

EXPLORING THE RELATIONSHIP BETWEEN PERCEIVED COST OF ATTENDANCE  
AND COLLEGE MATRICULATION

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## ABSTRACT

Researchers have consistently found that students and their parents have a distorted view of the costs of college attendance (Grodsky & Jones, 2004; Horn, Chen, & Chapman, 2003; Ikenberry & Hartle, 1998; Mumper, 1996). Those who are able to give an estimate of the tuition for various higher education alternatives often overestimate the actual price. When asked to estimate the tuition that in-state undergraduates would pay at four-year colleges in a given year, most students and their parents thought that the price was twice the actual amount (Horn et al., 2003b). Seventy-one percent of all individuals, and 83% of African-Americans believed that college was unaffordable for most families. The majority of individuals over-estimated the price by several thousands of dollars (Hartle, 1998).

This study examined the literature on perceived price and used the theoretical construct based on the work of Nobel Prize winner Gary Becker to develop a methodology for studying whether students' perceived price of has a statistically significant impact on their plan to attend college and their actual matriculation. Applying Becker's theory, having faulty information on the price of attendance would result in people incorrectly weighting the cost-benefit equation and making what could be considered irrational decisions in the presence of complete information.

Highlighting the problem of misperceived price is the contribution this study makes to the literature. Further study is warranted to determine the extent to which individuals use misperceived prices to make decisions on whether to plan to attend higher education.

## ORGANIZATION OF THE DISSERTATION

This dissertation uses the alternate dissertation option, which specifies that two papers ready for submission to appropriate journals be included as the final two chapters. The reader should consider the document as three separate parts. Except for minor changes, Chapters One, Two and Three were prepared in the prospectus stage, approved by the dissertation committee in September, 2008.

Chapter Four serves as a "bridge" chapter explaining some of the methodological decisions made after the prospectus was approved. Chapters Five and Six represent the two stand alone manuscripts in their final form. Readers should view Chapters Five and Six as independent documents that can be read without reference to the first four chapters. They address some of the more compelling findings of the study and may deviate from the issues identified in the first three chapters.

## Dedication

To my wife Patricia Dawn Sale Hall, who made my pursuit of this doctoral degree possible through her hard work, strength, and devotion.

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While I always tried to put the activities of my children before other obligations, Brantley and Michael no doubt would have received more attention during this decade had I not been driven to attain this degree. As noted in the dedication, my wife Patti provided me unwavering support, and also provided the boys the necessary extra attention they did not get from me.

Finally, I want to thank my parents, William H. “Bill” Hall, and Priscilla Musser Hall. My father was told he could not afford to attend college when he was growing up. He never

went to college. He supported my mother as she obtained two degrees, and then she stood beside him during the years while he defied the odds and became the regional president of a Fortune 500 company. Those who act on faulty information in the 21<sup>st</sup> century will not likely be so fortunate.

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Chapter 1

INTRODUCTION

College attendance is increasingly becoming a requirement for individuals in the United States who aspire to a rewarding career (St. John & Asker, 2003). Researchers have consistently found that students and their parents have a distorted view of the costs of college attendance (Horn, Chen, & Chapman, 2003; Ikenberry & Hartle, 1998; 2004; Mumper, 1996). Those who are able to give an estimate of the tuition for various higher education alternatives often overestimate the actual price. When asked to estimate the tuition that in-state undergraduates would pay at four-year colleges in a given year, most students and their parents thought that the price was twice the actual amount (Horn et al., 2003). Seventy-one percent of all individuals, and 83% of African-Americans believed that college was unaffordable for most families. The majority of individuals over-estimated the price by several thousands of dollars and few had any idea of what financial aid was available to them (Hartle, 1998).

While students and parents face uncertainty in the cost of college, there is a seemingly unrelated paradox that persists. The country continues to take action to achieve racial equality in higher education, yet there is a growing gap between the attendance levels of college-prepared Whites and Blacks. In 1974 there was absolute parity between the rate of attendance of Black and White high school graduates who went on to college – 47.2% for each group (U. S. Department of Education - National Center for Education Statistics, 2004). In 1997, 68.2% of Whites who graduated from high school matriculated into a college program by the end one year while only 58.2% of Blacks had done so. This gap has remained roughly consistent since 1997 (U. S. Department of Education - National Center for Education Statistics, 2004).

