	[0.0879]	[0.1013]	[0.0452]	[0.0146]	[0.1110]	[0.0100]	[0.0075]	[0.0162]
	(2.320)**	(2.710)***	(2.440)**	(1.830)	(1.390)**	(2.580)***	(0.840)	(1.350)	(1.440)
House Value, County [a]	0.0000049	0.0000012	0.0000049	-0.0000007	0.0000006	0.0000049	-0.0000026	-0.0000007	0.0000005
	(1.660)*	(0.470)	(1.670)*	(-0.230)	(0.220)	(1.670)*	(-0.670)	(-0.190)	(0.200)
	[0.00000064]	[0.00000002]	[0.00000069]	[-0.00000013]	[-0.000000002]	[0.00000071]	[-0.00000019]	[-0.00000001]	[-0.000000002]
	(1.690)*	(0.080)	(1.780)*	(-0.580)	(-0.170)	(1.810)*	(-0.970)*	(-0.440)	(-0.130)
Income, County [a]	-0.000049	-0.000001	-0.000049	0.000007	0.000002	-0.000050	0.000012	0.000004	0.000001
	(-2.540)**	(-0.070)	(-2.550)**	(0.410)	(0.090)	(-2.560)**	(0.640)	(0.160)	(0.070)
	[-0.0000066]	[0.0000008]	[-0.0000069]	[0.0000013]	[0.00000007]	[-0.0000070]	[0.0000012]	[0.00000010]	[0.00000007]
	(-2.660)***	(0.580)	(-2.700)***	(1.040)	(0.610)	(-2.700)***	(1.230)	(0.560)	(0.590)
White, County [a]	-0.475	1.768	-0.467	2.263	-0.388	-0.463	1.159	2.660	-0.361
	(-0.520)	(1.060)	(-0.510)	(0.970)	(-0.340)	(-0.510)	(0.560)	(0.800)	(-0.320)
	[-0.0971]	[0.1728]	[-0.0975]	[0.1732]	[-0.0034]	[-0.0805]	[0.0628]	[0.0195]	[-0.0026]
	(-0.800)	(1.150)	(-0.780)	(1.060)	(-0.530)	(-0.640)	(0.610)	(0.790)	(-0.390)

Table 3.5: Multinomial Probit Estimates for Public versus Multiple Private Schooling Options (Continued)

	Model C		Model D			Model E			
	Catholic	**Non-Catholic**	**Catholic**	**Other Religious**	**Secular**	**Catholic**	**Evangelical**	**Protestant**	**Secular**
Variable	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)
Catholic, County [b]	1.689	1.675	1.708	2.152	-1.967	1.713	1.513	3.623	-1.822
	(1.820)*	(1.430)	(1.840)*	(1.700)*	(-1.340)	(1.840)*	(1.140)	(1.890)*	(-1.250)
	[0.1970]	[0.1240]	[0.2044]	[0.1336]	[-0.0156]	[0.2182]	[0.0577]	[0.0230]	[-0.0149]
	(1.630)	(1.180)	(1.650)*	(1.500)	(-1.960)**	(1.730)*	(0.880)	(1.640)	(-1.830)*
Evangelical,	0.308	1.318	0.329	2.130	-4.053	0.295	2.206	-0.772	-4.227
County [b]	(0.250)	(0.970)	(0.270)	(1.470)	(-1.980)**	(0.240)	(1.410)	(-0.300)	(-2.070)**
	[0.0171]	[0.1166]	[0.0183]	[0.1542]	[-0.0263]	[0.0241]	[0.1129]	[-0.0071]	[-0.0277]
	(0.110)	(0.970)	(0.110)	(1.530)	(-2.210)**	(0.140)	(1.480)	(-0.410)	(-2.240)**
Protestant,	-0.673	1.244	-0.670	1.759	-1.689	-0.720	0.905	3.298	-1.538
County [b]	(-0.580)	(1.150)	(-0.580)	(1.470)	(-1.310)	(-0.620)	(0.840)	(2.060)**	(-1.230)
	[-0.1141]	[0.1279]	[-0.1162]	[0.1403]	[-0.0106]	[-0.1130]	[0.0528]	[0.0249]	[-0.0094]
	(-0.750)	(1.330)	(-0.750)	(1.620)	(-1.400)	(-0.710)	(0.980)	(1.700)*	(-1.290)
Student-Teacher,	0.048	0.007	0.049	0.012	-0.017	0.048	0.050	-0.036	-0.020
Public [a]	(1.720)*	(0.310)	(1.730)*	(0.490)	(-0.540)	(1.720)*	(1.920)*	(-1.140)	(-0.620)
	[0.0064]	[-0.0002]	[0.0065]	[0.0002]	[-0.0002]	[0.0062]	[0.0021]	[-0.0004]	[-0.0002]
	(1.770)*	(-0.120)	(1.770)*	(0.100)	(-0.920)	(1.660)*	(1.640)	(-1.330)	(-1.080)
Black, Public [a]	-0.00016	0.015	-0.00006	0.022	-0.006	0.00025	0.005	0.044	-0.005
	(-0.020)	(1.060)	(-0.010)	(1.210)	(-0.450)	(0.030)	(0.300)	(1.650)*	(-0.390)
	[-0.0003]	[0.0014]	[-0.0003]	[0.0016]	[-0.0001]	[-0.0001]	[0.0002]	[0.0003]	[-0.00004]
	(-0.250)	(1.090)	(-0.270)	(1.260)	(-0.710)	(-0.070)	(0.280)	(1.380)	(-0.520)
Hispanic, Public [a]	-0.016	0.019	-0.016	0.025	0.003	-0.016	0.020	0.025	0.002
	(-1.470)	(1.110)	(-1.470)	(1.100)	(0.180)	(-1.470)	(0.930)	(0.810)	(0.140)
	[-0.0026]	[0.0021]	[-0.0026]	[0.0021]	[0.00002]	[-0.0025]	[0.0012]	[0.0002]	[0.00002]
	(-1.730)*	(1.330)	(-1.730)*	(1.300)	(0.210)	(-1.650)*	(1.100)	(0.800)	(0.220)

Table 3.5: Multinomial Probit Estimates for Public versus Multiple Private Schooling Options (Continued)

	Model C		Model D			Model E			
	Catholic	**Non-Catholic**	**Catholic**	**Other Religious**	**Secular**	**Catholic**	**Evangelical**	**Protestant**	**Secular**
Variable	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)	Coefficient (z-score) [Marginal Effect] (z-score)
Free Lunch [a]	0.0007	0.014	0.0007	0.013	0.022	0.0006	0.009	0.008	0.022
	(0.090)	(1.600)	(0.090)	(1.390)	(1.640)	(0.070)	(1.060)	(0.580)	(1.650)*
	[-0.0002]	[0.0013]	[-0.0001]	[0.0009]	[0.0001]	[-0.0001]	[0.0005]	[0.00005]	[0.0001]
	(-0.150)	(1.690)*	(-0.110)	(1.430)	(1.440)	(-0.060)	(1.050)	(0.480)	(1.490)
Constant	-2.776	-7.529	-2.784	-8.793	-4.435	-2.770	-7.840	-11.410	-4.521
	(-2.430)**	(-3.880)***	(-2.430)**	(-3.330)***	(-2.990)***	(-2.420)**	(-3.320)***	(-2.790)***	(-3.040)***
Observations	8,460		8,460			8,460			
Log Likelihood	-4,928.33		-5,124.41			-5,271.18			
Wald chi2 (df)	932.85 (94)		1,541.69 (141)			2,657.74 (188)			

Source: Unless otherwise indicated, data are from the restricted use ECLS-K, 1999-2000.

(df) denotes degrees of freedom

*p<0.10 ; **p<0.05 ; ***p<0.01

Sample sizes are rounded to comply with NCES restricted use data reporting standards.

[a] denotes Census 2000 data

[b] denotes Glenmary Research Center's 2000 Religious Congregations & Membership Data

Religiosity, Head and *Religiosity, Spouse* are positive and significant for attending a Catholic or other religious school while an insignificant negative effect is found for secular schools. Consistent with my early results, a child living in a single parent household is more likely to attend Other Religious or Catholic.

Living in the Midwest increases the likelihood of the child attending an other religious private school by approximately five percent while living in the South region decreases the probability of attending a Catholic school by seven percent when compared to living in New England. *Urban* increases the likelihood of the child attending a Catholic school by over six percent.

When household income is between twenty thousand and twenty-five thousand dollars, a child is significantly less likely to attend a Catholic or Secular school. When household income falls within thirty-five to forty thousand dollars, a child is significantly more likely to attend an other religious school. This positive relationship between household income and other religious school attendance continues for all higher income levels. A positive and significant relationship for household income and Catholic school attendance is found once income is greater than forty thousand dollars. When income is higher than seventy-five thousand dollars, then a positive and significant relationship for Secular attendance is present.

The median house value is positive and significant while the median household income is negative and significant for attending Catholic school. When the average student-teacher ratio in public schools rises, the child is significantly more likely to attend a Catholic school. When the percentage of blacks in public schools rises, a child is more likely to attend an other religious school.

When *Catholic, County* increases by ten percent, the child's likelihood of attending a Catholic school increases to roughly twenty percentage points. The probability of attending a Catholic school drops by twelve percentage points when *Protestant, County* increases by ten percent. Once again a negative cross-denomination effect for Catholic school attendance and Protestant adherents in a county is demonstrated. A ten percent increase in Catholic, Evangelical, or Protestant adherents increases the probability of *Other Religious* by thirteen percentage points, fifteen percentage points, and fourteen percentage points, respectively. The Catholic and Evangelical adherent populations have a significant negative effect on Secular enrollment. Specifically, the likelihood of attending a Secular school falls by two percentage points when Catholic adherents increases by ten percent and by three percentage points when Evangelical adherents increase by ten percent.

Using so many types of private schools allows for the possibility that private schools are not homogeneous as many studies have treated them, but rather they are heterogeneous. While it is impossible to look at every type of private school on an individual basis, this study moves one step closer to distinguishing important factors in determining which school type to attend: public, Catholic, Evangelical, Protestant, or Secular.

The results of estimating a multinomial probit model with a further dichotomy of private schools are reported in Table 3.5, model E. *Black*, *Hispanic*, *Asian*, and *Multiracial* are negatively related to attending Evangelical schools while these findings are significant if a child is Asian or Hispanic. *Fall Reading* is positive and significant for attending Secular while *Fall General Knowledge* is positive and significant for attending

Catholic and Evangelical. Spring and fall kindergarten math scores are significant only for attending an Evangelical school. A child's kindergarten math score in the fall shows a significant negative likelihood of attending an Evangelical school while a child's spring kindergarten math score indicates a significant positive probability of attending an Evangelical school. If the child has siblings, then he or she is significantly less likely to attend Evangelical and Secular schools. Many of the results for parental educational attainment and household religiosity are positive and significant for attending Catholic or Evangelical.

Compared to an income level below fifteen thousand dollars, when a household's income is between fifteen thousand and twenty-five thousand dollars a child is significantly less likely to attend Catholic. When a household income falls in the highest category, a child is approximately one percent more likely to attend an Evangelical or Protestant school and a slightly over one percent likelihood of attending a Secular school. This is in contrast to an increase of eleven percent for Catholic.

Compared to living in New England, living in the western region increases the likelihood of attending a Protestant school by over three percentage points. Living in an urban or suburban area, relative to a rural area or small town, increases a child's probability of attending *Protestant* and *Secular* by less than one percent for each school type. When household income is above two hundred thousand, the likelihood of a child attending a Catholic school is eleven percentage points higher than a child whose household income is below fifteen thousand dollars. Even at the highest income category the likelihood of attending an Evangelical or Protestant school is less than one percentage

point higher than the reference individual. Secular attendance is roughly two percentage points higher.

When *Catholic, County* rises by ten percent, the child is twenty-two percentage points more likely to attend Catholic school, six percentage points more likely to attend an Evangelical school, and two percentage points more likely to attend a Protestant school. The likelihood of attending a Secular drops by nearly two percentage points when *Catholic, County* increases by ten percent. A ten percent increase in *Evangelical, County* leads to an increase of eleven percentage points that the child attends an Evangelical school while a ten percent increase in *Protestant, County* indicates an increase of nearly three percentage points in attending a Protestant school. This same increase in Protestant, County reduces the likelihood that the child attends a Catholic school by eleven percentage points.

3.5.3 Voucher Simulations

The results from the estimation of the model can be expressed as predicted probabilities for first graders to attend different school types as well as private, in general. However, these simulations should be viewed as short run, or marginal, in their outlook. They do not reflect a longer time horizon in which a new general equilibrium point can be determined.

The first grader can be assigned any number of different characteristics in the process of calculation these predicted probabilities.[20] It is useful to see how an increase in household income affects a child's enrollment in private or public school. While this increase could be the result of a number of factors, treating the increase in household income as a voucher is the most policy relevant. In this case, a dollar value is not

[20] The specific values used for each simulation are provided in Appendix C.

assigned to the voucher; rather, it is assumed that the voucher is large enough in value to move the household from one income category to the next highest category within the lower household income categories.[21] It is reported in Table 60 of the Digest of Education Statistics (2004) that the average private elementary school tuition in 1999-2000 equals $3,267 while Catholic elementary school tuition is below this at $2,451 and Secular is substantially higher at $7,884. Other religious school tuition, on average, is $3,503. Clearly, the income simulations equal to a one thousand dollar increase in income, as performed by Coleman, Hoffer, and Kilgore (1981a), do not reflect current private school tuition.

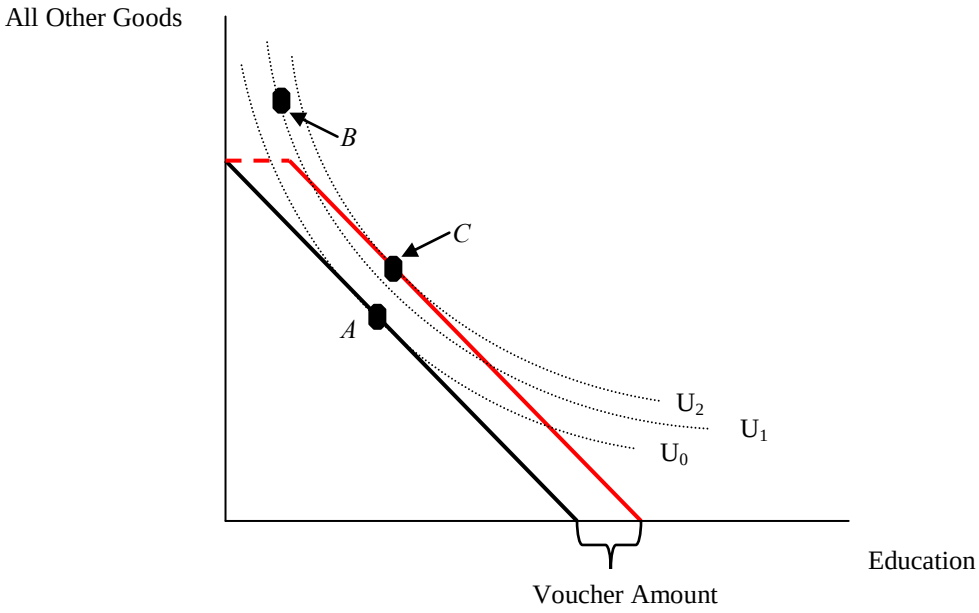
The possible impact of a voucher on a household's budget constraint is shown in Figure 3.3. The absence of the provision of public schooling would force households to purchase education as a private good, shown as point *A*. Upon establishing public schooling, households have the option of point *B*, which is a fixed amount of publicly provided schooling. Public schools must serve all households in an area where as private schools are able to specialize in a myriad of areas including college preparatory and religious education (Gemello and Osman 1984). As drawn, the public schooling option enables the household to reach a higher indifference curve. However, if selecting point *B* does not maximize the household's utility, then the household enrolls in private school and consumes according its budget constraint, point *A*.[22] A voucher represents a lump

[21] In the lower income level categories, this difference between groups is $5,000 while this difference increases as the higher income levels are reached. Rouse (1998) states that a Milwaukee voucher was valued at roughly $3200 in 1995. The New York city voucher program had vouchers worth up to $1400 each year for three years to children from low income families (Howell and Peterson 2004; Krueger and Zhu 2004a). Mayer, Peterson, Myers, Tuttle, and Howell (2002) note that the New York city voucher helps cover cost of attending private school, but the voucher amount does not result in free (e.g., zero cost) private school enrollment for participating families.

[22] The selection of point *A* or *B* depends solely on the shape of the household's indifference curves. Point *A* could be located anywhere along the household's budget constraint. The point in the figure represents only

sum transfer to the household and shifts the budget constraint to the right to express the increased consumption possibilities. As illustrated, the household is able to reach a higher level of utility by using the voucher to attend a private school of its choice, point *C*.

Figure 3.3: Impact of Voucher (Lump Sum Transfer) on Household's Budget Constraint



It is the intent of the simulations that follow to investigate where different students would choose to attend private school as the result of receiving a voucher. There is no reason to assume that the impact on private school enrollment would be uniform across all private school types. Thus, it is necessary to see the impact is for various groups. For the first simulation, I focus on a female student with three siblings living in a single parent household. Her mother has her high school degree while her father is a high school dropout. The household is not religious and lives in an urban area in the northeast. Many of the qualities that will remain constant through out these simulations relate to the

---

one of many maximization possibilities. As indicated, I assume that point *A* provides less utility and more education than public schooling point *B*.

child's home county and include the median house value and median household income in the county as well as the percentage of the county population that is white and religious adherents for Catholic, Evangelical, and Protestant. For this simulation, she lives in a poor county with below average religious adherents and bad public schools. The second simulation features a female student earning average test scores. She is the only child of two religious and college educated parents. She lives in an urban area in the northeast. With the exception of the quality of public schools, area characteristics are evaluated at their mean values for this second simulation. The first simulation uses bad quality public school characteristics while the second looks at public schools classified as horrible, which are outlined in detail in Appendix C. Results from both simulations are presented in Tables 3.6 and 3.7, respectively.

In the first simulation, regardless of race, a female student with average test scores is more likely to attend a private school as a result of receiving a voucher and moving from *Income, 20-25* to *Income, 25-30*. As indicated in Table 3.6, this increase in likelihood of attending a private school is not observed when a voucher results in moving from *Income, 25-30* to *Income, 30-35*. All predicted probabilities for this income level change remain the same. If a voucher increases income level from *Income, 30-35* to *Income, 35-40*, the probability increases once again. At an income level of thirty-five thousand to forty thousand dollars, a white girl has a sixteen percent likelihood of attending a private school while a Hispanic girl experiences a fifteen percent probability. An African-American girl has a seven percent likelihood of attending a private school.

However, only examining the likelihood of attending a private school is not sufficient. There are differences in the probability to attend each school type. For any

income category, African-American girls have the lowest probability of attending a Protestant school while Hispanic girls have the lowest probability of attending an Evangelical school. For the lowest income category, white and Hispanic girls display similar predicted probabilities for all private school types expect Evangelical. African-American and white girls exhibit nearly equal likelihoods of thirteen and sixteen percentage points in Evangelical enrollment, respectively. When household income is below fifteen thousand dollars, a white girl experiences a ten percent likelihood of attending a Catholic school while Hispanic and African-American girls have a twelve percent and five percent predicted probabilities, respectively. The likelihood of Secular or Protestant enrollment is less than two percent and one percent, respectively for both white and Hispanic girls. As income increases to the next category, where household income falls between fifteen and twenty thousand dollars, as a result of receiving a voucher, all of the predicted probabilities drop. The likelihood of a white girl attending a Catholic school is now seven percentage points while a Hispanic girl experiences a likelihood of eight percentage points.

It is clear from the first simulation that these girls are not the students attending Evangelical schools as a result of receiving vouchers. The highest predicted probability for attending an Evangelical school for all three races is less than three percent and occurs for white girls living in households with an income level of twenty to twenty-five thousand dollars as a result of the voucher. Protestant schools will likely encounter an increase in white and Hispanic female enrollments displaying characteristics similar to those used in this prediction. African-American girls display a large increase in the probability of attending Protestant, but this likelihood remains extremely low indicating

that African-American enrollment at Protestant schools will not change because of a voucher. Catholic and Secular will observe small increases for all three racial groups.

Table 3.6: Probability of Female with Average Test Score Attending Private School by Income, Race, and School Type with a $5,000 Voucher

Income Level, Race	Private, All Inclusive	Catholic	Evangelical	Protestant	Secular
Income $0-$15,000 (33%)					
White	0.136	0.104	0.016	0.007	0.014
Black	0.054	0.038	0.013	0.0002	0.009
Hispanic	0.120	0.120	0.005	0.005	0.012
Income $15,000 - $20,000 (100%)					
White	0.087	0.066	0.010	0.006	0.007
Black	0.031	0.022	0.008	0.0002	0.004
Hispanic	0.075	0.077	0.003	0.004	0.006
Income $20,000 - $25,000 (100%)					
White	0.106	0.062	0.026	0.009	0.004
Black	0.040	0.020	0.020	0.0003	0.002
Hispanic	0.093	0.074	0.009	0.007	0.003
Income $25,000 - $30,000 (100%)					
White	0.142	0.097	0.017	0.011	0.021
Black	0.057	0.035	0.014	0.0004	0.015
Hispanic	0.126	0.113	0.006	0.008	0.019
Income $30,000-$35,000 (100%)					
White	0.143	0.101	0.021	0.007	0.012
Black	0.058	0.036	0.017	0.0003	0.008
Hispanic	0.126	0.116	0.007	0.005	0.010
Income $35,000-$40,000 (100%)					
White	0.167	0.110	0.021	0.029	0.017
Black	0.070	0.042	0.018	0.002	0.012
Hispanic	0.149	0.128	0.007	0.022	0.015

Note: While all private school types are represented, they are not represented equally. Over one-half of the sample attends Catholic schools. Due to this large proportion of Catholic students in the sample, changes in the probability of attending a Catholic school have a greater impact on the probability of attending a private school overall than the remaining three private school types do. Thus, the sum of the probabilitiy of attending each school type separately will not equal the probability of attending a private school, all-inclusive. Assuming income is uniformly distributed through all eleven categories, the probability of moving up one level to a higher category is the dollar value of the voucher divided by the dollar range of the category. These probabilities of moving up one cateogory are in parentheses in the table above, next to each income level. Voucher amount is assumed to be five thousand dollars.

Figure 3.4, parts a through d, depict these probability changes for each racial group over all six income levels.[23] Figure 3.4a shows that white and Hispanic girls follow a similar probability pattern for attending Catholic as income increases. While the line for African-American girls has the same general trend as white and Hispanic girls, it is much flatter and lower reflecting a lower likelihood of attending Catholic. For Figure 3.4b, white girls have the highest probability of attending Evangelical at all income levels, followed by African-American girls. Figure 3.4c shows that white and Hispanic girls follow the same pattern. While white has the highest probability for attending Evangelical and Protestant schools, the trend lines are very different. Enrollment in Evangelical is much more responsive at lower income levels than Protestant. It is only at the *Income, 30-35* and above that the likelihood of attending Protestant dramatically rises. For probability of attending Secular shown in Figure 3.4d, all three racial groups display extremely similar, tightly grouped together, trends reflecting very similar probabilities of attending this school type.

[23] Due to the construction of these simulations, the peaks are the same for all simulations.

Figure 3.4a: Probability of Attending Catholic Female Student, Average Test Scores

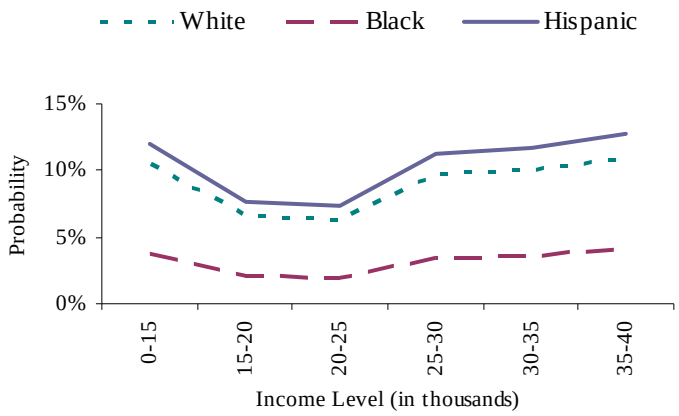


Figure 3.4b: Probability of Attending Evangelical Female Student, Average Test Scores

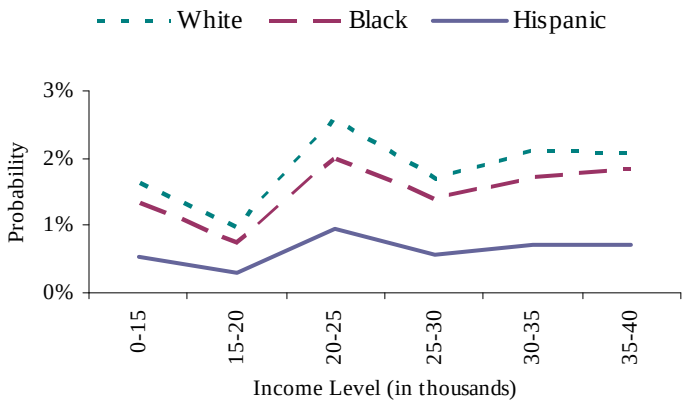


Figure 3.4c: Probability of Attending Protestant Female Student, Average Test Scores

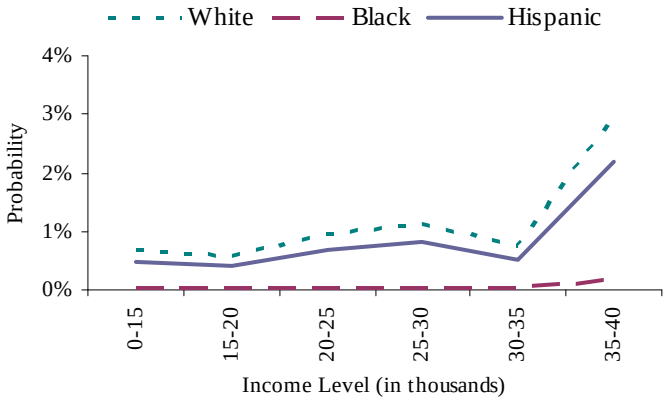
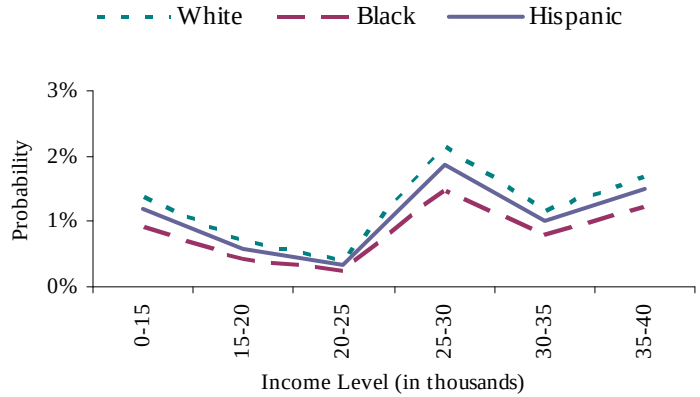


Figure 3.4d: Probability of Attending Nonsectarian Female Student, Average Test Scores



For the second simulation, the race of the girl and quality of the area public schools is varied. Isolating horrible public schools, when income increases from *Income, 30-35* to *Income, 35-40* because of a voucher, the probability of attending private school increases to nearly five percent for white and Hispanic girls. African-American girls experience a probability of three percentage points. As shown in Table 3.7 for *Income, 30-35* to *Income, 35-40*, the types of private schools selected are different when a more detailed breakdown of private schools is used. White girls see a one percent decrease in the probability of attending Catholic and a three percent drop in the probability of attending Evangelical. There is less than a one percent increase for Secular. There is an eleven percent increase in the likelihood of attending a Protestant school for white girls as a result of a voucher. For an African-American girl, the likelihood of attending a Catholic, Evangelical, or Secular school increases by one percent or less. The biggest increase is a two percent rise in the probability for Protestant. These likelihoods for Hispanic girls are similar to the ones reported for white girls. Hispanic girls observe a reduction in the probability of attending a Catholic school and Evangelical school by one and two percent respectively. Secular remains constant. The probability of attending Protestant increases by eleven percent.

Table 3.7: Probability of Female Attending Private School With Horrible Public Schools by Income, Race, and School Type

Income Level, Race	Private, All Inclusive	Catholic	Evangelical	Protestant	Secular
Income $0-$15,000 (33%)					
White	0.429	0.166	0.264	0.074	0.014
Black	0.246	0.078	0.266	0.006	0.013
Hispanic	0.399	0.222	0.148	0.067	0.015
Income $15,000 - $20,000 (100%)					
White	0.329	0.124	0.210	0.076	0.008
Black	0.171	0.054	0.203	0.007	0.007
Hispanic	0.302	0.165	0.112	0.068	0.009
Income $20,000 - $25,000 (100%)					
White	0.372	0.093	0.332	0.086	0.003
Black	0.202	0.040	0.324	0.008	0.003
Hispanic	0.344	0.136	0.201	0.084	0.004
Income $25,000 - $30,000 (100%)					
White	0.440	0.149	0.262	0.106	0.021
Black	0.255	0.072	0.272	0.011	0.020
Hispanic	0.410	0.203	0.147	0.098	0.023
Income $30,000-$35,000 (100%)					
White	0.441	0.153	0.299	0.075	0.011
Black	0.257	0.071	0.300	0.007	0.010
Hispanic	0.412	0.209	0.173	0.070	0.012
Income $35,000-$40,000 (100%)					
White	0.481	0.144	0.268	0.188	0.013
Black	0.290	0.077	0.303	0.028	0.014
Hispanic	0.451	0.199	0.153	0.178	0.015
Income $40,000-$50,000 (50%)					
White	0.554	0.183	0.346	0.128	0.011
Black	0.356	0.098	0.380	0.016	0.012
Hispanic	0.524	0.255	0.208	0.124	0.013

Table 3.7: Probability of Female Attending Private School With Horrible Public Schools by Income, Race, and School Type (continued)

Income Level, Race	Private, All Inclusive	Catholic	Evangelical	Protestant	Secular
Income $50,000-$75,000 (20%)					
White	0.567	0.234	0.322	0.086	0.014
Black	0.368	0.125	0.348	0.009	0.014
Hispanic	0.537	0.312	0.187	0.080	0.015
Income $75,000-$100,000 (20%)					
White	0.569	0.251	0.272	0.092	0.028
Black	0.369	0.137	0.299	0.010	0.028
Hispanic	0.539	0.326	0.151	0.084	0.030
Income $100,000-$200,000 (5%)					
White	0.580	0.253	0.275	0.091	0.027
Black	0.380	0.139	0.303	0.010	0.027
Hispanic	0.550	0.329	0.153	0.082	0.029
Income $200,000+ (0%)					
White	0.659	0.251	0.259	0.139	0.062
Black	0.462	0.147	0.304	0.019	0.066
Hispanic	0.631	0.328	0.143	0.128	0.066

Note: While all private school types are represented, they are not represented equally. Over one-half of the sample attends Catholic schools. Due to this large proportion of Catholic students in the sample, changes in the probability of attending a Catholic school have a greater impact on the probability of attending a private school overall than the remaining three private school types do. Thus, the sum of the probabilitiy of attending each school type separately will not equal the probability of attending a private school, all-inclusive. Assuming income is uniformly distributed through all eleven categories, the probability of moving up one level to a higher category is the dollar value of the voucher divided by the dollar range of the category. These probabilities of moving up one cateogory are in parentheses in the table above, next to each income level. Voucher amount is assumed to be five thousand dollars.

Figure 3.5, parts a through d, depict these probability changes for each racial group over all eleven income categories.[24] Figure 3.5a shows that Hispanic girls are the most likely to attend a Catholic school at all income levels. The trend line for white girls follows closely along the Hispanic line, just lower. African-American girls have a much lower probability of attending Catholic, yet the trend line does have a similar shape to those of Hispanic and white. Figure 3.5b shows that, upon reaching an income level of thirty-five thousand to forty thousand dollars, African-American girls have the highest likelihood of attending Evangelical. The Hispanic trend line is much lower. Figure 3.5c illustrates that white and Hispanic girls follow a nearly identical trend line while the line for African-American girls is flat at a very low likelihood. There is a tremendous spike in the probability of attending Protestant for white and Hispanic at a household income between thirty-five thousand and forty thousand dollars. Figure 3.5d indicates that all three racial groups have the same probability pattern for attending Secular.

The two simulations presented indicate that not all voucher recipients would attend the same type of school. In particular, the differences appear to follow racial lines. I observe in both simulations that white and Hispanic, in different household and area environments, exhibit very similar predicted enrollment probabilities among varying school types. The probability of attending a Protestant school increases the greatest magnitude in each simulation suggesting that white and Hispanic girls, displaying similar characteristics to featured households, will use a voucher to attend Protestant much more than the other three school types. African-American girls, in both simulations, are more likely to attend Catholic or Secular schools because of a voucher. Race does not appear to a distinguishing factor in Secular enrollment patterns resulting from an

[24] Due to the construction of these simulations, the peaks are the same for all simulations.

Figure 3.5a: Probability of Attending Catholic
Female Student, Horrible Public Schools

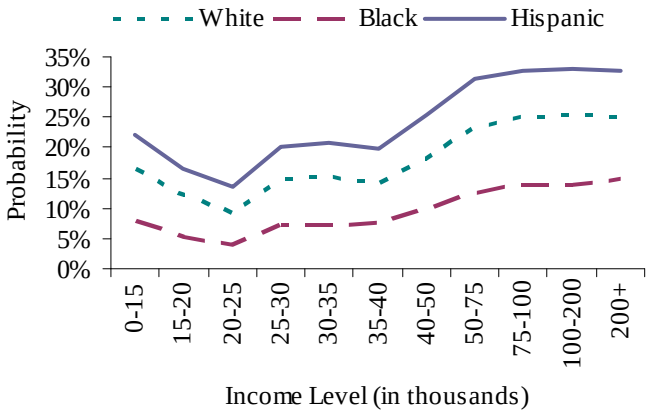


Figure 3.5b: Probability of Attending Evangelical
Female Student, Horrible Public Schools

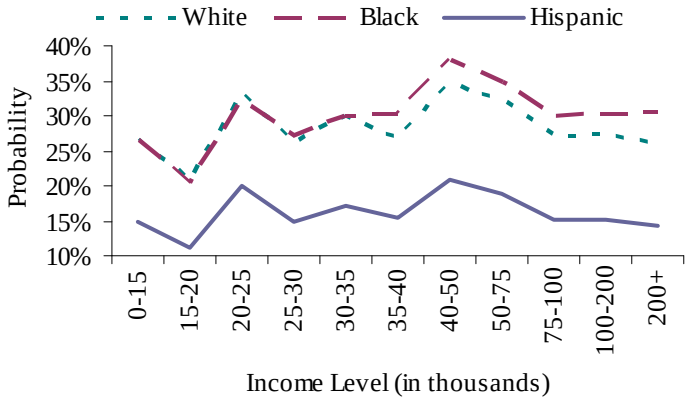


Figure 3.5c: Probability of Attending Protestant
Female Student, Horrible Public Schools

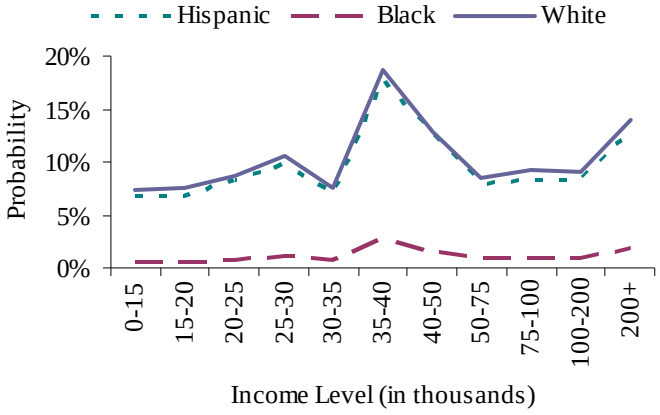
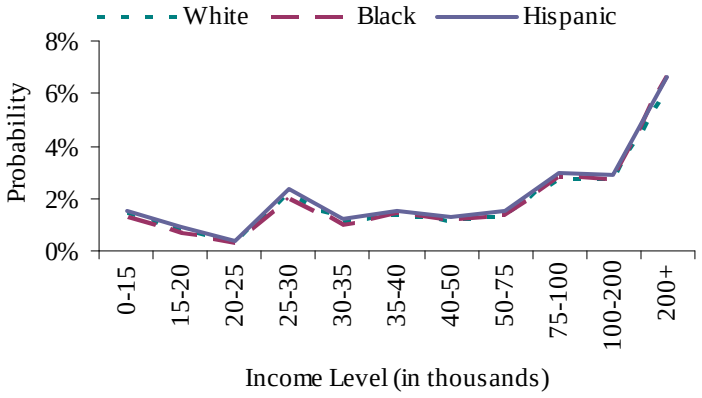


Figure 3.5d: Probability of Attending Nonsectarian
Female Student, Horrible Public Schools



increase in income since the trend lines for white, African-American, and Hispanic girls are superimposed. Clearly, an increase in private school attendance does not translate to a uniform enrollment increase at all types of private schools.

3.6 Conclusions

While numerous papers have focused on the choice of schooling types for the high school grades, there have been only a handful of studies concentrating on this public or private choice on the elementary school echelon. This paper seeks to contribute to this under researched area by focusing on the type of school a household selects to send their child to school for the first grade. Choices by consumers at this level are particularly important in that they may condition decisions and outcomes throughout a child's academic career. The implication of this is that most secondary school choice studies are incomplete; the elementary schooling decision of the parents should be included for all secondary school choice analyses performed.

This essay proceeds to break up the standard public or private taxonomy found in the literature and separate private schools into a more detailed typology. After all, Other Religious and Secular categories for private schools encompass quite a range of private schools. Using a 1999-2000 national dataset permits the separation of elementary schools at the national level into the following groupings: public, Catholic, Evangelical, Protestant, Secular schools. Supplemental data including per capita adherents for various religious memberships and county level demographics are incorporated to assist in controlling for many population shift factors present in this demand for elementary education analysis.

I find kindergarten test performance, household income, and parental education levels are important factors in selecting a school. Additionally, religiosity of households and denomination adherents are significant determinants. The two simulations presented indicate that not all voucher recipients would attend the same type of school. In particular, the differences appear to follow racial lines for religious schools. I observe in both simulations that white and Hispanic, in different households and area environments, exhibit very similar predicted enrollment probabilities among varying school types. Evidence suggests that African-American girls respond differently to school selection than whites and Hispanics. The predicted probabilities in the simulations demonstrate that households do not view all private schools as identical. In particular, the probability patterns over a change in income are very different for Evangelical and Protestant school types. Race does not appear to a distinguishing factor in Secular enrollment patterns resulting from an increase in income since the trend lines for white, African-American, and Hispanic girls are superimposed. Clearly, an increase in private school attendance does not translate to a uniform enrollment increase at all types of private schools.

Chapter Four:
Academic Achievement of Private School Students:
Do Private Schools Make Good Students or Do Good Students Make Private Schools?

4.1 Introduction

The choice-based market-driven approach employed by voucher programs forces underperforming schools to improve due to newfound competition from higher performing challengers (Hoxby 1994; Chubb and Moe 1990). In metropolitan areas, a resident's ability to relocate is cited as incentive for public schools to compete (Tiebout 1956). Some purport that these better performing schools are located in the private sector by reasoning that private schools are forced to be more efficient in their operations and instructional methods, which leads to better schools that yield higher levels of academic achievement for students (Bryk, Lee, and Holland 1993; Harris 2000; Hallinan 2000). Some studies have called for the incorporation of Catholic school curriculum into the public school system as part of the reform of education system in the United States (Bushweller 1997; Hudolin-Gabin 1994). However, the foundation of these policies is the underlying assumption that private schools, not their students, are generating the higher test scores.

While several works focus on various non-academic outcome measures associated with private school attendance such as sexual activity and drug use (Figlio and Ludwig 2000; Mocan, Scafidi, and Tekin 2002) or teen pregnancy (Evans, Oates, and Schwab 1992), most concentrate on academic-based results like graduation rates (Evans and Schwab 1995; Grogger and Neal 2000; Neal 1997; Coleman and Hoffer 1987), high school dropout rates (Sander and Krautmann 1995; Evans, Oates, and Schwab 1992), and college attendance rates (Grogger and Neal 2000; Neal 1997; Evans and Schwab 1995).

Within this academic achievement arena, mathematics test scores are most common (Sander 1996; Gamoran 1996; Willms 1985; Kim and Placier 2004; Goldhaber 1996; Grogger and Neal 2000; Peterson and Llaudet 2006; Lubienski and Lubienski 2006; Bryk, Lee, and Holland 1993). In addition to mathematics, studies have employed vocabulary, reading, social studies, civics, and science test results (Sander 1996; Gamoran 1996; Willms 1985; Noell 1982; Coleman, Hoffer, and Kilgore 1982; Kim and Placier 2004; Goldhaber 1996; Lee, Chow-Hoy, Burkam, Geverdt, and Smerdon 1998; Peterson and Llaudet 2006; Lubienski and Lubienski 2006).

Results are mixed as to whether private schools yield a positive impact on student outcomes. Specifically isolating test scores, many papers find positive gains for students attending private schools (Coleman, Hoffer, and Kilgore 1982; Coleman and Hoffer 1987; Chubb and Moe 1990; Gamoran 1996; Bryk, Lee, and Holland 1993; Greeley 2002; Grogger and Neal 2000; Peterson and Llaudet 2006; Keith and Page 1985) while critics argue that selection and omitted variable biases generate these observed positive effects for students rather than private school superiority (Noell 1982; Goldberger and Cain 1982; Murnane 1981; Murnane, Newstead, and Olsen 1985; Witte 1990; Witte 1992; Cookson 1994; Evans, Oates, and Schwab 1992).

The selection of a child's peer group is endogenous with other household decisions, including school enrollment, such that single equation estimation overstates the peer group's impact (Evans, Oates, and Schwab 1992). Simultaneous estimation of a child's peer group and an outcome measure eliminates the observed peer group effects present in single equation estimation (Evans, Oates, and Schwab 1992). Thus, in order not to overstate estimates when using a simple single equation, it is imperative to control

for unobservable characteristics (Evans, Oates, and Schwab 1992). Furthermore, without controlling for initial student ability, it is impossible to view a positive impact on test scores as evidence of the benefit of private school attendance (Peterson and Llaudet 2006).

This essay seeks to address criticisms of previous studies by using test scores from a student's entrance into kindergarten to control for his or her ability and a host of other unobservable characteristics. By controlling for previous test scores, it is possible to disentangle the selection effect. Table 4.1 provides test scores means by grade level and school type to address the causality of school type selection. Since a child's home environment strongly influences reading ability, research has focused attention to mathematics achievement in effort to capture more of a school's contribution to a child's education (Lubienski and Lubienski 2006; Figlio and Stone 1999; Bryk, Lee, and Holland 1993; Heyneman 2005). Following Gamoran (1996) and Kim and Placier (2004), I use multiple achievement tests in effort to ascertain a more comprehensive look at a child's academic achievement. For all three tests, scores are higher for private school students when they entered kindergarten in the fall. Additionally, first grade test scores for all three subjects are higher for private schools.

Table 4.1: Test Means by Grade Level

	Reading		Math		General Knowledge	
School Type, First	Kindergarten	First	Kindergarten	First	Kindergarten	First
Overall	6.52	17.39	5.33	12.55	5.40	9.18
Public	6.18	17.18	5.06	12.40	5.11	9.01
Catholic	7.36	17.97	6.14	12.97	6.34	9.72
Evangelical	7.40	18.33	5.90	13.02	6.30	9.82
Protestant	8.55	18.58	7.13	13.64	6.80	9.74
Secular	10.28	18.46	7.11	13.25	6.76	10.01

Note: The minimum score for each test is 0. The maximum score for Reading, Math, and General Knowledge tests are twenty, sixteen, and twelve respectively.

The public mean for each of the three fall kindergarten scores is over one point below any private school means. Private school students, Secular and Protestant in particular, enter kindergarten at higher proficiency levels indicating that there is selection into the private sector.[25, 26] Without these initial ability controls at the child's entrance to kindergarten, it is impossible to look at the impact of private school enrollment has on test scores. Studies that do not control for prior student ability cannot be regarded as justification in support of or opposition to the existence of a positive private school effect (Peterson and Llaudet 2006). I seek to examine whether these higher first grade test scores are the result of selection into the private sector, which is better students enrolling in private schools, or preeminence of the private sector, which is private schools are better than public ones.

I use data from the restricted use the Early Childhood Longitudinal Survey – Kindergarten cohort to gauge student performance in public and private schools. Many papers use one particular national survey data, High School and Beyond (HSB), in which the students surveyed are now over forty years old (Grogger and Neal 2000). Furthermore, changes within the private sector precipitate the need to examine the effects of attending religious private schools rather than Catholic private schools alone (Chubb and Moe 1990; Gaziel 1997).

These ECLS-K data are timely, reflecting recent compositional changes within the private school sector children, since the children attended kindergarten in Fall 1998 through Spring 1999 and first grade in Fall 1999 through Spring 2000. Catholic schools

[25] See Appendix D for overall distribution of test scores, by test subject and grade level.
[26] Although public schools may be considered secular as well, through out this essay, secular refers to private secular schools only.

no longer constitute the majority of religiously affiliated private schools (Sander 2005). At the same time, there has been an increase in private schools, especially conservative Christian private schools (Sander 2005). Examining enrollment numbers for the schooling year on which this essay focuses using the Private School Survey data, while sixty-four percent of total elementary private students attended Catholic schools in 1999 – 2000, only forty-eight percent of private first grade enrollment is Catholic. Hence, studies focusing on Catholic schools as a proxy for all private education or all private religious education are missing important variances within the private school sector, especially at the elementary schooling grades.

The data used in this essay present the opportunity to look at achievement differences very early in a child's academic career. A student's academic achievement in the first grade predicts academic achievement in his or her junior year of high school (Cunningham and Stanovich 1997). In addition, elementary school test performance is an indicator of labor market productivity (Bishop 1989; Loury and Garman 1995; Murnane, Willett, and Levy 1995).

Findings indicate that first grade private school enrollment transforms below average achievers in kindergarten into better students in the first grade, relative to their low achieving peers. Yet, private schools offer no significant benefit for first grade enrollment to high achieving kindergarten students. Above average kindergarten students see an increase in their first grade reading scores by attending an Evangelical or Secular school for first grade. High achieving kindergarten students, in many cases, experience a significant decrease in first grade achievement scores because of private school enrollment, especially Catholic school attendance.

In the next section of this essay, I provide variable definitions and means describing these data. The third section discusses the regression model I employ, presents results for all three first grade achievement tests, and connects the empirical work this chapter with Chapter Three's work. The final section offers several concluding remarks.

4.2 Data

The Kindergarten cohort of the Early Childhood Longitudinal Survey (ECLS-K) is a national data set, released by the National Center for Educational Statistics. Coupling the Private School Survey's (PSS) detailed religious affiliation data and Glenmary Research Center's categorizations of all religious affiliations, private schools in ECLS-K are grouped as follows: Catholic, Evangelical or Fundamentalist Protestant (Evangelical), Mainline Protestant or Other Faiths (Protestant), and Secular schools.[27, 28] I restrict my analysis to first grade students during the 1999-2000 academic year, which is the second wave of data collection.[29]

Table 4.2 shows the number of children in each school type in kindergarten and first grade. There are approximately eight thousand children in this estimation sample with over six thousand first grade students attending public schools.[30] There are thirty students who changed from a Catholic to a public school in between kindergarten and first grade. Ninety-five students switched from Secular to public in between kindergarten

[27] Glenmary Research Center's grouping of affiliations is consistent with the American Religion Data Archive's taxonomy. Refer to Appendix A for a detailed list of affiliations within each category.
[28] Additional details, including technical documentation, regarding the ECLS-K and PSS surveys are available from the National Center for Education Statistics (NCES).
[29] This analysis concentrates on regular elementary schools and children without disabilities. All schools for the disabled and all children with mild to severe disabilities have been eliminated from the data for this essay.
[30] Since these data are nested, Tables E.1 and E.2 in Appendix E offer additional information regarding the number of students, schools, counties and states used in this essay.

and first grade, which is the largest group of switchers in these data. Overall, the majority of children remain enrolled in their kindergarten school type for first grade, as there are only two hundred sixty-five children who switch school types between kindergarten and first grade.[31]

Table 4.2: Observations by Grade and School Type

		School Type, First				
		Public	Catholic	Other Religious	Secular	Total, by row
School Type, K	Public	6,090	30	20	5	6,145
	Catholic	30	1,065	0	0	1,095
	Other Religious	30	0	475	5	510
	Secular	95	30	20	145	290
	Total, by column	6,245	1,125	515	155	8,040

Source: Data are from the restricted use ECLS-K, 1999-2000.
Sample sizes are rounded to comply with NCES restricted use data reporting standards.