As one objective, this study examined the relationship between these two phenomena, and explored the possibility that inaccurate information regarding the price of attendance is having a negative impact on the number of individuals who attend college. It also determined if the disparate impact on the college going behavior of Blacks and Whites is due to the different levels of pricing knowledge that each group possesses. To isolate the effect of this financial knowledge gap, an analytic model to determine the college matriculation decision of high school students was developed. This examination begins in the following section with a review of the importance of higher education in today's economic and social environment and the resulting evolution of the federal government's role in providing equal access to the higher education system in the United States.

### The Importance of College Education

Individuals who obtain a college degree consistently earn more than their non-degreed counterparts. In 2002, an individual with a bachelor's degree earned an average of \$51,194 compared to \$27,280 for an individual with a high school diploma only, an 88% difference (Couturier & Cunningham, 2006). This earning differential has been widening. In 1980 the differential was only 60%. During an adult's working life, high school graduates earn an average of \$1.2 million compared to \$2.1 million for person holding a bachelor's degree (Day & Newburger, 2002; Porter, 2002).

There are also significant non-occupational benefits that accrue to those who attend college. This is sometimes referred to as the development of the "whole person." Aside from the inherent value of cognitive learning, graduates develop emotionally and morally. They mature socially. They develop practical competence that improves their family life, their consumer behavior, their leisure life, and their health. The non-monetary value of higher education is

“several times the value of the monetary value,” (Bowen, 1977, p. 448 as cited in (Kerr, 1997), p. 348).

As previously noted, the changing landscape of financing of higher education costs is resulting in a growing gap between those who can take advantage of this opportunity, and those who cannot. Blacks who have graduated from high school do not attend college at the same rate as their White counterparts. This difference did not exist in 1974, but has grown consistently during the last quarter of a century. There is also a significant difference in the college-going rate based on socio-economic status (St. John & Asker, 2003; St. John, Paulsen, & Carter, 2005).

#### Equal Opportunity to Higher Education as United States Policy

Federal involvement in providing equal access to higher education for Blacks and Whites began in 1890 when the Second Morrill Land Grant Act was passed. This act, a follow-on to the Land-Grant Act of 1862, allowed subsidies to states for the provision of higher education in the area of agricultural and mechanical arts. It permitted segregation between educational facilities as long as the state equitably divided its land-grant funds between a college for Blacks and a College for whites (Wallenstein, 2007). One result from this second Land-Grant act was what we today call the Historically Black Colleges and Universities (HBCUs).

However, until 1944 when the Serviceman’s Readjustment Act (better known as the G.I. Bill) was passed, there was very little emphasis by the federal government on providing educational access to any large group of the population. The G.I. Bill itself was passed primarily for economic reasons, even though some cite the element of reward to returning soldiers as part of the bill’s objectives. It emerged mainly from the fear that the United States would plunge back into the depression that had preceded World War II if all the returning soldiers entered the labor market simultaneously (Bennett, 1996; Ford & Miller, 1995).

Following on the heels of the G.I. Bill, President Harry Truman's 1947 Commission on Higher Education (commonly referred to as the Zook Commission because it was chaired by American Council on Education president George Zook) said the system of education in the United States should provide "the means by which every citizen, youth, and adult, is enabled and encouraged to carry his education, formal and informal, as far as his native capacities permit" (Cervantes, 2005, p. 10). The motivation behind this equal educational opportunity was the creation of a more equitable and democratic society (Cervantes, 2005).

While the G.I. Bill received significant funding from Congress, the most immediate result from the Zook Commission's work was the expansion of the community college system. Congress was unwilling at the time to fund the recommendations that called not only for tuition assistance, but general financial assistance, so that individuals from low-income families would not suffer the opportunity cost of having a student removed from the work force (Cervantes, 2005).

Approximately 10 years after the Zook Commission report, the federal government again changed its policy on financial aid for college students. The National Defense Education Act (NDEA) passed in 1958 following the scientific scare caused by Russia's launch of Sputnik the year before. NDEA's aims were to broaden the G.I. Bill, first to anyone wanting to study mathematics, foreign languages, and sciences; and later to all academic majors. The goal of this financial aid was to improve the educational system so that the United States would not lose further ground to the Russians (Cervantes, 2005).