In effort to offer conservative estimates of any observed private school gains, I do not employ sample weights to achieve a nationally representative sample. Consistent with Figlio and Stone (1999) and Goldhaber (1996), this essay does not employ sample weights to achieve a nationally representative sample. Grogger and Neal (2000) note that using sample weights increases the size of estimated Catholic schooling benefits, in particular for minorities.

The outcome measures for this study are a child's reading, mathematics, and general knowledge test scores, which were administered for each round of data

[31] ECLS-K first grade follow up survey provides a unique PSS identification number for each private school, which allows the separation of other religious schools into Evangelical and Protestant classifications. The ECLS-K base year survey does not contain these PSS numbers, but rather a nondescript identification number assigned to each school to distinguish one school from another one within the survey itself. Without these PSS identification numbers for the kindergarten school attended, it is impossible to separate other religious private schools. Thus, there are only three types of private schools for a child's kindergarten enrollment: Catholic, Other Religious, and Secular.

collection.[32] I use the child's spring first grade scores as achievement outcomes and the fall kindergarten scores as proxies for ability at entrance to kindergarten. Table 4.3 presents sample means for these data.[33]

The equal split between genders holds in all school sectors except Secular private schools where the estimation sample is forty percent male and sixty percent female as shown in Table 4.3. Over all school sectors, as well as in each school type individually, the majority of the sample is white. Public schools and Secular private schools have the lowest white population at sixty-three percent. *Catholic* has seventy-five percent white population while *Evangelical* and *Protestant* have the highest white population at eighty percent. The public school portion of the sample is fourteen percent African-American while *Catholic* as well as *Protestant* equal four percent and two percent respectively. Within the private sector, Evangelical has the largest African-American student population at nearly ten percent as well as the smallest Hispanic student population at six percent.[34]

There is a larger representation of only children attending *Secular* since sixty-nine percent have at least one sibling. *Evangelical* is eighty-two percent and *Protestant*, *Catholic*, and *Public* are above eighty-five percent for children with at least one sibling. The highest proportion of bachelor's degrees or more for educational attainment for the child's mother and father occurs at sixty percent for both *Protestant* and *Secular*. Public schools as well as Evangelical schools have the lowest proportion of parents possessing at least their bachelor's degrees at twenty-five percent and thirty percent respectively.

[32] Information regarding the subject matter for each of these three tests is provided in Appendix F. Copies of the child assessment questionnaires are not provided by NCES.
[33] Appendix G provides correlations between test scores and school types for kindergarten and first grade.
[34] I acknowledge the disparity regarding the appropriate terminology when discussing racial and ethnic categories. To maintain consistency with ELCS-K data, I employ the same racial and ethnic categories as used by ECLS-K.

Nearly fifty percent of Evangelical schools are located in the Midwest. While the Northeast region is often considered the largest concentration of Catholic schools, this does not hold for my estimation sample. Only one quarter of all Catholic schools are in *Northeast* while thirty-eight percent are found in *Midwest* and twenty percent in the West.

Protestant and *Secular* are nearly one hundred percent located in urban or suburban areas. Eighty-three percent of Catholic schools are found in urban or suburban areas while *Evangelical* has thirty-two percent of schools in rural areas or small towns.

At the time of these first and second rounds of data collection for this survey, mandatory kindergarten attendance legislation was enacted in sixteen states and the District of Columbia.[35] In this sample there are 1,915 students living in fifteen states who attended kindergarten, at least in part, as a result of this requirement. Forty-one percent of students attending Protestant schools for first grade live in mandatory kindergarten states while only thirteen percent of students attending Evangelical or Secular first grade schools do.

[35] While most states have compulsory schooling laws based on a child's age, mandatory kindergarten enrollment requirements are less common. Refer to Appendix H for a list of these compulsory kindergarten states in 2000.

Table 4.3: Variable Descriptions and Means by Grade School Type

Variable	Variable Description	Overall	Public	Catholic	Evangelical	Protestant	Secular
Male	Equals one if student is male, zero otherwise	0.483	0.484	0.487	0.478	0.487	0.397
		(0.500)					
White	Equals one if student is white, zero otherwise	0.657	0.629	0.748	0.799	0.818	0.635
		(0.475)					
Black	Equals one if student is Black, zero otherwise	0.120	0.140	0.044	0.095	0.019	0.045
		(0.325)					
Hispanic	Equals one if student is Hispanic, zero otherwise	0.118	0.123	0.113	0.064	0.097	0.122
		(0.323)					
Asian	Equals one if student is Asian, zero otherwise	0.050	0.050	0.054	0.008	0.026	0.147
		(0.218)					
Multiracial	Equals one if student is Multiracial or Other race, zero otherwise	0.054	0.059	0.039	0.031	0.039	0.051
		(0.226)					
Child Reads	Equals one if student reads on own four or more times per week, zero otherwise	0.806	0.800	0.817	0.866	0.831	0.782
		(0.396)					
Siblings	Equals one if student has at least one sibling, zero otherwise	0.864	0.868	0.879	0.816	0.877	0.692
		(0.343)					
Parent Reads	Equals one if parent reads to student four or more times per week, zero otherwise	0.784	0.779	0.811	0.757	0.851	0.769
		(0.412)					
Father, BA	Equals one if student's father has Bachelor's degree or higher, zero otherwise	0.290	0.249	0.419	0.327	0.623	0.596
		(0.454)					

Table 4.3: Variable Descriptions and Means by Grade School Type (continued)

Variable	Variable Description	Overall	Public	Catholic	Evangelical	Protestant	Secular
Mother, BA	Equals one if student's mother has Bachelor's degree or higher, zero otherwise	0.292 (0.455)	0.250	0.427	0.341	0.630	0.571
Income, 50+	Equals one if annual household income is above $50,000, zero otherwise	0.495 (0.500)	0.438	0.708	0.573	0.714	0.814
Single Parent	Equals one if student lives in a single parent household, zero otherwise	0.202 (0.401)	0.225	0.103	0.154	0.136	0.167
Northeast	Equals one if student lives in Northeast, zero otherwise	0.192 (0.394)	0.188	0.252	0.106	0.175	0.141
Midwest	Equals one if student lives in Midwest, zero otherwise	0.284 (0.451)	0.263	0.379	0.469	0.214	0.071
South	Equals one if student lives in South, zero otherwise	0.303 (0.459)	0.331	0.163	0.260	0.305	0.288
West	Equals one if student lives in West, zero otherwise	0.222 (0.415)	0.219	0.206	0.165	0.305	0.500
Urban	Equals one if student lives in urban or suburban area, zero otherwise	0.752 (0.432)	0.730	0.834	0.682	0.987	0.962
Mandatory K State	Equals one if student lives in a mandatory kindergarten state, zero otherwise	0.239 (0.426)	0.247	0.216	0.137	0.416	0.135

Source: Data are from the restricted use ECLS-K, 1999-2000.
Note: Standard deviations for overall sample are in parentheses. Means and standard deviations are the unweighted ECLS-K reporting samples. They are not weighted to represent students and schools nationwide.

4.3 Results

First, I present a brief discussion of the Ordinary Least Squares (OLS) regression models used in this essay. Next, separate subsections for each test subject highlight regression results of these models. This section continues with a dialogue regarding the implications of these findings. Lastly, a brief presentation of extensions of predicted first grade achievement on first grade school choice is provided.

4.3.1 Model

In this essay, I posit a classical linear regression model estimated by OLS where a child's test score is a linear function of independent variables and an error term, where the error term has an expected value equal to zero and uniformly distributed variance. Thus,

$$Y_t = Y_{t-1}\beta + X_t\delta + \varepsilon \tag{4.1}$$

such that a child's first grade test score, represented by Y_t, is dependent on his or her fall kindergarten test scores, Y_{t-1}, and other child and household characteristics, X_t.

The first model includes two sets of dummy variables for school types a child attends. One set of these dummy variables represents the private school options for kindergarten and the second set of dummy variables signifies the first grade private schooling alternatives. The base cases for school type attended in kindergarten and first grade are pubic school enrollment. In model (2), I regress first grade test scores on kindergarten scores to address initial ability as well as kindergarten and first grade school types. The third model incorporates a series of interaction terms where the ranking of a child's fall kindergarten test score performance, divided into quartiles, is multiplied by the first grade school type a child attends to investigate whether a child's level of

achievement in kindergarten and school type attended in first grade are important.[36] Finally, the fourth model adds other child characteristics and household traits into the regression to present the full model.[37]

Next, first grade reading test regression results are presented followed by the estimations for the math and general knowledge first grade tests. Discussions related to implications and extensions conclude this section.

4.3.2 Reading Test

Table 4.4 presents the regression results for the first grade reading test where the model number is noted in parentheses at the top of each column. The first model considers the impact of school types attended for kindergarten and first grade on spring first grade reading scores and finds that private school attendance for either grade level increases a child's reading score for all school types and all grade levels, where these findings are significant for all school types and all grade levels except *Secular, K* and *Catholic, First*. The constant term in model (1) reflects that a child attending public school for kindergarten and first grade earns an eighty-six percent, seventeen out of twenty points, on his or her reading test.

Once fall kindergarten test scores are incorporated, as shown in column (2) of Table 4.4, the significance of school type attended, present in the first model, disappears. Attending a Secular school for kindergarten significantly reduces a child's reading score

[36] The four kindergarten test performance quartiles are: low, below average, above average, and high. Then, belonging to a certain performance quartile is interacted with a child's first grade school type attended. These interaction terms equal to one if a child's kindergarten test performance falls within a given quartile and the child attended a certain first grade school type. Appendix I provides additional information on the reading, math, and general knowledge test distributions for kindergarten and first grade.

[37] Difference-in-Differences was not estimated due to the small number of school type switchers. First Difference estimations are provided in Table J.1 of Appendix J. OLS regressions containing all variables except kindergarten test scores are provided in Table J.2 in Appendix J.

by 0.8 points, which equates to a decrease of four percent in a child's score since the reading test consists of twenty questions. All three fall kindergarten test scores are positive and significant. *Fall Reading, K* and *Fall Math, K* each increase a child's reading score by 0.23 points while the fall kindergarten general knowledge test adds 0.09 points. By adding these initial controls, the constant term in model (2) shows that a child attending public school for kindergarten and first grade earns fourteen points out of twenty possible points on his or her first grade reading test. The constant terms in models (3) and (4) remains at fourteen points.

Table 4.4: OLS Results for Spring Reading, First Grade (Continued)

	(1)	(2)	(3)	(4)
Catholic, First	0.063	-0.055	0.311	0.147
	(0.19)	(0.22)	(1.07)	(0.48)
Evangelical, First	0.547	0.375	0.77	0.711
	(1.67)*	(1.45)	(2.58)**	(2.41)**
Protestant, First	0.826	0.151	0.771	0.592
	(2.44)**	(0.50)	(2.16)**	(1.69)*
Nonsectarian, First	1.065	0.503	0.138	-0.029
	(2.03)**	(1.33)	(0.11)	(0.02)
Catholic, K	0.769	0.247	0.254	0.27
	(2.33)**	(0.98)	(1.01)	(0.98)
Other Religious, K	0.645	0.21	0.184	0.172
	(1.99)**	(0.83)	(0.79)	(0.72)
Nonsectarian, K	0.219	-0.828	-0.845	-0.872
	(0.44)	(2.64)***	(2.73)***	(2.93)***
Fall Reading, K		0.222	0.24	0.215
		(24.74)***	(24.00)***	(21.82)***
Fall Math, K		0.232	0.234	0.219
		(18.66)***	(18.84)***	(17.72)***
Fall General, K		0.087	0.084	0.061
		(7.01)***	(6.82)***	(5.39)***
Male				-0.305
				(5.92)***
Black				-0.623
				(4.96)***
Hispanic				-0.172
				(1.70)*
Asian				0.335
				(2.84)***
Multiracial				-0.098
				(0.70)

Table 4.4: OLS Results for Spring Reading, First Grade (Continued)

	(1)	(2)	(3)	(4)
Child Reads				0.826
				(9.79)***
Siblings				-0.058
				(0.84)
Parent Reads				-0.111
				(1.63)
Father, BA				0.029
				(0.46)
Mother, BA				0.081
				(1.43)
Income, 50+				0.103
				(1.70)*
Single Parent				-0.293
				(3.47)***
Midwest				-0.083
				(0.82)
South				0.111
				(0.96)
West				0.037
				(0.34)
Urban				0.161
				(1.76)*
Mandatory K, State				-0.033
				(0.33)
Constant	17.168	14.2	14.093	14.018
	(250.50)***	(122.38)***	(115.36)***	(77.69)***
Observations	8040	8040	8040	8040
R-squared	0.02	0.32	0.32	0.35

Source: Data are from the restricted use ECLS-K, 1999-2000.
Note: Robust t-statistics in parentheses. Results for the interaction terms used in models (3) and (4) have been omitted from this table. A complete version is available in Table I.3 of Appendix I.
*p<0.10 ; **p<0.05 ; ***p<0.01
Sample sizes are rounded to comply with NCES restricted use data reporting standards.

The magnitude, significance, and sign for the three kindergarten test scores remain unchanged in the third and fourth models. Enrollment in a Secular kindergarten school lowers a child's first grade score by 0.85 points. However, in order to accurately determine the impact of first grade private school attendance on a child's first grade reading score in models (3) and (4), it is necessary to consider the interaction terms with each school type in addition to the coefficient for the school type dummy variable itself. Table 4.7 for model (3) and Table 4.8 for model (4) in *Section 4.3.5* present these cumulative effects for the first grade reading test.

Looking specifically at the fourth model in Table 4.4 again, a boy's first grade reading score is 0.3 points significantly lower than a girl's score. An African-American child's score is lowered by 0.6 points compared to a white child whereas a child who is Asian experiences an increase of 0.34 points in his or her reading score. The findings are significant for all minorities except *Multiracial*. A child who reads to him- or herself sees a significant increase of 0.8 points while a child whose parents read to him or her experiences a decrease of 0.11 points, although this decline is insignificant. Having a household income above fifty thousand dollars leads to a significant increase of 0.1 points in a child's reading score while living in a single parent household significantly lowers a child's score by 0.29 points. Living in a mandatory kindergarten state does not significantly affect a child's first grade reading score.

Looking at the constant term in model (4), the incorporation of additional explanatory variables indicates that a child attending public school for both kindergarten and first grade answers fourteen out of twenty questions correctly. Model (4) explains

thirty-five percent of the variation while adding the kindergarten tests alone in model (2) explains thirty-two percent.

4.3.3 Math Test

Table 4.5 presents the regression results for the first grade math test in the same format as the reading test results. In the first model, attending a Catholic school for kindergarten and a Protestant school for first grade are significant and increase a child's math score of 0.76 points and 0.6 points respectively. All remaining kindergarten and first grade school types are positive and insignificant. When the ability controls are added in model (2), *Secular, K* significantly lowers a child's math score by 0.4 points, which equates to a decrease of 2.5 percent since the math test consists of sixteen questions. The kindergarten reading, math, and general knowledge tests are all highly significant for increasing a child's math score, yet the magnitudes of their impacts are different. *Fall Reading, K* provides an increase of 0.04 points while the general knowledge tests offers an increase of 0.17 points to a child's math score. Earning one additional point on his or her kindergarten math score increases a child's first grade math score by 0.4 points.

The magnitude, significance, and sign for the three kindergarten test scores remain unchanged in the model (3). Attending a Secular kindergarten remains the same from the second to the third model, a decrease of 0.4 points when a child attends this school type. The incorporation of child and household characteristics in model (4) diminishes the finding for *Secular, K* to a decrease in a child's math score of 0.37 points. The magnitude, significance, and sign for the three kindergarten test scores remain

unchanged in the fourth model except for a slight decrease in the impact of a child's kindergarten general knowledge test on his or her first grade math score.

Table 4.5: OLS Results for Spring Math, First Grade

	(1)	(2)	(3)	(4)
Catholic, First	0.01	-0.17	-0.15	-0.262
	(0.03)	(0.81)	(0.62)	(1.10)
Evangelical, First	0.164	-0.115	0.481	0.431
	(0.50)	(0.57)	(1.51)	(1.41)
Protestant, First	0.76	-0.054	-0.36	-0.535
	(1.92)*	(0.27)	(0.85)	(1.39)
Secular, First	0.366	-0.038	-0.042	-0.183
	(0.77)	(0.16)	(0.07)	(0.31)
Catholic, K	0.596	0.076	0.064	0.096
	(1.93)*	(0.36)	(0.30)	(0.44)
Other Religious, K	0.495	0.164	0.171	0.128
	(1.51)	(0.90)	(0.95)	(0.75)
Secular, K	0.519	-0.393	-0.404	-0.373
	(1.21)	(1.96)*	(2.03)**	(1.91)*
Fall Reading, K		0.04	0.039	0.036
		(5.55)***	(5.33)***	(5.01)***
Fall Math, K		0.386	0.404	0.378
		(38.72)***	(36.03)***	(35.94)***
Fall General, K		0.173	0.171	0.144
		(15.30)***	(15.17)***	(14.06)***
Male				0.171
				(3.73)***
Black				-0.93
				(9.58)***
Hispanic				-0.205
				(2.49)**
Asian				0.107
				(1.07)
Multiracial				-0.254
				(2.35)**
Child Reads				0.213
				(3.43)***
Siblings				0.143
				(2.22)**
Parent Reads				-0.189
				(3.51)***
Father, BA				0.119
				(2.30)**

Table 4.5: OLS Results for Spring Math, First Grade (continued)

	(1)	(2)	(3)	(4)
Mother, BA				0.153
				(3.14)***
Income, 50+				0.027
				(0.52)
Single Parent				0.012
				(0.19)
Midwest				0.202
				(2.41)**
South				0.454
				(4.83)***
West				0.231
				(2.42)**
Urban				0.182
				(2.51)**
Mandatory K, State				-0.13
				(1.77)*
Constant	12.385	9.312	9.246	9.027
	(181.68)***	(100.62)***	(94.03)***	(60.82)***
Observations	8040	8040	8040	8040
R-squared	0.02	0.41	0.41	0.43

Source: Data are from the restricted use ECLS-K, 1999-2000.

Note: Robust t-statistics in parentheses. Results for the interaction terms used in models (3) and (4) have been omitted from this table. A complete version is available in Table I.4 of Appendix I.

*p<0.10 ; **p<0.05 ; ***p<0.01

Sample sizes are rounded to comply with NCES restricted use data reporting standards.

In order to determine the impact of first grade private school attendance on a child's first grade math score in models (3) and (4) accurately, it is necessary to consider the interaction terms with each school type in addition to the coefficient for the school type dummy variable itself. *Section 4.3.5* offers discussion of these cumulative effects for the math test for model (3) in Table 4.7 and for model (4) in Table 4.8.

Looking specifically at the fourth model in Table 4.5 again, boys earn 0.17 points higher on their first grade math tests than girls do, which is significant. An African-American child experiences 0.93 points drop in his or her math score, which equates to a 5.8 percent lower math score. *Hispanic* and *Multiracial* earn 0.21 points and 0.25 points less, respectively. When a child reads to him- or herself, he or she experiences an

increase of 0.21 points. This increase for *Child Reads* is matched by a nearly equal negative finding when a parent reads to a child. Parent Reads shows a decrease of 0.19 points in a child's math score if a parent reads to the child. Having siblings and college educated parents are significantly and positively related to a child's first grade math score. Living outside of the New England region results in an increase in the child's math score. Midwest, South, and West exhibit increases of 0.2 points, 0.5 points, and 0.2 points respectively. Living in an urban or suburban area leads to an increase of 0.18 points in a child's first grade math score.

Mandatory K State shows a decrease of 0.13 points, both of which are significant. This finding for mandatory kindergarten programs is surprising since many presume mathematics is what schools teach. Since a child's home environment strongly influences reading ability, research has focused attention to mathematics achievement in effort to capture more of a school's contribution to a child's education (Lubienski and Lubienski 2006; Figlio and Stone 1999; Bryk, Lee, and Holland 1993; Heyneman 2005). This finding may indicate that mandatory kindergarten states have kindergarten programs with different emphases than non-mandatory kindergarten states.

Looking at the constant term in model (4), the incorporation of additional explanatory variables indicates that a child attending public school for both kindergarten and first grade answers nine out of sixteen questions correctly. Model (4) explains forty-three percent of the variation while adding the kindergarten tests alone in model (2) explains forty-one percent.

4.3.4 General Knowledge Test

Table 4.6 provides the regression results for a child's first grade general knowledge test. In the first model, *Catholic, K* gives a significant increase of 0.7 points and attending an Evangelical school for first grade increases a child's score by 0.6 points. *Evangelical, First* is the only first grade level private school that significantly affects a child's score. Upon adding a child's fall kindergarten test scores, the significance of all school types at both grade levels disappears. Only the three initial control measures significantly increase a child's first grade general knowledge score. The kindergarten reading score has a positive and significant, yet small effect of on a child's general knowledge test score of an increase of 0.02 points. A child's kindergarten math score has a significant and positive impact of 0.11 points while a child's kindergarten general knowledge score increases a child's first grade general knowledge score by 0.4 points.

Once the kindergarten score and first grade school type interactions are added in model (3), accurately determining the impact of first grade private school attendance on a child's first grade general knowledge score in models (3) and (4) requires considering the interaction terms with each school type in addition to the coefficient for the school type dummy variable itself. I discuss these cumulative effects for the general knowledge test, provided in Table 4.7 for model (3) and Table 4.8 for model (4), in *Section 4.3.5*.

Looking specifically at the fourth model in Table 4.6 again, *Male* has a small, yet significant increase of 0.1 points on a child's general knowledge score. All minorities score significantly lower than whites do. African-American students experience the largest decrease at 0.7 points while Hispanics and Asian students see a decrease of 0.4 points in test scores. *Multiracial* has the smallest decrease in test score at 0.3 points. A

child who reads to him- or herself increases his or her test score by 0.14 points. Having siblings reduces a child's test score by 0.24 points. A child of a college educated mother has an increase of 0.1 points in test score. *Income, 50+* leads to a significant increase of 0.08 points while living in a single parent household results in a decrease of 0.17 points in a child's first grade general knowledge test score. Living in the Midwest, relative to the northeast, significantly increases a child's score by 0.16 points. Living in a mandatory kindergarten state does not significantly affect a child's first grade general knowledge score.

Model (1) only explains two percent of the variation. The second model adds three kindergarten test scores and increases its explanatory power to forty-six percent. Including child and household characteristics in the fourth model increases R-squared to forty-eight percent.

Table 4.6: OLS Results for Spring General Knowledge, First Grade

	(1)	(2)	(3)	(4)
Catholic, First	0.043	-0.221	0.012	-0.128
	(0.18)	(1.29)	(0.06)	(0.58)
Evangelical, First	0.602	0.126	0.517	0.453
	(1.77)*	(0.44)	(1.31)	(1.07)
Protestant, First	0.466	-0.319	-0.204	-0.403
	(1.24)	(1.16)	(0.45)	(0.90)
Secular, First	0.405	0.07	-0.27	-0.293
	(0.88)	(0.31)	(0.53)	(0.60)
Catholic, K	0.699	0.283	0.315	0.302
	(2.93)***	(1.63)	(1.80)*	(1.69)*
Other Religious, K	0.232	0.069	0.049	0.008
	(0.71)	(0.26)	(0.18)	(0.03)
Secular, K	0.646	-0.098	-0.098	-0.124
	(1.51)	(0.47)	(0.48)	(0.61)
Fall Reading, K		0.023	0.022	0.027
		(3.62)***	(3.40)***	(4.13)***
Fall Math, K		0.114	0.114	0.095
		(12.82)***	(12.94)***	(11.13)***
Fall General, K		0.419	0.439	0.393
		(43.49)***	(39.64)***	(41.77)***

Table 4.6: OLS Results for Spring General Knowledge, First Grade (continued)

	(1)	(2)	(3)	(4)
Male				0.099
				(2.74)***
Black				-0.696
				(7.58)***
Hispanic				-0.424
				(6.13)***
Asian				-0.469
				(4.21)***
Multiracial				-0.29
				(2.82)***
Child Reads				0.138
				(2.42)**
Siblings				-0.241
				(4.85)***
Parent Reads				-0.005
				(0.10)
Father, BA				0.026
				(0.59)
Mother, BA				0.096
				(2.41)**
Income, 50+				0.084
				(1.84)*
Single Parent				-0.168
				(3.02)***
Midwest				0.155
				(2.35)**
South				0.044
				(0.58)
West				0.033
				(0.43)
Urban				0.006
				(0.10)
Mandatory K, State				0.037
				(0.57)
Constant	8.999	6.156	6.058	6.498
	(129.95)***	(68.75)***	(63.49)***	(53.81)***
Observations	8040	8040	8040	8040
R-squared	0.02	0.46	0.46	0.48

Source: Data are from the restricted use ECLS-K, 1999-2000.
Note: Robust t-statistics in parentheses. Results for the interaction terms used in models (3) and (4) have been omitted from this table. A complete version is available in Table I.5 of Appendix I.
*p<0.10 ; **p<0.05 ; ***p<0.01

Sample sizes are rounded to comply with NCES restricted use data reporting standards.

4.3.5 Implications

In order to determine the impact of first grade private school attendance on a child's first grade math score in models (3) and (4) accurately, it is necessary to consider the interaction terms with each school type in addition to the coefficient for the school type dummy variable itself. These cumulative effects for first grade private school attendance are presented here. The reference individual in each of these scenarios attended public school for kindergarten and first grade.

Table 4.7 offers a summary of the impact that school type attended in first grade has on first grade reading, math, and general knowledge tests for the third model specification used for the three tests. In particular, a student with a high kindergarten achievement level for reading, math, or general knowledge improves his or her first grade test score by not attending a private school for first grade, compared to low achievers on these kindergarten tests. This finding is significant for all three first grade tests for a high kindergarten achiever who attends a Catholic school for first grade. Table 4.8 provides the same information for the fourth model specification employed for the three tests. Using model (4) coefficients, kindergarten high achievers, compared to low achievers, for all three tests score significantly lower on their first grade tests when they attend a Catholic school for first grade. Although only significant for math and general knowledge tests, this finding holds for *Evangelical, First* as well.

As shown in Table 4.7, a child scoring below average on his or her kindergarten reading test, who attends any type of private school for first grade, increases his or her first grade reading test score while this result is only significant for attending a Protestant school for first grade. A child scoring above average on his or her kindergarten reading

test, who attends any type of private school, increases his or her first grade reading test score while this result is only significant for attending an Evangelical or Secular school for first grade. In particular, attending *Secular, First* increases an above average achieving child's score by 1.22 points. A high achiever on the kindergarten reading test who attends a Catholic school for first grade significantly lowers his or her first grade reading score by 0.7 points. Although insignificant, this negative relationship holds for a high achieving kindergarten reading test student attending *Evangelical, First* or *Protestant, First*.

Table 4.7: Impact of First Grade School Type on First Grade Test when Kindergarten Test Performance is Considered, Using Model (3) Results

School Type, First	Achievement Level, K Test	First Grade Test		
		Reading	Math	General Knowledge
Catholic	Below Average	0.01	0.05	0.06
	Above Average	0.13	0.05	-0.26
	High	-0.69***	-0.54**	-0.78***
Evangelical	Below Average	0.43	0.02	0.37
	Above Average	0.78***	-0.30	0.20
	High	-0.30	-0.59***	-0.52*
Protestant	Below Average	0.87**	0.02	-0.11
	Above Average	0.02	0.16	-0.23
	High	-0.32	-0.22	-0.65**
Secular	Below Average	0.73	0.22	0.77***
	Above Average	1.22***	-0.01	0.29
	High	0.15	-0.21	-0.47**

*p<0.10 ; **p<0.05 ; ***p<0.01

A high achiever on the kindergarten math test who attends a Catholic or Evangelical school in first grade experiences a significant decrease of 0.5 points and 0.6 points respectively in his or her first grade math score, compared to a low achieving student. Although insignificant, this negative relationship holds for a high achieving kindergarten math test student attending a Protestant or Secular school for the first grade.

A high achieving student on the kindergarten general knowledge test, attending any private school in the first grade, experiences a significant decrease in his or her first grade general knowledge test score relative to low achievers on the kindergarten test. For *Catholic, First* a high kindergarten achiever lowers his or his first grade score by 0.78 points while this reduction in first grade score equals 0.65 points for *Protestant, First*. When a student attending a Secular school for first grade also scores below average compared to low achievers on the kindergarten general knowledge test, then he or she receives a significant increase in his or her first grade test score of 0.77 points.

As shown in Table 4.8, a child scoring below average on his or her kindergarten reading test compared to low achievers, who attends an Evangelical, Protestant, or Secular private school, increases his or her first grade reading test score. However, this result is only significant for attending a Protestant school. A child scoring above average on his or her kindergarten reading test increases his or her first grade reading test score by attending any type of private school for first grade except Protestant. In particular, attending *Secular, First* significantly increases a child's score one point while *Evangelical, First* shows an increase of 0.66 points. A high achiever on the kindergarten reading test who attends a Catholic school for first grade significantly lowers his or her first grade reading score by 0.66 points. Although insignificant, this negative relationship holds for a high achieving kindergarten reading test student attending *Evangelical, First* or *Protestant, First*.

A high achiever on the kindergarten math test who attends a Catholic or Evangelical school in first grade experiences a significant decrease of 0.6 points and 0.5 points respectively in his or her first grade math score, compared to a low achieving

student. Although insignificant, this negative relationship holds for a high achieving kindergarten math test student attending a Protestant or Secular school for the first grade.

Table 4.8: Impact of First Grade School Type on First Grade Test when Kindergarten Test Performance is Considered, Using Model (4) Results

School Type, First	Achievement Level, K Test	First Grade Test		
		Reading	Math	General Knowledge
Catholic	Below Average	-0.12	-0.06	-0.07
	Above Average	0.02	-0.04	-0.33*
	High	-0.66**	-0.59***	-0.74***
Evangelical	Below Average	0.33	-0.08	0.23
	Above Average	0.66**	-0.24	0.14
	High	-0.15	-0.50**	-0.50*
Protestant	Below Average	0.88**	-0.11	-0.18
	Above Average	-0.19	0.02	-0.31
	High	-0.31	-0.28	-0.59*
Secular	Below Average	0.67	0.13	0.65**
	Above Average	1.05**	-0.15	0.28
	High	0.11	-0.37	-0.35

*p<0.10 ; **p<0.05 ; ***p<0.01

A high achieving student on the kindergarten general knowledge test, attending any private school in the first grade, experiences a decrease in his or her first grade general knowledge test score relative to low achievers on the kindergarten test. This result is significant for all private schools except Secular. For *Catholic, First* a high kindergarten achiever lowers his or his first grade score by 0.74 points while this reduction in first grade score equals 0.59 points for *Protestant, First*. When a student attending a Secular school for first grade also scores below average compared to low achievers on the kindergarten general knowledge test, then he or she receives a significant increase in his or her first grade test score of 0.65 points.

One significant finding holds Catholic first grade enrollment across all three first grade tests for both models (3) and (4). If a child is a high achiever in kindergarten, then

he or she earns higher first grade test scores by not attending a Catholic school for first grade, relative to low kindergarten achievers. Catholic first grade programs appear to focus on basic skills that aid lower performing kindergarten students. Thus, high achieving kindergarten students lose focus and interest in first grade material, which lowers their first grade test scores in comparison to low kindergarten achievers. A second possible explanation for this is that earning a low achievement level on the kindergarten tests captures a child's difficulty in adjusting to school. Therefore, by the time of the first grade tests, these low performing students are well acclimated to school and able to demonstrate true high achieving abilities.

4.3.6 Extensions

For this portion of *Section 4.3*, I connect the two empirical chapters of my paper together. I include the predicted first grade test scores from this fourth chapter into the school choice model used in the third chapter to investigate whether parents factor their children's anticipated performance in first grade into their decision making processes. Table 4.9 presents the results of this re-estimation of the school choice decision. The smaller sample size of 7,755 observations for this estimation is the result of performing separate, distinct extractions for data used in each chapter. This sample size represents the number of observations the two datasets share in common.[38]

A second difference in Table 4.9 is the exclusion of models D and E, as featured in Table 3.5. These models were omitted due to computation difficulties associated with multinomial probit estimations of four and five schooling alternatives. Model A in Table 4.9 corresponds to model A in Table 3.4 with the only differences being the additional three predicted first grade test scores. The same relationship among tables holds for the

[38] For variable means for this smaller estimation sample, please see Appendix K.

model B specifications in Table 4.9 and Table 3.4 as well as the model C specifications in Table 4.9 and Table 3.5.

In model A of Table 4.9, a boy is thirty-three percent more likely than a girl to attend a private school, which is significant. A child who is a minority is significantly less likely to attend a private school. Specifically, an African-American child is nearly thirty percent less likely to attend a private school compared to a child who is white.

A child's fall kindergarten test scores are all significant. Answering one additional question correctly on the reading test leads to a nearly four percent decrease in the likelihood of attending a private school in first grade. Answer one additional question correctly on the math and general knowledge tests increases a child's probability by twenty-six percent and twenty-two percent respectively.

The three predicted first grade test scores are all highly significant. A higher predicted first grade reading test score increases the probability a child attends a private school by forty-three percent whereas a higher predicted math or general knowledge score decreases a child's likelihood of attending private by ninety-four percent and twenty-nine percent respectively. These results suggest that parents do consider their children's expected academic performances in first grade when selecting schools. In particular, reading achievement is considered differently than math and general knowledge performance.

Table 4.9: Chapter Three School Choice Estimates Including Predicted First Grade Test Scores

	Model A	Model B	Model C	
Variable	**Coefficient (Z-Score) [Marginal Effect] (Z-Score)**	**Coefficient (Z-Score) [Marginal Effect] (Z-Score)**	**Coefficient (Z-Score) [Marginal Effect] (Z-Score)**	
	All Private	**Catholic**	**Catholic**	**Non-Catholic**
Male	1.341 (17.66)*** [0.334] (15.57)***	1.577 (15.47)*** [0.2771] (11.06)***	1.708 (16.34)*** [0.191] (9.27)***	1.924 (15.30)*** [0.130] (8.31)***
Black	-3.718 (-12.63)*** [-0.296] (-14.26)***	-5.160 (-17.19)*** [-0.2405] (-11.36)***	-5.306 (-15.45)*** [-0.192] (-9.82)***	-4.442 (-8.24)*** [-0.086] (-6.88)***
Hispanic	-1.013 (-7.41)*** [-0.163] (-10.14)***	-1.355 (-8.99)*** [-0.1112] (-8.76)***	-1.227 (-6.90)*** [-0.093] (-7.27)***	-1.534 (-6.22)*** [-0.056] (-6.63)***
Asian	-0.925 (-4.91)*** [-0.142] (-8.10)***	-0.956 (-4.38)*** [-0.0838] (-6.99)***	-0.929 (-3.85)*** [-0.072] (-4.87)***	-1.692 (-4.52)*** [-0.051] (-6.71)***
Multiracial	-1.181 (-8.37)*** [-0.158] (-12.04)***	-1.633 (-9.25)*** [-0.0989] (-8.56)***	-1.614 (-7.70)*** [-0.098] (-8.40)***	-1.534 (-6.69)*** [-0.048] (-6.98)***
Fall Reading, K	-0.155 (-6.84)*** [-0.038] (-6.72)***	-0.123 (-4.43)*** [-0.0196] (-4.35)***	-0.165 (-5.53)*** [-0.017] [-4.450]	-0.281 (-6.16)*** [-0.019] [-5.090]
Spring Reading, K	0.010 (1.01) [0.003] (1.01)	0.009 (0.73) [0.0015] (0.73)	0.01 (0.60) [0.001] (0.47)	0.02 (1.18) [0.001] (1.09)
Fall Math, K	1.081 (13.01)*** [0.265] (12.20)***	1.532 (19.35)*** [0.2447] (11.27)***	1.558 (18.33)*** [0.181] (10.06)***	1.284 (8.50)*** [0.074] (5.78)***
Spring Math, K	0.017 (1.53) [0.004] (1.53)	0.005 (0.35) [0.0007] (0.35)	0.017 (1.00) [0.002] (0.77)	0.036 (1.73)* [0.002] (1.60)
Fall General, K	0.912 (9.90)*** [0.224] (9.45)***	1.304 (11.74)*** [0.2083] (9.14)***	1.223 (11.83)*** [0.139] (8.28)***	1.206 (7.59)*** [0.073] (5.59)***

Table 4.9: Chapter Three School Choice Estimates Including Predicted First Grade Test Scores (continued)

	Model A	Model B	Model C	
Variable	**Coefficient (Z-Score) [Marginal Effect] (Z-Score)**	**Coefficient (Z-Score) [Marginal Effect] (Z-Score)**	**Coefficient (Z-Score) [Marginal Effect] (Z-Score)**	
	All Private	**Catholic**	**Catholic**	**Non-Catholic**
Spring General, K	-0.011 (-0.85) [-0.0027] (-0.84)	-0.005 (-0.36) [-0.0009] (-0.36)	-0.012 (-0.61) [-0.001] (-0.53)	-0.016 (-0.72) [-0.001] (-0.64)
Reading, First - Predicted	1.768 (15.99)*** [0.434] (13.61)***	1.809 (11.89)*** [0.2889] (9.12)***	2.052 (13.83)*** [0.221] (8.52)***	2.871 (13.29)*** [0.188] (7.97)***
Math, First - Predicted	-3.826 (-17.66)*** [-0.939] (-15.10)***	-4.813 (-20.22)*** [-0.7686] (-11.25)***	-5.202 (-20.66)*** [-0.593] (-10.22)***	-5.029 (-13.16)*** [-0.305] (-7.60)***
General Knowledge, First - Predicted	-1.190 (-5.39)*** [-0.292] (-5.33)***	-1.849 (-7.04)*** [-0.2953] (-6.44)***	-1.503 (-6.19)*** [-0.168] (-5.29)***	-1.697 (-4.13)*** [-0.107] (-3.46)***
Siblings	0.025 (1.11) [0.006] (1.11)	0.026 (1.09) [0.0041] (1.09)	0.059 (1.83)* [0.008] (1.92)*	-0.013 (-0.28) [-0.002] (-0.55)
Mother, High School	0.181 (1.83)* [0.046] (1.76)*	0.191 (1.61) [0.0324] (1.53)	0.318 (2.03)** [0.041] (1.85)*	0.142 (0.72) [0.006] (0.38)
Mother, Some College	0.396 (3.98)*** [0.103] (3.72)***	0.341 (2.79)*** [0.0586] (2.56)***	0.552 (3.44)*** [0.068] (2.84)***	0.508 (2.72)*** [0.032] (1.92)*
Mother, BA	0.995 (8.71)*** [0.303] (7.55)***	1.195 (8.66)*** [0.2867] (6.49)***	1.423 (8.03)*** [0.216] (5.43)***	1.195 (5.92)*** [0.084] (3.11)***
Mother, Advanced	0.904 (6.96)*** [0.295] (5.92)***	0.958 (6.27)*** [0.2448] (4.61)***	1.106 (5.52)*** [0.151] (3.28)***	1.345 (5.85)*** [0.138] (3.09)***
Father, High School	0.248 (2.38)** [0.065] (2.23)**	0.158 (1.42) [0.0267] (1.34)	0.26 (1.70)* [0.028] (1.33)	0.401 (2.06)** [0.030] (1.63)

Table 4.9: Chapter Three School Choice Estimates Including Predicted First Grade Test Scores (continued)

	Model A	Model B	Model C	
Variable	**Coefficient (Z-Score) [Marginal Effect] (Z-Score)**	**Coefficient (Z-Score) [Marginal Effect] (Z-Score)**	**Coefficient (Z-Score) [Marginal Effect] (Z-Score)**	
	All Private	**Catholic**	**Catholic**	**Non-Catholic**
Father, Some College	0.201 (1.91)* [0.052] (1.82)*	0.174 (1.44) [0.0295] (1.37)	0.269 (1.65)* [0.033] (1.45)	0.219 (1.17) [0.013] (0.86)
Father, BA	0.655 (5.64)*** [0.192] (4.95)***	0.729 (5.55)*** [0.1562] (4.39)***	0.848 (4.93)*** [0.113] (3.53)***	0.904 (4.28)*** [0.071] (2.68)***
Father, Advanced	0.630 (4.96)*** [0.190] (4.30)***	0.656 (4.74)*** [0.1453] (3.74)***	0.731 (3.98)*** [0.090] (2.66)***	0.998 (4.24)*** [0.094] (2.63)***
Religiosity, Head	0.292 (5.16)*** [0.074] (4.81)***	0.325 (5.29)*** [0.0544] (4.51)***	0.494 (5.95)*** [0.063] (5.06)***	0.177 (1.77)* [0.006] (0.78)
Religiosity, Spouse	0.188 (3.08)*** [0.048] (2.92)***	0.135 (2.03)** [0.0225] (1.92)*	0.207 (2.28)** [0.022] (1.78)*	0.346 (3.19)*** [0.025] (2.53)**
Single Parent	0.753 (6.50)*** [0.223] (5.63)***	0.511 (4.04)*** [0.0993] (3.36)***	0.789 (4.67)*** [0.085] (2.97)***	1.308 (6.82)*** [0.131] (4.25)***
Midwest	1.218 (5.82)*** [0.361] (5.24)***	1.409 (5.91)*** [0.3234] (4.62)***	1.438 (4.60)*** [0.168] (2.85)***	1.994 (4.93)*** [0.196] (2.98)***
South	1.103 (4.14)*** [0.319] (3.72)***	1.267 (4.14)*** [0.2742] (3.23)***	1.201 (2.96)*** [0.127] (1.84)*	1.93 (3.84)*** [0.192] (2.42)**
West	0.609 (2.10)** [0.174] (1.85)*	0.672 (2.09)** [0.1382] (1.67)*	0.537 (1.23) [0.040] (0.63)	1.408 (2.52)** [0.156] (1.71)*
Urban	0.603 (3.23)*** [0.126] (3.87)***	0.832 (3.73)*** [0.1016] (4.72)***	0.966 (3.19)*** [0.093] (3.78)***	0.533 (1.71)* [0.025] (1.39)

Table 4.9: Chapter Three School Choice Estimates Including Predicted First Grade Test Scores (continued)

	Model A	Model B	Model C	
Variable	Coefficient (Z-Score) [Marginal Effect] (Z-Score)	Coefficient (Z-Score) [Marginal Effect] (Z-Score)	Coefficient (Z-Score) [Marginal Effect] (Z-Score)	
	All Private	Catholic	Catholic	Non-Catholic
Income, 15-20	0.117 (0.73) [0.030] (0.70)	0.022 (0.12) [0.0035] (0.12)	0.078 (0.33) [0.004] (0.14)	0.326 (0.93) [0.028] (0.77)
Income, 20-25	0.160 (0.96) [0.042] (0.90)	-0.098 (-0.52) [-0.0147] (-0.55)	-0.037 (-0.15) [-0.015] (-0.52)	0.548 (1.68)* [0.057] (1.34)
Income, 25-30	0.509 (3.70)*** [0.151] (3.17)***	0.390 (2.30)** [0.0770] (1.90)*	0.554 (2.49)** [0.062] (1.58)	0.891 (3.40)*** [0.087] (2.13)**
Income, 30-35	0.574 (4.27)*** [0.174] (3.61)***	0.357 (2.18)** [0.0698] (1.81)*	0.6 (2.81)*** [0.065] (1.68)*	1.016 (3.89)*** [0.107] (2.33)**
Income, 35-40	0.596 (4.29)*** [0.181] (3.64)***	0.433 (2.45)** [0.0875] (1.99)**	0.653 (2.85)*** [0.073] (1.75)*	1.053 (4.12)*** [0.109] (2.49)**
Income, 40-50	0.829 (6.38)*** [0.261] (5.35)***	0.658 (4.34)*** [0.1441] (3.30)***	0.995 (4.99)*** [0.127] (3.00)***	1.306 (5.01)*** [0.132] (2.77)***
Income, 50-75	0.951 (6.98)*** [0.288] (5.96)***	0.947 (5.66)*** [0.2110] (4.26)***	1.282 (5.93)*** [0.183] (3.92)***	1.251 (4.70)*** [0.098] (2.58)***
Income, 75-100	0.922 (6.64)*** [0.292] (5.59)***	0.878 (5.31)*** [0.2062] (3.91)***	1.256 (5.77)*** [0.189] (3.71)***	1.203 (4.37)*** [0.098] (2.26)**
Income, 100-200	0.969 (6.28)*** [0.314] (5.33)***	0.904 (4.70)*** [0.2199] (3.47)***	1.283 (5.13)*** [0.192] (3.23)***	1.313 (4.72)*** [0.117] (2.41)**
Income, 200+	1.082 (6.00)*** [0.370] (5.19)***	0.869 (4.20)*** [0.2208] (3.05)***	1.298 (4.64)*** [0.178] (2.53)**	1.625 (4.87)*** [0.187] (2.45)**

Table 4.9: Chapter Three School Choice Estimates Including Predicted First Grade Test Scores (continued)

Variable	Model A	Model B	Model C	
	Coefficient (Z-Score) [Marginal Effect] (Z-Score)	Coefficient (Z-Score) [Marginal Effect] (Z-Score)	Coefficient (Z-Score) [Marginal Effect] (Z-Score)	
	All Private	Catholic	Catholic	Non-Catholic
House Value, County [a]	0.0000023 (1.33) [0.0000006] (1.33)	0.0000028 (1.36) [0.00000045] (1.38)	0.0000045 (1.51) [0.00000056] (1.53)	0.0000011 (0.46) [0.00000002] (0.09)
Income, County [a]	-0.000018 (-1.56) [-0.0000044] (-1.57)	-0.000025 (-1.73)* [-0.0000039] (-1.76)*	-0.0000393 (-1.98)** [-0.0000051] (-2.10)**	0.00000494 (0.30) [0.0000010] (0.82)
White, County [a]	-0.380 (-0.66) [-0.093] (-0.65)	-0.688 (-1.15) [-0.1098] (-1.14)	-0.881 (-1.04) [-0.128] (-1.19)	1.033 (0.69) [0.092] (0.82)
Catholic, County [b]	1.017 (1.65)* [0.250] (1.65)*	0.979 (1.44) [0.1563] (1.43)	1.381 (1.52) [0.160] (1.40)	1.171 (0.98) [0.068] (0.77)
Evangelical, County [b]	0.989 (1.31) [0.243] (1.31)	1.086 (1.26) [0.1735] (1.25)	1.196 (1.00) [0.129] (0.85)	1.634 (1.26) [0.106] (1.11)
Protestant, County [b]	0.053 (0.08) [0.013] (0.08)	-0.403 (-0.53) [-0.0643] (-0.53)	-0.723 (-0.66) [-0.110] (-0.79)	1.149 (1.05) [0.098] (1.20)
Student-Teacher, Public [a]	0.026 (1.78)* [0.006] (1.77)*	0.034 (1.90)* [0.0055] (1.91)*	0.05 (1.89)* [0.0063] (1.91)*	0.005 (0.24) [-0.0003] (-0.21)
Black, Public [a]	-0.0006 (-0.10) [-0.00015] (-0.10)	-0.0019 (-0.30) [-0.00031] (-0.30)	-0.002 (-0.27) [-0.00043] (-0.38)	0.008 (0.63) [0.00065] (0.68)
Hispanic, Public [a]	-0.003 (-0.49) [-0.0008] (-0.49)	-0.009 (-1.16) [-0.0014] (-1.16)	-0.014 (-1.26) [-0.0020] (-1.46)	0.017 (1.04) [0.0015] (1.24)

Table 4.9: Chapter Three School Choice Estimates Including Predicted First Grade Test Scores (continued)

	Model A	Model B	Model C	
Variable	**Coefficient (Z-Score) [Marginal Effect] (Z-Score)**	**Coefficient (Z-Score) [Marginal Effect] (Z-Score)**	**Coefficient (Z-Score) [Marginal Effect] (Z-Score)**	
	All Private	**Catholic**	**Catholic**	**Non-Catholic**
Free Lunch [a]	0.0041 (0.80) [0.0010] (0.80)	0.0029 (0.50) [0.00046] (0.50)	0.002 (0.22) [0.000021] (0.02)	0.014 (1.56) [0.0010] (1.59)
Constant	14.191 (5.66)***	27.464 (12.96)***	24.495 (9.88)***	7.767 (1.52)
Observations	7755	7100	7755	
Log Likelihood	-2746.4282	-1947.4749	-3728.0048	
Wald chi2(50)	1173.22	1029.94	1747.4	
Pseudo R2	0.3398	0.3666		

Source: Unless otherwise indicated, data are from the restricted use ECLS-K, 1999-2000.
Note: Robust z-statistics in parentheses
*p<0.10 ; **p<0.05 ; ***p<0.01
Sample sizes are rounded to comply with NCES restricted use data reporting standards.
[a] denotes Census 2000 data
[b] denotes Glenmary Research Center's 2000 Religious Congregations & Membership Data

Parent educational attainment and religiosity of household are positive and significant factors in the probability of attending a private school. Household income categories in the range of twenty-five thousand dollars and higher are also positive and significant. When the Catholic adherents in the county increases by one percent, a child's probability of attending a private school is twenty-five percent. The only county-level public school characteristic measure that is significant is the student teacher ratio. When the average class size in public schools increases, then a child's likelihood of attending private school increases also. Specifically, an increase in class size of ten students leads to an increase of six percentage points in attending private.