NDEA was not intended to create equal opportunity for Blacks and Whites, nor for different socio-economic groups. Both the G.I. Bill and NDEA were motivated by national interests, not by the inherent right to education cited in the Zook Commission report. It was not

until Johnson's Great Society legislation (specifically the 1964 Economic Opportunity Act and the 1965 Higher Education Act) that federal policy first funded financial aid for individuals based on their economic station (Cervantes, 2005; St. John et al., 2005).

The Great Society legislation had a significant impact on equal opportunity within the decade. By 1974, there was equality between Blacks and Whites in the percent of their high school graduates who went on to college -- 47.2% of eligible Blacks attended college as did 47.2% of eligible Whites. Soon after this parity was achieved, the cost of higher education began to accelerate significantly. During the 20 years between 1976 and 1996 the average cost of public university tuition rose from \$642 to \$3,151 (U. S. Department of Education-National Center for Education Statistics, 1998). When adjusting for rise in the Consumer Price Index during the same period, this represented a growth from \$1,770 to \$3,151, or about 80%. Put another way, while the Consumer Price Index rose 175%, the tuition cost at public universities rose about 390%. That scorching acceleration has not abated. Between 1996 and 2003 tuition at public universities had risen from \$3,151 to \$4,698, another 49% (U. S. Department of Education - National Center for Education Statistics, 2004).

Despite this growing cost, more and more individuals took advantage of the opportunity to participate in the postsecondary education system. While in the 1960s and 1970s higher education was a privilege that enabled individuals to improve their economic status, by the 1980's higher education had become a necessity for economic prosperity (Immerwahr, 2004). While the structure of the financial aid system has not changed since the early 1970s (Kane, 2001), the funding of the program by the federal government has changed drastically. In 1975, the maximum Pell grant was equal to 85% of the average cost of attending a public four-year college. However, the program had a provision that at least half the cost of attendance at any

institution must come from other sources. Students who attended higher cost private institutions could receive the full amount of the grant. In real dollars, the value of the Pell grant fell during the next 20 years at the same time that the cost of higher education increased. In 1995 the maximum Pell Grant was equal to 35% of the annual cost of attending a four-year college (St. John & Asker, 2003). This shifted more and more costs to the individuals and shifted the primary means of enabling students to pay for their college experience from grants to loans. In 1972, about one-third of all costs of postsecondary education were paid by the student or student's family. That figure had grown to about two-thirds by the 1990s (St. John & Asker, 2003).

By 1987, the gap between Whites and Blacks had grown to approximately 6 %; 58.6% of Whites, but only 52.2% of Blacks went on to higher education within a year of graduating from high school. By 1997, the gap had reached 10%. Of those individuals graduating from high school within the previous 12 months, 68.2% of Whites started college, while only 58.2% of Blacks had done so. The gap has stayed roughly consistent at 10% since 1997 (U. S. Department of Education - National Center for Education Statistics, 2004).

In addition to difference by race, there is also a gap in college-going rates between those in the highest socio-economic group and those in the lowest group. About 80% of seniors in the upper quartile of family income from the high school classes of 1980/1982 attended some sort of postsecondary education within 20 months of their graduation. This compared to about 57% for the lowest quartile, a difference of 23%. By 1992, the matriculation gap between the highest and lowest income quartiles had grown to 30%. Ninety of the top quartile attended some form of higher education institution compared to 60% of the lowest quartile (U. S. Department of Education - NCES, 2004).

This gap was just as large when looking at traditional four-year college attendance. In 1980/82, 55% of those in the highest quartile group attended a four-year college at some point, and only 29% of those in the lowest quartiles went to these traditional colleges. By 1992, matriculation at four-year colleges was measured at 66% for those in the highest quartile and at 28% for those in the lowest quartile (Kane, 2001).

### The Problem

A primary reason for lack of attendance by low-income urban students is that resources are not available (Oliverrez & Tierney, 2005). There are other important reasons. In a 2004 literature review, Bridget Long (Long, 2004) found that very little work had been done to link inaccurate price perceptions to college access and choice. Her conclusion was that “(i)t is vitally important that researchers find a way to examine the role of college (tuition) perceptions” (Long, 2004, p. 24).

Parents and students know little about college costs and financial aid opportunities. Those who give an estimate of the tuition for various higher education alternatives often overestimate the actual level. They also underestimate the availability of financial aid programs (Long, 2004). In general, the public has a distorted view of the costs of college attendance (Ikenberry & Hartle, 1998). When asked to estimate the tuition that in-state undergraduates would pay at four-year colleges in a given year, most students and their parents thought that the price was twice the actual amount (Horn, Chen, & Chapman, 2003). These faulty perceptions place unnecessary constraints on student choice.