Many of the variables maintain the same sign and significance in model B, which is the probability of attending a Catholic school compared to a public school. A male child experiences a positive probability of attending a Catholic school compared to a girl. A boy is twenty-eight percentage points more likely to attend a Catholic school than a girl. Minorities are less likely to attend Catholic schools. Hispanic, Asian, and multiracial children all experience a ten percentage point decrease in the probability of attending Catholic while an African-American child sees a decrease of twenty-four percentage points. All three of the fall kindergarten test scores are significant. An additional point on a child's kindergarten reading test reduces his or her likelihood of attending a Catholic school by two percent. An additional point on the math or general knowledge kindergarten tests increases a child's probability by twenty-four percent and twenty-one percent respectively.

The three predicted first grade test scores are all highly significant. A higher predicted first grade reading test score increases the probability a child attends a Catholic school by twenty-nine percent whereas a higher predicted math or general knowledge score decreases a child's likelihood of attending private by seventy-seven percent and thirty percent respectively. These results suggest that parents do consider their children's expected academic performances in first grade when selecting schools. These findings continue to suggest that parents view reading achievement differently than math and general knowledge.

Many of the variables maintain the same sign and significance in model C, which is the probability of attending a Catholic or non-Catholic school compared to a public school. A male child experiences a significant positive probability of attending a

Catholic or non-Catholic school compared to a girl equaling nineteen percent for Catholic and thirteen percent for non-Catholic. Minorities are less likely to attend Catholic schools as well as non-Catholic schools. An African-American child sees significant decreases of nineteen percentage points for attending a Catholic school and nine percentage points for a non-Catholic school.

All three of the fall kindergarten test scores are highly significant. An additional point on a child's fall kindergarten reading test reduces his or her likelihood of attending a Catholic or non-Catholic school by two percent for each school type. An additional point on the fall math or general knowledge kindergarten tests increases a child's probability of attending a Catholic school by eighteen percent and fourteen percent respectively. An additional point on the fall math or general knowledge kindergarten tests increases a child's probability of attending a non-Catholic school by seven percent for each.

The three predicted first grade test scores are all highly significant. A higher predicted first grade reading test score increases the probability a child attends a Catholic school by twenty-two percent whereas a higher predicted math or general knowledge score decreases a child's likelihood of attending Catholic by nearly sixty percent and seventeen percent respectively. A higher predicted first grade reading test score increases the probability a child attends a non-Catholic school by nineteen percent whereas a higher predicted math or general knowledge score decreases a child's likelihood of attending non-Catholic by nearly thirty percent and ten percent respectively.

These results suggest that parents do consider their children's expected academic performances in first grade when selecting schools. These findings for model C continue

to suggest that parents view reading achievement differently than math and general knowledge.

4.4 Conclusions

This essay attempts to address criticisms of previous studies by using test scores from a student's entrance into kindergarten to control for his or her ability and a host of other unobservable characteristics. By controlling for previous test scores, it is possible to disentangle the selection effect. For all three tests, raw scores are higher for private school students when they entered kindergarten in the fall. Additionally, raw first grade test scores for all three subjects are higher for private schools.

Findings indicate that first grade private school enrollment makes below average achievers in kindergarten into better students in the first grade. Yet, private schools offer no significant benefit for first grade enrollment to high achieving kindergarten students. Private schools help below average achieving kindergarten students earn higher first grade test scores, relative to their low achieving peers. Above average kindergarten students see an increase in their first grade reading scores by attending an Evangelical or Secular school for first grade. High achieving kindergarten students experience a significant decrease in first grade achievement scores for all three tests because of Catholic school enrollment in the first grade. High achievers in kindergarten experience a significant decrease in their first grade math score because of attending an Evangelical school for first grade. This significant negative relationship as holds for first grade general knowledge test for high achieving kindergarten students attending a Protestant school for first grade.

Other significant factors on a child's first grade reading test score include child's race and reading habits. Living in a single parent household or in an urban area are significant household characteristics for first grade reading achievement. Findings for the first grade general knowledge test are similar. Additional significant factors for a child's math performance include parental educational attainment and siblings in the household. All three geographic regions are significant relative to New England.

For a child's first grade math test score, living in a state that requires kindergarten attendance significantly reduced a child's score. This finding for mandatory kindergarten programs is surprising since many presume mathematics is what schools teach. Since a child's home environment strongly influences reading ability, research has focused attention to mathematics achievement in effort to capture more of a school's contribution to a child's education (Lubienski and Lubienski 2006; Figlio and Stone 1999; Bryk, Lee, and Holland 1993; Heyneman 2005). This finding may indicate that mandatory kindergarten states have kindergarten programs with different emphases than non-mandatory kindergarten states.

Predicted first grade scores are all highly significant when added to the school choice estimation from the third chapter. A higher predicted first grade reading score increased the probability of attending a private school while a higher predicted first grade math or general knowledge score lowered the likelihood of attending a private school. These results suggest that parents do consider their children's expected academic

performances in first grade when selecting schools. Specifically, parents view reading achievement differently than math and general knowledge performance when selecting whether to send their children to private schools.

Chapter Five:
Conclusions

5.1 Motivation

For the purposes of this dissertation, the definition on school choice allows competition to occur among public and private schools. This view draws criticism for the inclusion of religious schools within a household's choice set even after U.S. Supreme Court upheld the use of government-funded vouchers to attend religious schools in *Zelman v. Simmons-Harris* (2002).

In this case, the Cleveland voucher program allowed for a multitude of schooling options including attending a neighboring public school, a religious private school, a secular private school, and remaining at current public school and receiving tutoring assistance (*Zelman v. Simmons-Harris* 2002). Yet, faced with so many options, ninety-six percent of voucher program participants selected to attend a religiously affiliated private school (*Zelman v. Simmons-Harris* 2002). Investigating the schooling decision by incorporating a variety of school types within the private sector, especially for religious schools, is warranted.

While most Catholic schooling is undertaken at the elementary school level, the focus of academic research on the effects of private schools on performance and measures of educational outcomes has been primarily on Catholic high schools (Sander 2005). The implication of this is that the vast majority of secondary school choice studies are incomplete; the elementary schooling decision of the parents should be included for all secondary school choice analyses. No studies, to my knowledge, isolate this choice made for first grade attendance or achievement at the beginning of a child's academic career using a rich model of private schooling options.

Examining this decision at the start of a child's schooling years is critical for three reasons. First, a student's academic achievement in the first grade predicts academic achievement in his or her junior year of high school (Cunningham and Stanovich 1997). Second, elementary school test performance is an indicator of labor market productivity (Bishop 1989; Loury and Garman 1995; Murnane, Willett, and Levy 1995). Lastly, evidence suggests that students do not switch between schooling alternatives often once a school type is selected. Thus, this decision for first grade may determine a child's entire schooling path. Lee and Marks (1992) report that nearly one-half of their sample of high school seniors attended the same school since kindergarten while Goldhaber (1996) cites the "actual or perceived deleterious effects on children" (p59) as justification as for why parents are unlikely to switch school sectors.

Studies focusing on Catholic schools as a proxy for all private education or all private religious education are missing important variances within the private school sector, especially at the elementary schooling grades. While treating a household's choice between public and private school as synonymous with a choice between public and Catholic schools may have been appropriate when examining the educational choices of households in the 1970s and 1980s, since then there have been numerous changes in the composition of private schools, which precipitate the need to examine the effects of attending religious private schools rather than Catholic private schools alone (Chubb and Moe 1990; Gaziel 1997). Catholic schools no longer constitute the majority of religiously affiliated private schools. While Catholic has fallen, there has been an increase in private schools, especially conservative Christian private schools (Sander 2005).

5.2 School Choice Results

In this dissertation, I move beyond admitting these private sector differences are present to augment the scope of this choice by offering a rich model that incorporates the different types of private schools. In addition to including the public schooling option, my dissertation offers the most detailed typology of private schools to date by separating private schools into four distinct categories: Catholic, Evangelical or Fundamental Protestant (Evangelical), Mainline Protestant or Other Faith (Protestant), and Secular. Focusing on the determinants of school selection enhances the policy forum regarding vouchers, tuition tax credits, and school choice (Lankford, Lee, and Wykcoff 1995).

When estimating the choice of school to attend, I find kindergarten test performance, household income, and parental education levels are important factors in selecting a school. Additionally, religiosity of the household and denomination membership in a county are significant determinants. The two simulations presented indicate that not all voucher recipients would attend the same type of private school. In particular, the differences appear to follow racial lines. I observe in both simulations that white and Hispanic, in different households and area environments, exhibit very similar predicted enrollment probabilities among varying school types. Evidence suggests that African-American girls respond differently to school selection than white and Hispanic girls do. The predicted probabilities in the simulations demonstrate that households do not view all private schools as identical. In particular, the probability patterns over a change in income are very different for Evangelical and Protestant school types.

Clearly, an increase in private school attendance does not translate to uniform enrollment increases at all types of private schools. White and Hispanic girls display

similar patterns for Catholic and Protestant schools. African-American and white girls select Evangelical schools in analogous trends. Thus, the design of voucher and school choice programs should be examined to accommodate different choices made by different households, especially along racial and ethnic divisions. Findings indicate that a voucher program affects the diversity of student populations in private schools differently depending on the type of private school.

5.3 Comparative Performance Results

In general, school choice proponents deem that competition is required in order to incite transformation within public schools. The choice-based market-driven approach employed by voucher programs forces underperforming schools to improve due to newfound competition from higher performing challengers (Hoxby 1994; Chubb and Moe 1990). Some purport that these better performing schools are located in the private sector by reasoning that private schools are forced to be more efficient in their operations and instructional methods, which leads to better schools that yield higher levels academic achievement for students (Bryk, Lee, and Holland 1993, p.268-9; Harris 2000; Hallinan 2000).

Some studies have called for the incorporation of Catholic school curriculum into the public school system as part of the reform of education system in the United States (Bushweller 1997; Hudolin-Gabin 1994). However, the foundation of these policies is the underlying assumption that private schools, not their students, are generating the higher test scores. Critics argue that selection and omitted variable biases generate these observed positive effects for students rather than private school superiority. This essay attempts to address criticisms of previous studies by using test scores from a student's

entrance into kindergarten to control for his or her ability and a host of other unobservable characteristics.

By controlling for previous test scores, it is possible to disentangle the selection effect. Studies that do not control for prior student ability cannot be regarded as justification in support of or opposition to the existence of a positive private school effect (Peterson and Llaudet 2006). I seek to examine whether these higher first grade test scores are the result of selection into the private sector (i.e., better students enrolling in private schools) or preeminence of the private sector (i.e., private schools are better than public ones).

Findings suggest that, while a student's ability is the driving force behind first grade achievement, the type of school attended in first grade does affect a child's test score for all three tests. In particular, achievement estimations indicate that first grade private school enrollment transforms below average achievers in kindergarten into better students in the first grade, relative to their low achieving peers. Yet, private schools offer no significant benefit for first grade enrollment to high achieving kindergarten students. Above average kindergarten students see an increase in their first grade reading scores by attending an Evangelical or Secular school for first grade. High achieving kindergarten students, in many cases, experience a significant decrease in first grade achievement scores because of private school enrollment, especially for Catholic school.

Findings indicate that private school enrollment does not affect all students in the same manner. Enabling private school enrollment for all students, through school choice and voucher programs, as a means of attaining blanket school reform is not optimal. In effort to obtain higher a student achievement level, evidence suggests that reforms should

tailor private school attendance for different student performance levels. High achieving kindergarten students should not attend any type of private school in effort to gain higher first grade test scores. Evangelical and Protestant first grade enrollment benefits students who are above average kindergarten achieving students. Private school attendance in first grade, however, does transform below average achievers in kindergarten into better students in the first grade. Policy reforms should target below average kindergarten students and encourage them to attend Evangelical and Protestant first grade schools while high performing kindergarten students should be enticed to remain in public schools. Further investigation is warranted to investigate the possible explanations for why these different school types affect different students in very different ways.

For a child's first grade math test score, living in a state that requires kindergarten attendance significantly reduced a child's score. I find no significant result for the reading and general knowledge tests. This finding for mandatory kindergarten programs for math tests is surprising since many presume mathematics is what schools teach. Since a child's home environment strongly influences reading ability, research has focused attention to mathematics achievement in effort to capture more of a school's contribution to a child's education (Lubienski and Lubienski 2006; Figlio and Stone 1999; Bryk, Lee, and Holland 1993; Heyneman 2005). This finding suggests that mandatory kindergarten states have kindergarten programs with different emphases than those found in non-mandatory kindergarten states. A comprehensive examination of mathematics curriculum in mandatory and non-mandatory kindergarten programs is needed to explore this further.

5.4 Concluding Remarks

No studies, to my knowledge, isolate this choice made for first grade attendance or achievement at the beginning of a child's academic career using a rich model of four private schooling options. In addition to including the public schooling option, I offer the most detailed typology of private schools to date by separating private schools into four distinct categories: Catholic, Evangelical or Fundamental Protestant (Evangelical), Mainline Protestant or Other Faith (Protestant), and Secular.

Catholic schools no longer constitute the majority of religiously affiliated private schools so it is imperative to account for this diversity within the private school sector. Hence, studies focusing on Catholic schools as a proxy for all private education or all private religious education are missing important variances within the private school sector, especially at the elementary schooling grades.

As students progress from elementary school to high school, an observed downward trend in Catholic school enrollment, as well as private school enrollment overall, indicates that there is some attrition from the private school sector. Most private schooling occurs at the elementary school level while the majority of school choice works fail to acknowledge the primary schooling grades in any manner. The implication is that the vast majority of secondary school choice studies are incomplete. Examining the school choice decision at the first grade level, as opposed to the high school grades, is crucial. Parents are not likely to switch their children among school types at any grade level once determining this schooling decision. Additionally, performance in elementary school links to high school achievement and labor market productivity.

When estimating the choice of school to attend, I find kindergarten test performance, household income, and parental education levels are important factors in selecting a school. Additionally, religiosity of the household and denomination membership in a county are significant determinants. Clearly, an increase in private school attendance does not translate to uniform enrollment increases at all types of private schools. White and Hispanic girls display similar patterns for Catholic and Protestant schools. African-American and white girls select Evangelical schools in analogous trends. Thus, the design of voucher and school choice programs should be examined to accommodate different choices made by different households, especially along racial and ethnic divisions. Findings indicate that a voucher program affects the diversity of student populations in private schools differently depending on the type of private school.

Findings suggest that, while a student's ability is the driving force behind first grade achievement, the type of school attended in first grade does affect a child's test score for all three tests. In particular, achievement estimations indicate that first grade private school enrollment transforms below average achievers in kindergarten into better students in the first grade, relative to their low achieving peers. Yet, private schools offer no significant benefit for first grade enrollment to high achieving kindergarten students. Above average kindergarten students see an increase in their first grade reading scores by attending an Evangelical or Secular school for first grade. High achieving kindergarten students, in many cases, experience a significant decrease in first grade achievement scores because of private school enrollment, especially for Catholic school.

Findings indicate that private school enrollment does not affect all students in the same manner. Enabling private school enrollment for all students, through school choice and voucher programs, as a means of attaining blanket school reform is not optimal. In effort to obtain higher a student achievement level, evidence suggests that reforms should tailor private school attendance for different student performance levels.

Appendix A: Glenmary Research Center's Theology Listing of Churches

Roman Catholic

Evangelical or Fundamental Protestant

- Two-Seed-in-the-Spirit Predestinarian Baptists
- Church of the Lutheran Confession
- Fundamental Methodist Conference, Inc.
- Pentecostal Church of God
- Allegheny Wesleyan Methodist Connection
- Church of the Brethren
- General Six Principle Baptists
- International Pentecostal Holiness Church
- Advent Christian Church
- Church of the Lutheran Brethren of America
- Hutterian Brethren
- Presbyterian Church in America
- African Methodist Episcopal Zion Church
- Church of the Nazarene
- Independent Fundamental Churches of America
- Primitive Advent Christian Church
- American Baptist Association, The
- Christian and Missionary Alliance, The
- Independent, Charismatic Churches
- Primitive Baptists Associations
- Amish
- Christian Brethren
- Independent, Non-Charismatic Churches
- Primitive Baptist Churches--Old Line
- Apostolic Christian Churches (Nazarene)
- Christian Churches and Churches of Christ
- Independent Free Will Baptists Associations
- Primitive Baptists, Eastern District Association of
- Apostolic Christian Church of America, Inc.
- Christ Catholic Church
- International Churches of Christ
- Primitive Methodist Church in the USA

Evangelical or Fundamental Protestant (Continued)

- Apostolic Lutheran Church of America
- Christian Reformed Church in North America
- International Church of the Foursquare Gospel
- Progressive Primitive Baptists
- Associate Reformed Presbyterian Church Christian Union
- International Pentecostal Church of Christ
- The Protestant Conference (Lutheran)
- Assemblies of God
- Churches of Christ
- Interstate & Foreign Landmark Missionary Baptists Association
- Protestant Reformed Churches in America
- Baptist General Conference
- Community of Christ
- Jasper Baptist and Pleasant Valley Baptist Associations
- Reformed Baptist Churches
- Baptist Missionary Association of America
- Conservative Mennonite Conference
- Landmark Missionary Baptists, Independent Associations and Unaffiliated Churches
- Reformed Episcopal Church
- Beachy Amish Mennonite Churches
- Conservative Baptist Association of America
- American Association of Lutheran Churches
- Reformed Mennonite Church
- Central Baptist Association Ministries
- Evangelical Lutheran Synod
- New Testament Association of Independent
- Baptist Churches and other Fundamental
- Baptist Associations/Fellowships
- Southwide Baptist Fellowship
- Church of God in Christ, Mennonite
- Evangelical Mennonite Church
- Old Missionary Baptists Associations
- Truevine Baptists Association
- Church of God General Conference
- Evangelical Methodist Church
- Old Order Amish Church
- Church of the United Brethren in Christ
- Church of God (Anderson, Indiana)
- Evangelical Presbyterian Church
- Old Order Mennonite

Evangelical or Fundamental Protestant (Continued)

- United Christian Church
- Church of God (Cleveland, Tennessee)
- Fellowship of Evangelical Bible Churches
- Old Order River Brethren
- United Reformed Churches in North America
- Church of God, Mountain Assembly, Inc.
- Fire Baptized Holiness Church, (Wesleyan), The
- Old Regular Baptists
- United Baptists
- Church of God of Prophecy
- Association of Free Lutheran Congregations, The
- Open Bible Standard Churches, Inc.
- Vineyard USA
- Berean Fundamental Church
- Conservative Congregational Christian Conference
- Lutheran Church--Missouri Synod
- General Association of Regular Baptist Churches
- Bible Church of Christ, Inc.
- Cumberland Presbyterian Church
- Mennonite Brethren Churches, U.S. Conference of
- Regular Baptists
- Black Baptists Estimate
- Duck River and Kindred Baptists Associations
- Mennonite Church USA
- Seventh-day Adventist Church
- Brethren Church, The (Ashland, Ohio)
- Eastern Pennsylvania Mennonite Church
- Mennonite; Other Groups
- Salvation Army, The
- Brethren In Christ Church
- Enterprise Baptists Association
- Midwest Congregational Christian Fellowship
- Schwenkfelder Church
- Barren River Missionary Baptists
- Evangelical Congregational Church, The
- Missionary Church, The

Evangelical or Fundamental Protestant (Continued)

- Seventh Day Baptist General Conference, USA and Canada
- Bruderhof Communities, Inc.
- Evangelical Covenant Church, The
- National Primitive Baptist Convention, USA
- Separate Baptists in Christ
- Calvary Chapel Fellowship Churches
- Evangelical Free Church of America, The
- New Hope Baptist Association
- Southern Baptist Convention
- Church of God (Seventh Day)
- Free Methodist Church of North America
- Original Free Will Baptists
- Churches of God, General Conference
- National Association of Free Will Baptists
- Orthodox Presbyterian Church, The
- Wisconsin Evangelical Lutheran Synod
- Strict Baptists
- Wesleyan Church, The
- Wayne Trail Missionary Baptist Association

Mainline Protestant or Other Faith

- Albanian Orthodox Diocese of America
- Estonian Evangelical Lutheran Church
- Netherlands Reformed Congregations
- United Methodist Church, The
- American Baptist Churches in the USA
- Friends (Quakers)
- Orthodox Church in America: Albanian Orthodox Archdiocese
- Bahá'í
- Antiochian Orthodox Christian Archdiocese of North America, The
- Greek Orthodox Archdiocese of Vasiloupulis
- Orthodox Church in America: Bulgarian Diocese
- Buddhism
- Armenian Apostolic Church / Catholicossate of Cilicia
- Greek Orthodox Archdiocese of America
- Orthodox Church in America: Romanian Orthodox Episcopate of America
- Church of Christ, Scientist
- Armenian Apostolic Church / Catholicossate of Etchmiadzin
- Holy Orthodox Church in North America
- Orthodox Church in America: Territorial Dioceses
- Hindu

Mainline Protestant or Other Faith (continued)

- Apostolic Catholic Assyrian Church of the East, North American Dioceses
- International Council of Community Churches
- Presbyterian Church (U.S.A.)
- Jain
- Bulgarian Orthodox Diocese of the USA
- Latvian Evangelical Lutheran Church in America
- Reformed Church in America
- Jewish Estimate
- Byelorussion Council Of Orthodox Churches In North America
- Macedonian Orthodox Church: American Diocese
- Reformed Church in the United States
- Church of Jesus Christ of Latter-day Saints, The
- American Carpatho-Russian Orthodox Greek Catholic Church
- Malankara Orthodox Syrian Church, American Diocese of the
- Russian Orthodox Church Outside of Russia
- Muslim Estimate
- Christian Church (Disciples of Christ)
- Malankara Archdiocese of the Syrian Orthodox Church in North America
- Patriarchal Parishes of the Russian Orthodox Church in the USA
- Sikh
- Congregational Christian Churches, Additional (not part of any national CCC body)
- Universal Fellowship of Metropolitan Community Churches
- Serbian Orthodox Church in the USA
- Tao
- National Association of Congregational Christian Churches
- Moravian Church in America--Alaska Province
- Serbian Orthodox Church in the USA (New Gracanica Metropolitanate)

Mainline Protestant or Other Faith (continued)

- Unitarian Universalist Association of Congregations
- Coptic Orthodox Church
- Moravian Church in America--Northern Province
- Syrian Orthodox Church of Antioch
- Zoroastrian
- Evangelical Lutheran Church in America
- Moravian Church in America--Southern Province
- Ukrainian Orthodox Church of the USA
- Episcopal Church
- North American Baptist Conference
- United Church of Christ

Appendix B: Nested Data Details, Chapter Three

Appendix B, Table B.1a: Sample Size Details for Nested Data, Three Types of Private Schools

	Overall	Public	Private	Catholic	Other Religious	Secular
Number of students	8,460	6,550	1,910	1,195	555	160
Number of schools	1,230	990	240	125	75	40
Number of counties	310	275	170	105	75	30
Number of states	45	40	40	30	30	15

Student is level of observation for this essay.
Sample sizes are rounded to comply with NCES restricted use data reporting standards.

Appendix B, Table B.1b: Sample Size Details for Nested Data, Four Types of Private Schools

	Overall	Public	Private	Catholic	Evangelical or Fundamental Protestant	Mainline Protestant or Other Faith	Secular
Number of students	8,460	6,550	1,910	1,195	385	170	160
Number of schools	1,230	990	240	125	55	20	40
Number of counties	310	275	170	105	55	25	30
Number of states	45	40	40	30	25	15	15

Student is level of observation for this essay.
Sample sizes are rounded to comply with NCES restricted use data reporting standards.

Appendix B, Table B.2: Summary Mean Statistics for Other Religious, Detailed

Variable	Evangelical or Fundamental Protestant	Mainline Protestant or Other Faith
Male	0.47	0.51
White	0.81	0.81
Black	0.09	0.02
Hispanic	0.06	0.09
Asian	0.01	0.04
Multiracial	0.03	0.04
Fall Reading, K	7.42	8.48
Spring Reading, K	12.10	12.16
Fall Math, K	5.87	7.14
Spring Math, K	9.18	9.70
Fall General, K	6.31	6.73
Spring General, K	7.71	8.22
Siblings	1.35	1.67
Mother, Some High School	0.01	0.01
Mother, High School	0.23	0.10
Mother, Some College	0.40	0.26
Mother, BA	0.28	0.37
Mother, Advanced	0.07	0.27
Father, Some High School	0.02	0.01
Father, High School	0.24	0.10
Father, Some College	0.26	0.13
Father, BA	0.24	0.30
Father, Advanced	0.10	0.33
Religiousity, Head	0.65	0.51
Religiosity, Spouse	0.49	0.45
Single Parent	0.15	0.13
Northeast	0.11	0.20
Midwest	0.46	0.20
South	0.27	0.31
West	0.16	0.29

Appendix B, Table B.2: Summary Mean Statistics for Other Religious, Detailed (continued)

Variable	Evangelical or Fundamental Protestant	Mainline Protestant or Other Faith
Urban	0.67	0.99
Income, 0-15	0.02	0.01
Income, 15-20	0.02	0.01
Income, 20-25	0.04	0.02
Income, 25-30	0.05	0.03
Income, 30-35	0.05	0.02
Income, 35-40	0.07	0.08
Income, 40-50	0.16	0.10
Income, 50-75	0.29	0.15
Income, 75-100	0.13	0.15
Income, 100-200	0.09	0.20
Income, 200+	0.03	0.15
House Value, County [a]	115,433	148,867
Income, County [a]	43,303	45,842
White, County [a]	0.75	0.63
Catholic, County [b]	0.24	0.31
Evangelical, County [b]	0.18	0.09
Protestant, County [b]	0.15	0.18
Student-Teacher, Public [a]	16.50	15.91
Black, Public [a]	13.24	26.65
Hispanic, Public [a]	13.47	17.26
Free Lunch [a]	24.86	32.65
Number of observations	385	170

Source: Unless otherwise indicated, data are from the restricted use ECLS-K, 1999-2000.

Note: Sample sizes, means, and standard deviations are all the unweighted ECLS-K reporting samples. They are not weighted to represent students and schools nationwide. Sample sizes are rounded to comply with NCES restricted use data reporting standard

[a] denotes Census 2000 data

[b] denotes Glenmary Research Center's 2000 Religious Congregations & Membership Data

Appendix B, Table B.3: Minimum and Maximum Values for Continuous Variables

Variable	Minimum	Maximum
Fall Reading, K	0	20
Spring Reading, K	0	20
Fall Math, K	0	16
Spring Math, K	0	16
Fall General, K	0	12
Spring General, K	0	12
Siblings	0	10
House Value, County [a]	42,800	493,300
Income, County [a]	20,566	82,929
White, County [a]	0.17	0.99
Catholic, County [b]	0.01	0.62
Evangelical, County [b]	0.01	0.60
Protestant, County [b]	0.02	0.73
Student-Teacher, Public [a]	0	22.60
Black, Public [a]	0	97
Hispanic, Public [a]	0	84.83
Free Lunch [a]	0	92.31

Source: Unless otherwise indicated, data are from the retricted use ECLS-K, 1999-2000.

[a] denotes Census 2000 data

[b] denotes Glenmary Research Center's 2000 Religious

Appendix C: Simulations

Simulation Values

FEMALE
FOR Male = 0

AVERAGE TEST SCORES
50% FOR Fall Reading, K = 6
50% FOR Spring Reading, K = 11
50% FOR Fall Math, K = 5
50% FOR Spring Math, K = 8
50% FOR Fall General, K = 5
50% FOR Spring General, K = 7

3 SIBLINGS
FOR Siblings = 3

HS MOM
FOR Mother, High School = 1

SOME HS DAD
FOR Father, Some High School = 1

NOT RELIGIOUS
FOR Religiousity, Head = 0
FOR Religiousity, Spouse = 0

SINGLE PARENT HOUSEHOLD
FOR Single Parent = 1

URBAN
FOR Urban = 1

NE
FOR Northeast = 1

IN POOR AREA
25% FOR House Value, County =84200
25% FOR Income, County =36868
25% FOR White, County =0.5750737

BELOW AVERAGE ADHERENTS
25% FOR Catholic, County = 0.1000463
25% FOR Evangelical, County = 0.0502003
25% FOR Protestant, County = 0.096914

BAD SCHOOLS
95% FOR Student-Teacher, Public = 22.1
95% FOR Black, Public = 57.89474
75% FOR Hispanic, Public = 16.89877
95% FOR Free Lunch = 55.28964

Simulation Values

FEMALE
FOR Male = 0

AVERAGE TEST SCORES
50% FOR Fall Reading, K = 6
50% FOR Spring Reading, K = 11
50% FOR Fall Math, K = 5
50% FOR Spring Math, K = 8
50% FOR Fall General, K = 5
50% FOR Spring General, K = 7

0 SIBLINGS
FOR Siblings = 0

MOM BA
FOR Mother, BA = 1

DAD BA
FOR Father, BA = 1

RELIGIOUS
FOR Religiosity, Head = 1
FOR Religiosity, Spouse = 1

TWO PARENT HOUSEHOLD
FOR Single Parent = 1

URBAN
FOR Urban = 1

NE
FOR Northeast = 1

AVERAGE AREA
50% FOR House Value, County =110100
50% FOR Income, County =42189
50% FOR White, County =0.7450405

AVERAGE ADHERENTS
50% FOR Catholic, County =0.2153982
50% FOR Evangelical, County =0.0927293
50% FOR Protestant, County =0.1251003

HORRIBLE PUBLIC SCHOOLS
90% FOR Student-Teacher, Public =21.1
90% FOR Black, Public =41.82828
90% FOR Hispanic, Public =39.69226,
90% FOR Free Lunch=50.76366

Table C.1: Values Used in Simulations

	Percentile										
Variable Name	0	1	5	10	20	25	30	40	50	60	70
Fall Reading, K	0	0	1	2	3	4	4	5	6	7	8
Spring Reading, K	0	2	4	6	8	8	9	10	11	12	13
Fall Math, K	0	0	1	2	3	3	3	4	5	6	7
Spring Math, K	0	1	3	4	6	6	7	8	8	9	10
Fall General, K	0	0	1	1	3	3	4	4	5	6	7
Spring General, K	0	1	2	3	5	5	6	7	7	8	9
House Value, County	23,100	39,700	61,000	68,900	82,900	84,200	86,800	96,600	110,100	123,540	148,500
Income, County	17,235	20,035	30,134	33,313	35,867	36,868	38,173	39,978	42,189	45,062	47,617
White, County	0.044	0.170	0.311	0.421	0.513	0.575	0.615	0.689	0.745	0.820	0.865
Catholic, County	0.000	0.002	0.027	0.044	0.090	0.100	0.128	0.174	0.215	0.267	0.346
Evangelical, County	0.000	0.016	0.020	0.026	0.047	0.050	0.059	0.074	0.093	0.120	0.175
Protestant, County	0.019	0.031	0.057	0.070	0.091	0.097	0.102	0.119	0.125	0.133	0.154
Student-Teacher, Public	0.00	0.00	0.00	13.46	14.20	14.70	15.00	15.70	16.20	16.80	17.70
Black, Public	0.00	0.00	0.23	0.66	1.46	2.69	3.59	6.69	11.22	13.94	19.89
Hispanic, Public	0.00	0.00	0.25	0.46	0.82	1.25	1.88	3.21	4.77	7.94	14.43
Free Lunch	0.00	0.00	0.00	0.00	11.48	12.60	16.10	20.61	22.84	27.44	32.56

Table C.1: Values Used in Simulations (continued)

	Percentile					
Variable Name	75	80	90	95	99	100
Fall Reading, K	9	10	12	13	18	20
Spring Reading, K	13	14	16	18	20	20
Fall Math, K	7	8	9	10	13	16
Spring Math, K	10	11	12	13	15	16
Fall General, K	8	8	9	10	11	12
Spring General, K	9	10	10	11	12	12
House Value, County	154,300	173,800	212,000	253,000	422,600	493,300
Income, County	48,655	52,102	61,455	65,288	74,335	82,929
White, County	0.886	0.914	0.947	0.967	0.978	0.986
Catholic, County	0.367	0.399	0.457	0.515	0.542	0.602
Evangelical, County	0.204	0.211	0.337	0.418	0.583	0.664
Protestant, County	0.171	0.176	0.211	0.275	0.595	0.728
Student-Teacher, Public	18.10	18.80	21.10	22.10	22.40	22.60
Black, Public	23.98	28.93	41.83	57.89	92.24	97.82
Hispanic, Public	16.90	23.04	39.69	58.69	60.79	84.83
Free Lunch	35.13	39.63	50.76	55.29	71.83	93.12

Appendix D: Observations by Test Score and Grade

Table D.1a: Fall Reading Scores, Kindergarten

Score	Overall	Public	Catholic	Other Religious	Secular
0	285	255	20	5	5
1	475	430	30	10	5
2	525	455	40	20	5
3	625	525	65	35	5
4	880	705	105	50	20
5	870	685	115	45	20
6	745	565	115	50	15
7	650	475	110	50	15
8	585	420	100	40	30
9	520	370	90	35	20
10	495	340	85	45	25
11	420	285	75	40	20
12	440	310	70	40	25
13	175	110	20	20	25
14	95	65	15	10	10
15	75	45	10	10	5
16	50	25	10	5	10
17	30	20	5	0	5
18	40	30	10	5	0
19	30	20	0	0	10
20	30	15	5	0	5
Total	8,040	6,150	1,095	515	280

Table D.1b: Spring Reading Scores, First Grade

Score	Overall	Public	Catholic	Evangelical	Protestant	Secular
0	285	260	20	5	0	0
1	475	435	30	10	5	0
2	525	470	40	15	0	0
3	625	525	65	20	15	0
4	880	710	105	40	15	10
5	870	690	125	35	10	10
6	745	570	115	40	10	10
7	650	480	110	35	15	10
8	585	430	100	25	15	15
9	520	370	95	25	10	10
10	495	350	85	35	15	15
11	420	295	80	25	15	10
12	440	310	70	20	20	15
13	175	115	25	10	5	20
14	95	70	15	5	0	5
15	75	50	10	5	0	5
16	50	25	10	5	0	10
17	30	20	5	0	0	5
18	40	30	10	5	0	0
19	30	25	0	0	0	5
20	30	15	10	0	5	0
Total	8,040	6,245	1,125	360	155	155

Sample sizes are rounded to comply with NCES restricted use data reporting standards.

Table D.2a: Fall Math Scores, Kindergarten

Score	Overall	Public	Catholic	Other Religious	Secular
0	185	170	5	10	0
1	495	445	30	10	10
2	790	680	60	30	20
3	925	745	110	50	20
4	1,030	815	130	60	25
5	1,050	805	155	60	30
6	930	695	140	70	25
7	750	530	130	60	30
8	650	470	95	55	30
9	510	350	90	40	30
10	335	210	65	35	25
11	190	120	40	15	15
12	95	55	15	10	15
13	45	30	10	0	5
14	40	20	10	10	0
15	15	10	5	0	0
16	5	0	5	0	0
Total	8,040	6,150	1,095	515	280

Table D.2b: Spring Math Scores, First Grade

Score	Overall	Public	Catholic	Evangelical	Protestant	Secular
0	185	170	10	5	0	0
1	495	450	30	10	5	0
2	790	685	70	30	0	5
3	925	750	115	40	10	10
4	1,030	825	130	45	10	20
5	1,050	820	155	40	20	15
6	930	710	140	45	20	15
7	750	540	130	40	20	20
8	650	475	100	35	20	20
9	510	360	95	25	15	15
10	335	215	65	25	15	15
11	190	125	40	10	5	10
12	95	60	15	5	10	5
13	45	30	10	0	0	5
14	40	20	10	5	5	0
15	15	10	5	0	0	0
16	5	0	5	0	0	0
Total	8,040	6,245	1,125	360	155	155

Sample sizes are rounded to comply with NCES restricted use data reporting standards.

Table D.3a: Fall General Knowledge Scores, Kindergarten

Score	Overall	Public	Catholic	Other Religious	Secular
0	285	260	15	5	5
1	530	470	35	15	10
2	740	635	65	25	15
3	830	685	85	40	20
4	825	670	85	55	15
5	875	675	130	45	25
6	930	690	135	75	30
7	920	675	140	65	40
8	765	525	140	65	35
9	635	415	120	65	35
10	425	275	90	35	25
11	210	130	40	20	20
12	70	45	15	5	5
Total	8,040	6,150	1,095	515	280

Table D.3b: Spring General Knowledge Scores, First Grade

Score	Overall	Public	Catholic	Evangelical	Protestant	Secular
0	285	260	15	10	0	0
1	530	480	30	10	5	5
2	740	645	65	15	5	10
3	830	695	85	35	5	10
4	825	670	90	40	10	15
5	875	685	135	30	10	15
6	930	695	145	50	25	15
7	920	690	145	45	20	20
8	765	535	140	45	25	20
9	635	430	120	40	25	20
10	425	280	95	25	15	10
11	210	135	45	10	10	10
12	70	45	15	5	0	5
Total	8,040	6,245	1,125	360	155	155

Sample sizes are rounded to comply with NCES restricted use data reporting standards.

Appendix E: Nested Data Details, Chapter Four

Appendix E, Table E.1: Sample Size Details for Nested Data, Three Types of Private Schools

	Overall	Public	Private	Catholic	Other Religious	Secular
Number of students	8,040	6,245	1,795	1,125	515	155
Number of schools	1,240	1,000	240	130	70	40
Number of counties	310	280	170	105	75	30
Number of states	45	40	45	30	30	15

Student is level of observation for this essay.
Sample sizes are rounded to comply with NCES restricted use data reporting standards.

Appendix E, Table E.2: Sample Size Details for Nested Data, Four Types of Private Schools

	Overall	Public	Private	Catholic	Evangelical or Fundamental Protestant	Mainline Protestant or Other Faith	Secular
Number of students	8,040	6,245	1,795	1,125	360	155	155
Number of schools	1,240	1,000	240	130	50	20	40
Number of counties	310	280	170	105	55	25	30
Number of states	45	40	45	30	25	15	15

Student is level of observation for this essay.
Sample sizes are rounded to comply with NCES restricted use data reporting standards.

Appendix F: Additional Details Regarding Direct Child Cognitive Assessments

All of the following information is from chapters two and three of the ESLC-K user's manual for the ECLS-K first grade restricted-use data file and electronic codebook (NCES 2002-128, 2-1 – 3-30).

The direct cognitive assessment of each child occurred in two stages. First, the child answered between twelve and twenty questions on a routing test.[39] Performance on this routing test determined which second stage test the child was given. The reading and mathematics tests had three alternate exams for this second stage of assessment while the general knowledge test only had two alternate exams.

Within the reading test, the hierarchical score was letter recognition (upper and lower case letters by name), then beginning sounds (associating letters and sounds at the beginning of words), then ending sounds (associating letters and sounds at the end of words), then site words (recognizing common words by site), and then comprehension of a words in context (reading words in context).

Within the mathematics test, it was number and shape (identifying some one digit numerals, recognizing geometric shapes, and one to one counting of up to ten objects), then relative size (reading all single-digit numbers numerals, counting beyond ten, recognizing a sequence of patterns, and using nonstandard units of length to compare objects), then order and sequence (reading two digit numbers, recognizing the next number in a sequence, identifying the ordinal position of an object, and solving a simple word problem), then addition and subtraction (solving simple addition and subtraction

[39] There were separate reading, mathematics, and general knowledge routing tests. Each of these three tests had at least 12 questions, but no more than 20 questions, to assess and assign the student to the second stage test having the appropriate level of difficulty.

problems), and then followed by multiplication and division (solving simple multiplication and division problems, and recognizing more complex number patterns).

Questions for the general knowledge test did not follow a hierarchical pattern. Questions measured knowledge in the natural sciences and social studies. The science domain included questions from the fields of earth, space, physical, and life sciences. The social studies portion of this test covered questions about history, government, culture, geography, economics, and law. Many questions related to more than one of the categories. This test captured information of children's conceptions and understanding of the social, physical, and natural world and of their ability to draw inferences and comprehend implications.

Appendix G: Correlation Table

	Fall Reading, K	Fall Math, K	Fall General, K	Spring Reading, First	Spring Math, First	Spring General, First	Catholic, First	Evangelical, First	Protestant, First	Secular, First	Catholic, K	Other Religious, K	Secular, K
Fall Reading, K	1.00												
Fall Math, K	0.66	1.00											
Fall General, K	0.43	0.55	1.00										
Spring Reading, First	0.51	0.50	0.36	1.00									
Spring Math, First	0.45	0.61	0.48	0.55	1.00								
Spring General, First	0.38	0.48	0.66	0.43	0.52	1.00							
Catholic, First	0.09	0.11	0.13	0.08	0.07	0.10	1.00						
Evangelical, First	0.05	0.04	0.07	0.07	0.04	0.06	-0.09	1.00					
Protestant, First	0.07	0.09	0.07	0.06	0.06	0.04	-0.06	-0.03	1.00				
Secular, First	0.13	0.09	0.07	0.05	0.04	0.05	-0.06	-0.03	-0.02	1.00			
Catholic, K	0.08	0.11	0.13	0.09	0.07	0.10	0.95	-0.08	-0.06	-0.05	1.00		
Other Religious, K	0.08	0.08	0.08	0.09	0.07	0.07	-0.10	0.78	0.47	-0.02	-0.10	1.00	
Secular, K	0.15	0.11	0.09	0.04	0.05	0.06	-0.02	-0.04	0.06	0.68	-0.08	-0.05	1.00

Appendix H: Mandatory Kindergarten States

Yes	No
Alabama	Alaska
Arizona	California
Arkansas	Colorado
Delaware	Connecticut
District of Columbia	Georgia
Florida	Hawaii
Louisiana	Idaho
Maryland	Illinois
New Mexico	Indiana
Ohio	Iowa
Oklahoma	Kansas
Rhode Island	Kentucky
South Carolina	Maine
Tennessee	Massachusetts
Utah	Michigan
Virginia	Minnesota
West Virginia	Mississippi
	Missouri
	Montana
	Nebraska
	Nevada
	New Hampshire
	New Jersey
	New York
	North Carolina
	North Dakota
	Oregon
	Pennsylvania
	South Dakota
	Texas
	Vermont
	Washington
	Wisconsin
	Wyoming

Source: Table 150, 2002 Digest of Education Statistics

Appendix I: Percentiles for K Test Scores

Reading Test, K	
Percentile	Value
0	0
1	0
5	1
10	2
20	3
25	4
30	4
40	5
50	6
60	7
70	8
75	9
80	10
90	12
95	13
99	18
100	20

Math Test, K	
Percentile	Value
0	0
1	0
5	1
10	2
20	3
25	3
30	4
40	4
50	5
60	6
70	7
75	7
80	8
90	9
95	10
99	13
100	16

General Knowledge, K	
Percentile	Value
0	0
1	0
5	1
10	1
20	3
25	3
30	4
40	5
50	5
60	6
70	7
75	8
80	8
90	9
95	10
99	11
100	12

Note: The separations for the first, second, third, and fourth quartiles occur at the twenty-fifth, fiftieth, and seventy-fifth percentiles, respectively, for the reading and math tests. The general knowledge test employs the same first and second quarti

Low	1-4
Below Average	5-6
Above Average	7-9
High	10-20

Low	1-3
Below Average	4-5
Above Average	6-7
High	8-16

Low	1-3
Below Average	4-5
Above Average	6-8
High	9-12

Appendix J: Additional Regression Results

Table J.1: First Differences with and without Kindergarten Test Scores

	Reading, First - Reading, K		Math, First - Math, K		General, First - General, K	
	(1)	(2)	(3)	(4)	(5)	(6)
Fall Reading, K		-0.778		0.04		0.023
		(86.83)***		(5.55)***		(3.62)***
Fall Math, K		0.232		-0.614		0.114
		(18.66)***		(61.46)***		(12.82)***
Fall General, K		0.087		0.173		-0.581
		(7.01)***		(15.30)***		(60.37)***
Catholic, First	-0.037	-0.055	-0.19	-0.17	-0.527	-0.221
	(0.11)	(0.22)	(0.79)	(0.81)	(2.36)**	(1.29)
Evangelical, First	0.428	0.375	-0.066	-0.115	-0.465	0.126
	(0.81)	(1.45)	(0.22)	(0.57)	(1.33)	(0.44)
Protestant, First	-0.245	0.151	-0.585	-0.054	-0.984	-0.319
	(0.38)	(0.50)	(2.06)**	(0.27)	(2.72)***	(1.16)
Secular, First	-0.602	0.503	-0.264	-0.038	-0.132	0.07
	(1.14)	(1.33)	(1.06)	(0.16)	(0.54)	(0.31)
Catholic, K	-0.355	0.247	-0.325	0.076	0.017	0.283
	(1.07)	(0.98)	(1.31)	(0.36)	(0.07)	(1.63)
Other Religious, K	-0.563	0.21	-0.172	0.164	0.09	0.069
	(1.09)	(0.83)	(0.64)	(0.90)	(0.28)	(0.26)
Secular, K	-2.417	-0.828	-1.021	-0.393	-0.568	-0.098
	(6.68)***	(2.64)***	(5.45)***	(1.96)*	(2.99)***	(0.47)
Constant	11.038	14.2	7.355	9.312	3.91	6.156
	(171.37)***	(122.38)***	(175.46)***	(100.62)***	(110.12)***	(68.75)***
Observations	8040	8040	# 8040	8040	# 8040	8040
R-squared	0.02	0.56	0.01	0.38	0.01	0.46

Note: Robust t-statistics in parentheses

*p<0.10 ; **p<0.05 ; ***p<0.01

Sample sizes are rounded to comply with NCES restricted use data reporting standards.

Table J.2: OLS Results without Kindergarten Test Scores

	Spring Reading, First	Spring Math, First	Spring General, First
Catholic, First	-0.283	-0.369	-0.327
	(0.78)	(1.29)	(1.62)
Evangelical, First	0.579	0.166	0.509
	(1.92)*	(0.61)	(1.46)
Protestant, First	0.448	0.307	0.077
	(1.42)	(0.92)	(0.20)
Secular, First	0.737	0.072	0.327
	(1.77)*	(0.22)	(1.02)
Catholic, K	0.634	0.48	0.549
	(1.79)*	(1.67)*	(2.66)***
Other Religious, K	0.237	0.087	-0.151
	(0.80)	(0.34)	(0.46)
Secular, K	-0.314	0.06	0.157
	(0.83)	(0.20)	(0.52)
Male	-0.359	0.235	0.161
	(6.20)***	(4.54)***	(3.68)***
Black	-1.194	-1.762	-1.657
	(8.22)***	(13.81)***	(12.86)***
Hispanic	-0.737	-0.902	-1.141
	(6.38)***	(9.19)***	(12.98)***
Asian	0.321	-0.241	-1.232
	(2.66)***	(1.97)**	(8.69)***
Multiracial	-0.499	-0.796	-0.929
	(2.94)***	(5.30)***	(5.80)***
Child Reads	1.195	0.515	0.319
	(12.50)***	(6.92)***	(4.78)***

Table J.2: OLS Results without Kindergarten Test Scores (continued)

	Spring Reading, First	Spring Math, First	Spring General, First
Siblings	-0.246	0.016	-0.407
	(3.00)***	(0.21)	(6.34)***
Parent Reads	-0.261	-0.279	0.008
	(3.36)***	(4.41)***	(-0.15)
Father, BA	0.425	0.495	0.297
	(6.10)***	(7.87)***	(5.54)***
Mother, BA	0.558	0.646	0.547
	(8.60)***	(10.85)***	(10.75)***
Income, 50+	0.436	0.385	0.439
	(6.03)***	(6.09)***	(8.15)***
Single Parent	-0.406	-0.084	-0.283
	(4.08)***	(1.06)	(3.99)***
Midwest	0.017	0.337	0.208
	(0.16)	(3.12)***	(2.34)**
South	0.296	0.556	0.047
	(2.35)**	(4.71)***	(0.46)
West	0.035	0.203	-0.054
	(0.29)	(1.69)*	(0.51)
Urban	0.415	0.374	0.147
	(3.81)***	(4.09)***	(1.77)*
Mandatory K, State	-0.143	-0.169	-0.004
	(1.26)	(1.91)*	(0.05)
Constant	16.36	11.505	9.005
	(91.69)***	(71.46)***	(68.45)***
Observations	8040	8040	8040
R-squared	0.16	0.17	0.21

Note: Robust t-statistics in parentheses

*p<0.10 ; **p<0.05 ; ***p<0.01

Sample sizes are rounded to comply with NCES restricted use data reporting standards.

Table J.3: Complete OLS Results for Spring Reading, First Grade

	(1)	(2)	(3)	(4)
Catholic, First	0.063	-0.055	0.311	0.147
	(0.19)	(0.22)	(1.07)	(0.48)
Evangelical, First	0.547	0.375	0.77	0.711
	(1.67)*	(1.45)	(2.58)**	(2.41)**
Protestant, First	0.826	0.151	0.771	0.592
	(2.44)**	(0.50)	(2.16)**	(1.69)*
Secular, First	1.065	0.503	0.138	-0.029
	(2.03)**	(1.33)	(0.11)	(0.02)
Catholic, K	0.769	0.247	0.254	0.27
	(2.33)**	(0.98)	(1.01)	(0.98)
Other Religious, K	0.645	0.21	0.184	0.172
	(1.99)**	(0.83)	(0.79)	(0.72)
Secular, K	0.219	-0.828	-0.845	-0.872
	(0.44)	(2.64)***	(2.73)***	(2.93)***
Fall Reading, K		0.222	0.24	0.215
		(24.74)***	(24.00)***	(21.82)***
Fall Math, K		0.232	0.234	0.219
		(18.66)***	(18.84)***	(17.72)***
Fall General, K		0.087	0.084	0.061
		(7.01)***	(6.82)***	(5.39)***
Catholic, First * Fall Reading, K (Below Average Score)			-0.302	-0.262
			(1.58)	(1.39)
Catholic, First * Fall Reading, K (Above Average Score)			-0.178	-0.13
			(1.01)	(0.75)
Catholic, First * Fall Reading, K (High Score)			-1.004	-0.81
			(5.01)***	(4.17)***

Table J.3: Complete OLS Results for Spring Reading, First Grade (continued)

	(1)	(2)	(3)	(4)
Evangelical, First * Fall Reading, K (Below Average Score)			-0.341	-0.377
			(1.23)	(1.40)
Evangelical, First * Fall Reading, K (Above Average Score)			0.009	-0.056
			(0.03)	(0.23)
Evangelical, First * Fall Reading, K (High Score)			-1.066	-0.863
			(4.09)***	(3.43)***
Protestant, First * Fall Reading, K (Below Average Score)			0.099	0.284
			(0.25)	(0.70)
Protestant, First * Fall Reading, K (Above Average Score)			-0.749	-0.778
			(1.49)	(1.62)
Protestant, First * Fall Reading, K (High Score)			-1.087	-0.902
			(3.03)***	(2.71)***
Nonsectarian, First * Fall Reading, K (Below Average Score)			0.59	0.698
			(0.48)	(0.57)
Nonsectarian, First * Fall Reading, K (Above Average Score)			1.077	1.081
			(0.84)	(0.84)
Nonsectarian, First * Fall Reading, K (High Score)			0.007	0.141
			(0.01)	(0.12)
Male				-0.305
				(5.92)***
Black				-0.623
				(4.96)***
Hispanic				-0.172
				(1.70)*
Asian				0.335
				(2.84)***
Multiracial				-0.098
				(0.70)
Child Reads				0.826
				(9.79)***

Table J.3: Complete OLS Results for Spring Reading, First Grade (continued)

	(1)	(2)	(3)	(4)
Siblings				-0.058
				(0.84)
Parent Reads				-0.111
				(1.63)
Father, BA				0.029
				(0.46)
Mother, BA				0.081
				(1.43)
Income, 50+				0.103
				(1.70)*
Single Parent				-0.293
				(3.47)***
Midwest				-0.083
				(0.82)
South				0.111
				(0.96)
West				0.037
				(0.34)
Urban				0.161
				(1.76)*
Mandatory K, State				-0.033
				(0.33)
Constant	17.168	14.2	14.093	14.018
	(250.50)***	(122.38)***	(115.36)***	(77.69)***
Observations	8040	8040	8040	8040
R-squared	0.02	0.32	0.32	0.35

Note: Robust t-statistics in parentheses

*p<0.10 ; **p<0.05 ; ***p<0.01

Sample sizes are rounded to comply with NCES restricted use data reporting standards.

Table J.4: Complete OLS Results for Spring Math, First Grade

	(1)	(2)	(3)	(4)
Catholic, First	0.01	-0.17	-0.15	-0.262
	(0.03)	(0.81)	(0.62)	(1.10)
Evangelical, First	0.164	-0.115	0.481	0.431
	(0.50)	(0.57)	(1.51)	(1.41)
Protestant, First	0.76	-0.054	-0.36	-0.535
	(1.92)*	(0.27)	(0.85)	(1.39)
Secular, First	0.366	-0.038	-0.042	-0.183
	(0.77)	(0.16)	(0.07)	(0.31)
Catholic, K	0.596	0.076	0.064	0.096
	(1.93)*	(0.36)	(0.30)	(0.44)
Other Religious, K	0.495	0.164	0.171	0.128
	(1.51)	(0.90)	(0.95)	(0.75)
Secular, K	0.519	-0.393	-0.404	-0.373
	(1.21)	(1.96)*	(2.03)**	(1.91)*
Fall Reading, K		0.04	0.039	0.036
		(5.55)***	(5.33)***	(5.01)***
Fall Math, K		0.386	0.404	0.378
		(38.72)***	(36.03)***	(35.94)***
Fall General, K		0.173	0.171	0.144
		(15.30)***	(15.17)***	(14.06)***

Table J.4: Complete OLS Results for Spring Math, First Grade (continued)

	(1)	(2)	(3)	(4)
Catholic, First * Fall Math, K (Below Average Score)			0.2	0.204
			(1.18)	(1.21)
Catholic, First * Fall Math, K (Above Average Score)			0.2	0.227
			(1.13)	(1.30)
Catholic, First * Fall Math, K (High Score)			-0.394	-0.323
			(2.41)**	(2.10)**
Evangelical, First * Fall Math, K (Below Average Score)			-0.462	-0.515
			(1.46)	(1.64)
Evangelical, First * Fall Math, K (Above Average Score)			-0.785	-0.67
			(2.54)**	(2.29)**
Evangelical, First * Fall Math, K (High Score)			-1.069	-0.931
			(3.42)***	(3.05)***
Protestant, First * Fall Math, K (Below Average Score)			0.383	0.43
			(0.85)	(1.00)
Protestant, First * Fall Math, K (Above Average Score)			0.523	0.551
			(1.23)	(1.39)
Protestant, First * Fall Math, K (High Score)			0.141	0.259
			(0.40)	(0.86)
Secular, First * Fall Math, K (Below Average Score)			0.266	0.314
			(0.44)	(0.53)
Secular, First * Fall Math, K (Above Average Score)			0.033	0.035
			(0.05)	(0.06)
Secular, First * Fall Math, K (High Score)			-0.164	-0.184
			(0.27)	(0.31)

Table J.4: Complete OLS Results for Spring Math, First Grade (continued)

	(1)	(2)	(3)	(4)
Male				0.171
				(3.73)***
Black				-0.93
				(9.58)***
Hispanic				-0.205
				(2.49)**
Asian				0.107
				(1.07)
Multiracial				-0.254
				(2.35)**
Child Reads				0.213
				(3.43)***
Siblings				0.143
				(2.22)**
Parent Reads				-0.189
				(3.51)***
Father, BA				0.119
				(2.30)**
Mother, BA				0.153
				(3.14)***
Income, 50+				0.027
				(0.52)
Single Parent				0.012
				(0.19)
Midwest				0.202
				(2.41)**

Table J.4: Complete OLS Results for Spring Math, First Grade (continued)

	(1)	(2)	(3)	(4)
South				0.454
				(4.83)***
West				0.231
				(2.42)**
Urban				0.182
				(2.51)**
Mandatory K, State				-0.13
				(1.77)*
Constant	12.385	9.312	9.246	9.027
	(181.68)***	(100.62)***	(94.03)***	(60.82)***
Observations	8040	8040	8040	8040
R-squared	0.02	0.41	0.41	0.43

Note: Robust t-statistics in parentheses

*p<0.10 ; **p<0.05 ; ***p<0.01

Sample sizes are rounded to comply with NCES restricted use data reporting standards.

Table J.5: Complete OLS Results for Spring General Knowledge, First Grade

	(1)	(2)	(3)	(4)
Catholic, First	0.043	-0.221	0.012	-0.128
	(0.18)	(1.29)	(0.06)	(0.58)
Evangelical, First	0.602	0.126	0.517	0.453
	(1.77)*	(0.44)	(1.31)	(1.07)
Protestant, First	0.466	-0.319	-0.204	-0.403
	(1.24)	(1.16)	(0.45)	(0.90)
Secular, First	0.405	0.07	-0.27	-0.293
	(0.88)	(0.31)	(0.53)	(0.60)
Catholic, K	0.699	0.283	0.315	0.302
	(2.93)***	(1.63)	(1.80)*	(1.69)*
Other Religious, K	0.232	0.069	0.049	0.008
	(0.71)	(0.26)	(0.18)	(0.03)
Secular, K	0.646	-0.098	-0.098	-0.124
	(1.51)	(0.47)	(0.48)	(0.61)
Fall Reading, K		0.023	0.022	0.027
		(3.62)***	(3.40)***	(4.13)***
Fall Math, K		0.114	0.114	0.095
		(12.82)***	(12.94)***	(11.13)***
Fall General, K		0.419	0.439	0.393
		(43.49)***	(39.64)***	(41.77)***

Table J.5: Complete OLS Results for Spring General Knowledge, First Grade (continued)

	(1)	(2)	(3)	(4)
Catholic, First * Fall General, K (Below Average Score)			0.043	0.063
			(0.28)	(0.41)
Catholic, First * Fall General, K (Above Average Score)			-0.274	-0.199
			(1.76)*	(1.31)
Catholic, First * Fall General, K (High Score)			-0.794	-0.612
			(4.21)***	(3.38)***
Evangelical, First * Fall General, K (Below Average Score)			-0.146	-0.227
			(0.52)	(0.77)
Evangelical, First * Fall General, K (Above Average Score)			-0.313	-0.309
			(1.16)	(1.08)
Evangelical, First * Fall General, K (High Score)			-1.037	-0.952
			(3.23)***	(2.80)***
Protestant, First * Fall General, K (Below Average Score)			0.092	0.227
			(0.15)	(0.39)
Protestant, First * Fall General, K (Above Average Score)			-0.023	0.089
			(0.05)	(0.21)
Protestant, First * Fall General, K (High Score)			-0.449	-0.191
			(1.13)	(0.50)
Secular, First * Fall General, K (Below Average Score)			1.044	0.944
			(1.91)*	(1.77)*
Secular, First * Fall General, K (Above Average Score)			0.559	0.569
			(1.14)	(1.19)
Secular, First * Fall General, K (High Score)			-0.202	-0.057
			(0.41)	(0.12)

Table J.5: Complete OLS Results for Spring General Knowledge, First Grade (continued)

	(1)	(2)	(3)	(4)
Male				0.099
				(2.74)***
Black				-0.696
				(7.58)***
Hispanic				-0.424
				(6.13)***
Asian				-0.469
				(4.21)***
Multiracial				-0.29
				(2.82)***
Child Reads				0.138
				(2.42)**
Siblings				-0.241
				(4.85)***
Parent Reads				-0.005
				(0.10)
Father, BA				0.026
				(0.59)
Mother, BA				0.096
				(2.41)**
Income, 50+				0.084
				(1.84)*
Single Parent				-0.168
				(3.02)***
Midwest				0.155
				(2.35)**

Table I.5: Complete OLS Results for Spring General Knowledge, First Grade (continued)

	(1)	(2)	(3)	(4)
South				0.044
				(0.58)
West				0.033
				(0.43)
Urban				0.006
				(0.10)
Mandatory K, State				0.037
				(0.57)
Constant	8.999	6.156	6.058	6.498
	(129.95)***	(68.75)***	(63.49)***	(53.81)***
Observations	8040	8040	8040	8040
R-squared	0.02	0.46	0.46	0.48

Note: Robust t-statistics in parentheses

*p<0.10 ; **p<0.05 ; ***p<0.01

Sample sizes are rounded to comply with NCES restricted use data reporting standards.

Appendix K: Data Definitions and Means

Variable	Variable Description	Overall	Public	Private	Catholic	Non Catholic
Male	Equals one if student is male, zero otherwise	0.48	0.48	0.48	0.49	0.46
		(0.50)				
White	Equals one if student is white, zero otherwise	0.67	0.64	0.76	0.76	0.77
		(0.47)				
Black	Equals one if student is Black, zero otherwise	0.12	0.14	0.05	0.04	0.07
		(0.33)				
Hispanic	Equals one if student is Hispanic, zero otherwise	0.12	0.12	0.10	0.11	0.08
		(0.32)				
Asian	Equals one if student is Asian, zero otherwise	0.05	0.05	0.05	0.05	0.04
		(0.21)				
Multiracial	Equals one if student is Multiracial or Other race, zero otherwise	0.05	0.05	0.04	0.04	0.04
		(0.21)				
Fall Reading, K	Reading test, administered during fall of Kindergarten year (Maximum: 20)	6.54	6.19	7.74	7.37	8.35
		(3.97)				
Spring Reading, K	Reading test, administered during spring of Kindergarten year (Maximum: 20)	10.92	10.61	12.01	11.70	12.54
		(3.86)				
Fall Math, K	Math test, administered during fall of Kindergarten year (Maximum: 16)	5.36	5.09	6.29	6.18	6.48
		(2.94)				
Spring Math, K	Math test, administered during spring of Kindergarten year (Maximum: 16)	8.28	8.01	9.18	9.02	9.44
		(3.01)				
Fall General, K	General Knowledge test, administered during fall of Kindergarten year (Maximum: 12)	5.44	5.15	6.44	6.39	6.53
		(2.91)				

Appendix K: Data Definitions and Means (continued)

Variable	Variable Description	Overall	Public	Private	Catholic	Non Catholic
Spring General, K	General Knowledge test, administered during spring of Kindergarten year (Maximum: 12)	7.10 (2.78)	6.86	7.92	7.86	8.00
Reading, First - Predicted	Predicted spring first grade reading test score, from Chapter four estimation	17.41 (1.67)	17.19	18.15	17.98	18.43
Math, First - Predicted	Predicted spring first grade math test score, from Chapter four estimation	12.57 (1.62)	12.42	13.08	13.00	13.23
General Knowledge, First-Predicted	Predicted spring first grade general knowledge test score, from Chapter four estimation	9.21 (1.51)	9.04	9.79	9.75	9.85
Siblings	Number of siblings student has	1.48 (1.06)	1.50	1.43	1.48	1.33
Mother, Some High School	Equals one if student's mother completed some high school or less, zero otherwise	0.08 (0.26)	0.09	0.01	0.01	0.02
Mother, High School	Equals one if student's mother completed high school or equivalent, zero otherwise	0.27 (0.44)	0.29	0.18	0.19	0.16
Mother, Some College	Equals one if student's mother completed some college, zero otherwise	0.35 (0.48)	0.35	0.35	0.36	0.34
Mother, BA	Equals one if student's mother has Bachelor's degree, zero otherwise	0.22 (0.41)	0.19	0.32	0.34	0.30
Mother, Advanced	Equals one if student's mother has an advanced degree, zero otherwise	0.07 (0.26)	0.06	0.12	0.09	0.16

Appendix K: Data Definitions and Means (continued)

Variable	Variable Description	Overall	Public	Private	Catholic	Non Catholic
South	Equals one if student lives in South, zero otherwise	0.31 (0.46)	0.34	0.21	0.17	0.28
West	Equals one if student lives in West, zero otherwise	0.21 (0.41)	0.21	0.23	0.21	0.27
Urban	Equals one if student lives in urban or suburban area, zero otherwise	0.76 (0.43)	0.74	0.83	0.83	0.82
Income, 0-15	Equals one if annual household income is below $15,000, zero otherwise	0.08 (0.28)	0.10	0.01	0.02	0.01
Income, 15-20	Equals one if annual household income is between $15,000 and $20,000, zero otherwise	0.05 (0.22)	0.06	0.01	0.01	0.02
Income, 20-25	Equals one if annual household income is between $20,000 and $25,000, zero otherwise	0.05 (0.22)	0.06	0.02	0.01	0.02
Income, 25-30	Equals one if annual household income is between $25,000 and $30,000, zero otherwise	0.07 (0.26)	0.08	0.04	0.04	0.05
Income, 30-35	Equals one if annual household income is between $30,000 and $35,000, zero otherwise	0.06 (0.23)	0.06	0.04	0.03	0.04
Income, 35-40	Equals one if annual household income is between $35,000 and $40,000, zero otherwise	0.07 (0.26)	0.08	0.06	0.05	0.07
Income, 40-50	Equals one if annual household income is between $40,000 and $50,000, zero otherwise	0.11 (0.32)	0.11	0.13	0.12	0.13

Appendix K: Data Definitions and Means (continued)

Variable	Variable Description	Overall	Public	Private	Catholic	Non Catholic
Income, 50-75	Equals one if annual household income is between $50,000 and $75,000, zero otherwise	0.22 (0.41)	0.20	0.27	0.30	0.24
Income, 75-100	Equals one if annual household income is between $75,000 and $100,000, zero otherwise	0.14 (0.34)	0.12	0.19	0.20	0.16
Income, 100-200	Equals one if annual household income is between $100,000 and $200,000, zero otherwise	0.11 (0.31)	0.09	0.16	0.16	0.17
Income, 200+	Equals one if annual household income is above $200,000, zero otherwise	0.04 (0.19)	0.03	0.07	0.05	0.10
House Value, County [a]	Median house value in student's home county, in dollars	129,039 (66,524)	127,151	135,448	134,230	137,501
Income, County [a]	Median household income in student's home county, in dollars	44,189 (11,043)	44,047	44,669	44,448	45,043
White, County [a]	Per capita white population in student's home county	0.71 (0.21)	0.71	0.70	0.71	0.69
Catholic, County [b]	Per capita Catholic adherents in student's home county	0.24 (0.15)	0.23	0.27	0.28	0.26
Evangelical, County [b]	Per capita Evangelical or Fundamental Protestant adherents in student's home county	0.14 (0.13)	0.15	0.12	0.12	0.14
Protestant, County [b]	Per capita Mainline Protestant or Other Faith adherents in student's home county	0.14 (0.09)	0.14	0.14	0.14	0.15

Appendix K: Data Definitions and Means (continued)

Variable	Variable Description	Overall	Public	Private	Catholic	Non Catholic
Student-Teacher, Public [a]	Average student-teacher ratio in public schools in student's home county	15.88 (4.69)	15.70	16.48	16.42	16.57
Black, Public [a]	Average percent Black students enrolled in public schools in student's home county	16.59 (18.82)	16.54	16.73	16.70	16.79
Hispanic, Public [a]	Average percent Hispanic students enrolled in public schools in student's home county	12.82 (17.14)	12.37	14.37	12.77	17.07
Free Lunch [a]	Average percent students receiving free or reduced lunch in public schools in student's home county	25.47 (17.64)	25.28	26.10	24.87	28.17
Number of observations		7755	5990	1765	1110	655

Source: Unless otherwise indicated, data are from the restricted use ECLS-K, 1999-2000.

Note: Standard Errors of overall sample are in parenthesis. Sample sizes, means, and standard deviations are all the unweighted ECLS-K reporting samples. They are not weighted to represent students and schools nationwide. Sample sizes are rounded to comply with NCES reporting standards.

[a] denotes Census 2000 data

[b] denotes Glenmary Research Center's 2000 Religious Congregations & Membership Data

References

Alexander, Karl L., and Aaron M. Pallas. 1985. School sector and cognitive performance: When is a little a little? *Sociology of Education* 58, no. 2 (April): 115-28.

Altonji, Joseph G., Todd E. Elder, and Christopher R. Taber. 2005. Selection on observed and unobserved variables: Assessing the effectiveness of Catholic schools. *Journal of Political Economy* 113, no. 1:151-84.

Baker, David P., and Cornelius Riordan. 1998. The "eliting" of the common American Catholic school and the national education crisis. *Phi Delta Kappan* 80, no. 1 (September): 16-23.

Bauch, P. A. 1988. Is parental involvement different in private schools? *Educational Horizons* 66:78-82.

Belfield, Clive R. 2004. Modeling school choice: A comparison of public, private-independent, private-religious and home-schooled students. *Education Policy Analysis Archives* 12, no. 30:1-18.

Betts, Julian R., and Robert W. Fairlie. 2001. Explaining ethnic, racial, and immigrant differences in private school attendance. *Journal of Urban Economics* 50, no. 1 (July): 26-51.

Bishop, John H. 1989. Is the test score decline responsible for the productivity growth decline? *American Economic Review* 79, no. 1 (March): 178-97.

Black, Sandra E. 1999. Do better schools matter? Parental valuation of elementary education. *Quarterly Journal of Economics* 114, no. 2 (May): 577-99.

Braddock II, J. H. 1981. The issue is still equality of educational opportunity. *Harvard Educational Review* 51, no. 4:490-6.

Broughman, Stephen, and Lenore Colaciello. 2001. *Private School Universe Survey 1999-2000*. National Center for Education Statistics.

Bryk, Anthony S. 1981. Disciplined inquiry or policy argument? *Harvard Educational Review* 51, no. 4:497-509.

Bryk, A. S., P. B. Holland, V. E. Lee, and R. A. Carriedo. 1984. *Effective Catholic Schools: An Exploration*. Washington, DC: National Catholic Education Association.

Bryk, Anthony S., Valerie E. Lee, and Peter B. Holland. 1993. *Catholic Schools and the Common Good*. Cambridge, MA: Harvard University Press.

Bushweller, Kevin. 1997. Working miracles: Catholic schools' success formula. *American School Board Journal* 184, no. 1 (January): 14-9.

Campbell, David E., Martin R. West, and Paul E. Peterson. 2005. Participation in a national means-tested school voucher program. *Journal of Policy Analysis and Management* 24, no. 3:523-41.

Catterall, James S., and Henry M. Levin. 1982. Public and private schools: Evidence on tuition tax credits. *Sociology of Education* 55, nos. 2-3 (April-July): 144-51.

Chiswick, Barry R., and Stella Kourtoumanes. 1996. An econometric analysis of the demand for private schooling. *Research in Labor Economics* 15:209-37.

Chubb, John E., and Terry M. Moe. 1990. *Politics Markets and America's Schools.* Washington, DC: The Brookings Institution.

Clotfelter, Charles T. 1976. School desegregation, "tipping" and private school enrollment. *Journal of Human Resources* 11, no. 1 (Winter): 28-50.

Cohen-Zada, Danny. 2006. Preserving religious identity through education: Economic analysis and evidence from the US. *Journal of Urban Economics* 60, no. 3:372-98.

Cohen-Zada, Danny, and Moshe Justman. 2005. The religious factor in private education. *Journal of Urban Economics* 57, no. 3 (May): 391-418.

Cohen-Zada, Danny, and William Sander. 2006. Private school choice: The effects of religion and religiosity. Paper presented at the annual meeting of the Western Economic Association International, San Diego, CA.

Coleman, James S. 1990. *Equality and Achievement in Education*. San Francisco: Westview Press.

Coleman, James, and Thomas Hoffer. 1987. *Public and Private High Schools*. New York, NY: Basic Books.

Coleman, James, Thomas Hoffer, and Sally Kilgore. 1981a. *Public and Private Schools.* Report to the National Center for Education Statistics.

Coleman, James, Thomas Hoffer, and Sally Kilgore. 1981b. Questions and answers: Our response. *Harvard Educational Review* 51, no. 4:526-45.

Coleman, James, Thomas Hoffer, and Sally Kilgore. 1982. *High School Achievement: Public, Catholic, and Private Schools Compared.* New York, NY: Basic Books.

Cookson Jr., Peter W. 1994. *School Choice: The Struggle for American Education*. New Haven, CT: Yale University Press.

Couch, Jim F., William F. Shughart II, and Al L. Williams. 1993. Private school enrollment and public school performance. *Public Choice* 76: 301-12.

Cunningham, Anne E., and Keith E. Stanovich. 1997. Early reading acquisition and its relation to reading experience and ability 10 years later. *Developmental Psychology* 33, no. 6 (November): 934-45.

Dougherty, J. Chrys and Stephen L. Becker. 1995. An analysis of public-private school choice in Texas. Texas Public Policy Foundation (Winter). http://www.texaspolicy.com/pdf/1995-12-01-education-choice.pdf (accessed on July 9, 2007).

Doyle, Denis P., and Marsha Levine. 1984. Magnet schools: Choice and quality in public education. *Phi Delta Kappan* 66, no. 4 (December): 265-70.

Epple, Dennis, and Richard E. Romano. 1998. Competition between private and public schools, vouchers, and peer-group effects. *American Economic Review* 88, no. 1 (March): 33-62.

Erekson, Homer O. 1982. Equity targets in school finance, tuition tax credits, and the public-private choice. *Journal of Education Finance* 7 (Spring): 436-49.

Evans, William N., Wallace E. Oates, and Robert M. Schwab. 1992. Measuring peer group effects: A study of teenage behavior. *Journal of Political Economy* 100, no. 5 (December): 966-91.

Evans, William N., and Robert M. Schwab. 1995. Finishing high school and starting college: Do Catholic schools make a difference? *Quarterly Journal of Economics* 110, no. 4 (November): 941-74.

Fairlie, Robert W., and Alexandra M. Resch. 2002. Is there "white flight" into private schools? Evidence from the National Educational Longitudinal Survey. *Review of Economics and Statistics* 84, no. 1 (February): 21-33.

Figlio, David N., and Jens Ludwig. 2000. Sex, drugs, and Catholic schools: Private schooling and non-market adolescent behaviors. Working Paper No. 7990, National Bureau of Economic Research, Cambridge, MA.

Figlio, David N. and Joe A. Stone. 1999 Are private schools really better? *Research in Labor Economics* 18:115-40.

Finn Jr., Chester E. 1981. Why public and private schools matter. *Harvard Educational Review* 51, no. 4:510-4.

Gamoran, Adam. 1996. Student achievement in public magnet, public comprehensive, and private city high schools. *Educational Evaluation and Policy Analysis* 18, no. 1 (Spring): 1-18.

Gaziel, Haim. H. 1997. Impact of school culture on effectiveness of secondary schools with disadvantaged students. *Journal of Educational Research* 90, no. 5:310-8.

Gemello, John M., and Jack W. Osman. 1984. Estimating the demand for private school enrollment. *American Journal of Education* 92 (May): 262-79.

Glenmary Research Center. 2002. *Religious Congregations and Membership in the United States 2000*.

Goldberger, Arthur S., and Glen G. Cain. 1982. The casual analysis of cognitive outcomes in the Coleman, Hoffer, and Kilgore Report. *Sociology of Education* 55, nos. 2-3 (April-July): 103-22.

Goldhaber, Dan D. 1994. Public or private high schools: School choice and the consequences. PhD diss., Cornell Univ.

Goldhaber, Dan D. 1996. Public and private high schools: Is school choice an answer to the productivity problem? *Economics of Education Review* 15, no. 2 (April): 93-109.

Goldhaber, Dan D., and Dominic J. Brewer. 1997. Why don't schools and teachers seem to matter? Assessing the impact of unobservables on educational productivity. *Journal of Human Resources* 32, no. 3 (Summer): 505-23.

Greeley, Andrew M. 2002. *Catholic High Schools and Minority Students.* 2nd ed. New Brunswick, NJ: Transaction Books.

Greene, Jay P., Paul E. Peterson, and Jiangtao Du. 1999. Effectiveness of school choice. The Milwaukee experiment. *Education and Urban Society* 31, no. 2 (February): 190-213.

Grogger, Jeffrey, and Derek Neal. 2000. Further evidence on the effects of Catholic secondary schooling. In *Brookings-Wharton Papers on Urban Affairs,* ed. William G. Gale and Janet Rothenberg Pack, 151-201. Washington, DC: Brookings Institution Press.

Gustman, Alan, and George B. Pidot Jr. 1973. Interactions between educational spending and student enrollment. *Journal of Human Resources* 8, no. 1 (Winter): 3-23.

Guthrie, James W., and Ami Zusman. 1981. Unasked questions. *Harvard Educational Review* 51(4):515-8.

Harris, Joseph Claude. 2000. The funding dilemma facing Catholic elementary and secondary schools. In *Catholic Schools at the Crossroads: Survival and Transformation*, ed. James Youniss and John J. Convey, 55-71. New York: Teachers College Press.

Hallinan, Maureen T. 2000. Conclusion: Catholic education at the crossroads. In *Catholic Schools at the Crossroads: Survival and Transformation*, ed. James Youniss and John J. Convey, 201-220. New York: Teachers College Press.

Hamilton, Bruce, and Molly Macauley. 1991. Determinants and consequences of the private-public school choice. *Journal of Urban Economics* 29, no. 3 (May): 282-94.

Hanushek, Eric A., John F. Kain, Jacob M. Markman, and Steven G. Rivkin. 2000. Do peers affect student achievement? Paper presented at the Conference on Empirics of Social Interactions, Brookings Institute, Washington, DC.

Henderson, Vernon, Peter Mieszkowski, and Yvon Sauvageau. 1978. Peer group effects and educational production functions. *Journal of Public Economics* 10, no. 1:97-106.

Heyneman, Stephen P. 2005. Student background and student achievement: What is the right question? *American Journal of Education* 112, no. 1 (November): 1-9.

Heyns, Barbara L. 1981. Policy implications of the public and private school debates. *Harvard Educational Review* 51, no. 4:519-25.

Hill, Paul T., Gail E. Foster, and Tamar Gendler. 1990. *High Schools with Character*. Santa Monica, CA: RAND.

Hoffer, Thomas, and James S. Coleman. 1987. *Public and Private High Schools: The Impact of Communities*. New York: Basic Books.

Hoffer, Thomas, Andrew M. Greeley, and James S. Coleman. 1985. Achievement growth in public and Catholic schools. *Sociology of Education*. 58, no. 2 (April): 74-97.

Houston, Robert G. 1999. The economic determinants of home education. PhD diss., Univ. of Kentucky.

Howell, William G., and Paul E. Peterson. 2002. *The Education Gap: Vouchers and Urban Schools*. Washington, DC: Brookings Institution Press.

Howell, William G., and Paul E. Peterson. 2004. Uses of theory in randomized field trials: Lessons from school voucher research on disaggregation, missing data, and the generalization of findings. *American Behavioral Scientist* 47, no. 5 (January): 634-57.

Howell, William G., Patrick J. Wolf, Paul E. Peterson, and David E. Campbell. 2000. Test-Score effects of school vouchers in Dayton, Ohio, New York City, and Washington DC: Evidence from randomized field trials. Paper presented at the annual meeting of the American Political Science Association, Washington, DC.

Hoxby, Caroline Minter. 1994. Do private schools provide competition for public schools? Working Paper No. 4978, National Bureau of Economic Research, Cambridge, MA.

Hoxby, Caroline Minter. 2000. The effects of class size on student achievement: New evidence from population variation. *Quarterly Journal of Economics* 115, no. 4 (November): 1239-85.

Hoyt, William, and Kangoh Lee. 1998. Educational vouchers, welfare effects and voting. *Journal of Public Economics* 69, no. 2 (June): 211-28.

Hudolin-Gabin, Janet. 1994. Lessons from Catholic schools: Promoting quality in Chicago's public schools. *Educational Forum* 58, no. 3 (Spring): 282-8.

James, Thomas, and Henry M. Levin. 1983. *Public Dollars for Private Schools: The Case of Tuition Tax Credits.* Philadelphia: Temple University Press.

Jencks, Christopher. 1985. How much do high schools students learn? *Sociology of Education*. 58 (April): 128-35.

Jensen, Gary F. 1986. Explaining differences in Academic behavior between public-school and Catholic-school students: A quantitative case study. *Sociology of Education* 59, no. 1 (January): 32-41.

Jepsen, Christopher. 2002. The role of aggregation in estimating the effects of private school competition on student achievement. *Journal of Urban Economics* 52, no. 3 (November): 477-500.

Jepsen, Christopher. 2003. The effectiveness of Catholic primary schooling. *Journal of Human Resources* 38, no. 4 (Autumn): 928-41.

Jepsen, Christopher. 2005. Teacher characteristics and student achievement: evidence from teacher surveys. *Journal of Urban Economics* 57, no. 2 (March): 302-19.

Jeynes, William H. 2002a. Educational policy and the effects of attending a religious school on the academic achievement of children. *Educational Policy* 16, no. 3:406-24.

Jeynes, William H. 2002b. Why religious schools positively impact the academic achievement of children. *International Journal of Education and Religion* 3, no. 1:p16-32.

Keith, Timothy Z., and Ellis B. Page. 1985. Do Catholic schools improve minority achievement? *American Educational Research Journal* 22, no. 3: 337-49.

Kim, Mikyong Minsun and Margaret Placier. 2004. Comparison of academic development in Catholic versus non-Catholic private secondary schools. *Education Policy Analysis Archives* 12, no. 5. http://epaa.asu.edu/epaa /v12n5/ (accessed November, 2, 2006).

Kirby, Sheila N., and Linda Darling-Hammond. 1988. Parental schooling choice: A case study of Minnesota. *Journal of Policy Analysis and Management* 7, no. 3 (Spring): 506-17.

Krueger, Alan B. 1999. Experimental estimates of education production functions. *Quarterly Journal of Economics* 114 (May): 497-532.

Krueger, Alan B., and Pei Zhu. 2004a. Another look at the New York City school voucher experiment. *American Behavioral Scientist* 47, no. 5:658-98.

Krueger, Alan B., and Pei Zhu. 2004b. Inefficiency, subsample selection bias, and nonrobustness. *American Behavioral Scientist*. 47, no. 5:718-28.

Lankford, H., E. S. Lee, and J. H. Wyckoff. 1995. An analysis of elementary and secondary school choice. *Journal of Urban Economics* 38, no. 2 (September): 236-51.

Lankford, Hamilton, and James Wykoff. 1992. Primary and secondary school choice among public and religious alternatives. *Economics of Education Review* 11, no. 4:317-337.

Lankford, Hamilton, and James Wyckoff. 2001. Who would be left behind by enhanced private school choice? *Journal of Urban Economics* 50, no. 2 (September): 288-312.

Lee, Valerie E., and Anthony S. Bryk. 1989. A multilevel model of the social distribution of high school achievement. *Sociology of Education* 62, no. 3 (July): 172-92.

Lee, Valerie E., Todd K. Chow-Hoy, David T. Burkham, Douglas Geverdt, and Becky A. Smerdon. 1998. Sector differences in high school course taking: A private or catholic school effect? *Sociology of Education* 71, no. 4 (October): 314-335.

Lee, Valerie E., and Helen M. Marks. 1992. Who goes where? Choice of single-sex and coeducational independent secondary schools. *Sociology of Education* 65, no. 3 (July): 226-53.

LePore, Paul C., and John Robert Warren. 1997. A comparison of single-sex and coeducational Catholic secondary schooling: Evidence from the National Educational Longitudinal Study of 1988. *American Educational Research Journal* 34, no. 3 (Autumn): 485-511.

Long, J. Scott. 1997. *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks, CA: Sage Publications.

Long, James E., and Eugenia F. Toma. 1988. The determinants of private school attendance, 1970-1980. *Review of Economics and Statistics* 70, no. 2 (May): 351-7.

Loury, Linda Datcher, and David Garman. 1995. College selectivity and earnings. *Journal of Labor Economics* 13, no. 2 (April): 289-308.

Lubienski, Sarah Theule, and Christopher Lubienski. 2005. A new look at public and private schools: Student background and mathematics achievement. *Phi Delta Kappan* 86, no. 9 (May): 696-9.

Lubienski, Christopher, and Sarah Theule Lubienski. 2006. Charter, private, public schools and academic achievement: New evidence from NAEP mathematics data. Working paper, National Center for the Study of Privatization in Education.

Maddala, G. S. 1983. *Limited-Dependent and Qualitative Variables in Econometrics*. Cambridge, UK: Cambridge University Press.

Manski, Charles F. 1993. Identification of endogenous social effects: The reflection problem. *Review of Economic Studies* 60 (July): 531-42.

Marsh, Herbert W. 1991. Public, Catholic single-sex, and Catholic coeducational high schools: Their effects on achievement, affect, and behaviors. *American Journal of Education* 99, no. 3 (May): 320-56.

Marsh, Herbert W., and David Grayson. 1990. Public/Catholic differences in the High School and Beyond Data: A multigroup structural equation modeling approach to testing mean differences. *Journal of Educational Statistics* 15, no. 3 (Autumn): 199-235.

Martinez-Vazquez, Jorge, and Bruce Seaman. 1985. Private schooling and the Tiebout hypothesis. *Public Finance Quarterly* 13 (July): 293-318.

Mayer, Daniel P., Paul E. Paterson, David E. Myers, Christina Clark Tuttle, and William G. Howell. 2002. School choice in New York City after three years: An evaluation of the school choice scholarship program. Prepared as part of the Program on Education Policy and Governance for the Taubman Center for State and Local Government. http://eric.ed.gov/ERICDocs/data/ericdocs2 /content_storage_01/0000000b/80/0d/ca/50.pdf (accessed November, 2, 2006).

Mocan, H. Naci, Benjamin Scafidi, and Erdal Tekin. 2002. Catholic schools and bad behavior. Working Paper No. 9172, National Bureau of Economic Research, Cambridge, MA.

Murnane, Richard J. 1981. Evidence, analysis, and unanswered questions. *Harvard Educational Review* 51, no. 4:483-9.

Murnane, Richard J. 1984. A review essay-comparisons of public and private schools: Lessons from the uproar. *Journal of Human Resources* 19, no. 2 (Spring): 263-77.

Murnane, Richard J., Stuart Newstead, and Randall J. Olsen. 1985. Comparing public and private schools: The puzzling role of selectivity bias. *Journal of Business and Economic Statistics* 3 (January): 23-35.

Murnane, Richard J., John Willett, and Frank Levy. 1995. The growing importance of cognitive skills in wage determination. *Review of Economics and Statistics* 77 (May): 251-66.

National Center for Education Statistics. 2001. *Early Childhood Longitudinal Study – Kindergarten Cohort Base Year Restricted-Use Data, 1998-1999*.

National Center for Education Statistics. 2001. *Early Childhood Longitudinal Study – Kindergarten Cohort First Grade Restricted-Use Data, 1999-2000*.

Neal, Derek. 1997. The effects of Catholic secondary schooling on educational achievement. *Journal of Labor Economics* 15, no 1:98-123.

Newmark, Craig M. 1995. Another look at whether private schools influence public school quality: Comment. *Public Choice* 82:365-73.

Noell, Jay. 1982. Public and Catholic schools: A reanalysis of "Public and Private Schools". *Sociology of Education* 55, nos. 2-3 (April-July): 123-32.

Noell, J., and D. Myers. 1983. The demand for private schooling: An empirical analysis. Working paper, Office of Planning, Budget, and Evaluation, U.S. Department of Education.

Ornstein, Allan C. 1989. Private and public school comparisons: Size, organization, and effectiveness. *Education and Urban Society* 21, no. 2 (February): 192-206.

Page, Ellis B., and Timothy Z. Keith. 1981 Effects of U.S. private schools: A technical analysis of two recent claims. *Educational Researcher* 10, no. 7 (August-September): 7-17.

Peterson, Paul E. 2003. Little gain in student achievement. In *Our Schools and Our Future,* ed. Paul E. Peterson, 39-72. Stanford, CA: Hoover Institution Press.

Peterson, Paul E., and William G. Howell. 2003. Efficiency, bias, and classification schemes: Estimating private-school impacts on test scores in the New York City voucher experiments. Working paper, Program on Education Policy and Governance, Kennedy School of Government, Harvard University. http://www.ksg.harvard.edu/pepg (accessed November, 2, 2006).

Peterson, Paul E., and William G. Howell. 2004a. Efficiency, bias, and classification schemes. A response to Alan B. Krueger and Pei Zhu. *American Behavioral Scientist* 47, no. 5:699-717.

Peterson, Paul E., and William G. Howell. 2004b. Voucher research controversy. Another look at the New York City school voucher experiment. *Education Next* (Spring): 73-78.

Peterson, Paul E., and Elena Llaudet. 2006. On the public-private school achievement debate. Paper presented at the annual meetings of the American Political Science Association, Philadelphia, PA. http://www.hoover.org/publications /ednext/4612612.html (accessed on November, 20, 2006).

Peterson, Paul E., and Elena Llaudet. 2007. The NCES private-public school study. *Education Next* 1 (Winter): 75-9. http://www.hoover.org /publications/ednext/4612612.html (accessed on November, 20, 2006).

Riordan, Cornelius. 1985. Public and Catholic schooling: The effects of gender context policy. *American Journal of Education* 93, no. 4 (August): 518-40.

Rouse, Cecilia Elana. 1998. Private school vouchers and student achievement: An evaluation of the Milwaukee parental choice program. *Quarterly Journal of Economics* 113, no. 2 (May): 553-602.

Sander, William. 1996. Catholic grade schools and academic achievement. *Journal of Human Resources* 31, no. 3 (Summer): 540-8.

Sander, William. 1999. Private schools and public school achievement. *Journal of Human Resources* 34, no. 4 (Autumn): 697-709.

Sander, William. 2000. Parochial schools and student achievement: Findings for older adults. *Education Economics* 8, no. 3: 259-68.

Sander, William. 2005. Catholics and Catholic schooling. *Education Economics* 13, no. 3 (September): 257-68.

Sander, William, and Anthony C. Krautmann. 1995. Catholic schools, dropout rates, and educational attainment. *Economic Inquiry* 33, no. 2 (April): 217-33.

Schneider, Barbara, Kathryn S. Schiller, and James S. Coleman. 1996. Public school choice: Some evidence from the National Education Longitudinal Study of 1988. *Educational Evaluation and Policy Analysis* 18, no. 1:19-29.

Snyder, Thomas D., and Alexandra G. Tan. 2004. *Digest of Education Statistics*. National Center for Education Statistics.

Sonstelie, Jon. 1979. Public school quality and private school enrollments. *National Tax Journal* 32:343-53.

Sonstelie, Jon. 1982. The welfare cost of free public schools. *Journal of Political Economy* 90, no. 4 (August): 794-808.

Summers, Anita A., and Barbara L. Wolfe. 1977. Do schools make a difference? *American Economic Review* 67:639-52.

Tiebout, Charles. 1956. A pure theory of local expenditures. *Journal of Political Economy* 64, no. 5: 416-24.

U.S. Census Bureau. 2000. *Census 2000*.

Wehlage, G. G., R. A. Rutter, G. A. Smith, N. Lesko, and R. R. Fernandez. 1989. *Reducing the Risk: Schools as Communities of Support*. London: Falmer.

West, Edwin, and Halldor Palsson. 1988. Parental choice of school characteristics: Estimation using state-wide data. *Economic Inquiry* 26, no. 4 (October): 725-40.

Willms, J. Douglas. 1985. Catholic-school effects on academic achievement: New evidence from the High School and Beyond Follow-Up Study. *Sociology of Education* 58, no. 2 (April): 98-114.

Witte, John F. 1990. Choice and control: An analytical overview. In *Choice and Control in American Education*. *Vol 1: The Theory of Choice and Control in Education* ed. William S. Clune and John F. Witte, 9-45. New York: Falmer Press.

Witte, John F. 1992. Private school versus public school achievement: Are there findings that should affect the educational choice debate?" *Economics of Education Review* 11, no. 4:371-94.

Witte, John F. 2000. *The Market Approach to Education*. *An Analysis of America's First Voucher Program*. New Jersey: Princeton University Press.

Wolfe, Lee M. 1987. Enduring cognitive effects of public and private schools. *Educational Researcher* 16, no. 4:5-11.

Wooldridge, Jeffrey M. 2003. *Introductory Econometrics*. 2nd ed. U.S.: Thomson South-Western.

Zelman v. Simmons-Harris. 2002.

Vita:
Christine Berry Lloyd

PERSONAL
Birth Date: July 24, 1976
Birth Place: Savannah, Georgia, United States of America
Citizenship: U.S.A.

EDUCATION
University of Kentucky
B.S.B.E. in Economics, August 1998
Summa Cum Laude, Departmental Honors, Beta Gamma Sigma, Golden Key Honor Society

EMPLOYMENT
Assistant Professor of Economics
Department of Economics, Western Illinois University, August 2003 – Present
Lab for Economic and Accounting Proficiency Coordinator
Department of Economics, University of Kentucky, January 2002 – June 2002
Teaching Assistant Supervisor/Head Teaching Assistant
Department of Economics, University of Kentucky, January 2002 – May 2002
Teaching Assistant/Primary Instructor
Department of Economics, University of Kentucky, August 1999 – May 2002
Grader and Classroom Assistant
Department of Economics, University of Kentucky, August 1998 – May 1999
Lab for Economic and Accounting Proficiency Tutor Coordinator
Department of Economics, University of Kentucky, May 1998 – May 1999
Lab for Economic and Accounting Proficiency Tutor
Department of Economics, University of Kentucky, January 1997 – May 1999

AWARDS AND HONORS
Outstanding Teacher Award for Teaching Assistants for 2002
Department of Economics, University of Kentucky