The news media are likely to report only on the actual tuition prices of the most elite and expensive institutions. They also report on the annual growth in tuition prices compared to costs of other items, and on the sticker shock felt by parents with college-age children. The variance in

prices between these elite institutions and other colleges is ignored. For instance, many colleges charge less than 20% of the cost of an Ivy League university (Long, 2004).

Of particular note is that the information known about price varies significantly among ethnic groups. Parents of minority children are less likely to be able to estimate the level of tuition (Long, 2004). There is also a correlation between parents' socioeconomic status and their knowledge about financial aid programs (Long, 2004). In addition to this lack of information about aid, navigating the process of receiving aid is complex and cumbersome. Part of this is because minority students, students who come from families with a low socioeconomic status, and students from rural areas, are less likely to have adequate guidance counseling (Long 2004).

The ramifications of this misinformation, and the general lack of information, are significant and may affect behavior. Much more important than someone who as a senior in high school deciding not to go on to college based on the lack of information is the development of the plan that parents, counselors and students identify early in the middle and high school career. If they believe that they cannot afford college in eighth grade, it is likely that they will not take the college preparatory classes necessary to successfully gain admittance into colleges, and will not be prepared even if they do attend. This misinformation may also lead to a lack of savings for college that might otherwise occur if individuals felt they could afford to send that child to college early in her life (Long, 2004).

#### Purpose Statement

The purpose of this study was to determine the impact that perceived cost of attending college has on matriculation. I specifically attempted to quantify the impact of cost misperception, and attempted to determine if this misperception impacts racial groups in a disparate way. A binary logistic regression model was developed to isolate the impact of

perceived price. The model also examined the enrollment gap between Caucasians and African-American, and higher and lower socioeconomic students. The study tested the hypothesis that misinformation about college costs is partially responsible for this gap.

I used the data set provided by the 12-year National Center on Educational Statistics (NCES) study referred to as High School and Beyond (HS&B) in this study. Data from this study were collected between 1980 and 1992, studying the prospective high school graduating classes of 1980 and 1982. The answers provided by the sophomore cohort of 1980, verified by extensive follow-up work through parent interviews, teacher interviews, and transcript review, provided the base data serving as the independent variables for the study. The most extensive follow-up work was done on the sophomores of 1980 who made up the prospective graduating class of 1982. Therefore, I used the sophomore class as the cohort for this analysis, determining whether they had enrolled in college by 1986, four years after those in this class would have had the opportunity to begin their higher education careers.

While the dependent variable is related to matriculation, the independent variable “perceived price,” or some derivative of that variable, is the true interest in this study. To isolate the impact of that variable, it was first necessary to develop a comprehensive model using the data in the HS&B study, as informed by the various scholarly works, to determine difference in matriculation patterns.

The following research questions were answered in the course of conducting this study:

1. Is perceived price a significant factor in determining whether an individual sophomore plans to matriculate at an institution of higher education?
2. Is perceived price a significant factor in determining actual matriculation in college for high sophomores?

3. Is perceived price a significant factor in determining individuals who planned to attend college and did not? Or vice versa, was it a significant factor in determining individuals who as sophomores did not plan to college and eventually did?
4. Is the opportunity gap in college attendance between Black and White individuals, and individuals of high and low socio-economic status partially explained by a different effect of the perceived price on matriculation between the two groups?

#### Significance of Study

The results of this study can inform federal and state policy makers, high school guidance counselors and principals, and college admissions professionals.

#### *Getting the Issue Back on the Agenda*

These issues are not now on the public agenda because there has been no way to measure the impact of the known misperception in price. The most important element of this study is that it takes advantage of the last longitudinal data that explored price perception. Finding a significant impact, albeit one that is measuring perception in the past, can provide the starting point to determining the probable impact of this phenomenon on current matriculation patterns. Optimally, some questions about the perceived price of attendance would be included in the next wave of student longitudinal studies. An intermediate step would be to encourage a federal agency to sponsor a pilot project that would sample a smaller group of individuals based on the model developed to see if there is a current impact between perceived price and college attendance.

#### *State and Federal Policy Makers*

Legislators are increasingly interested in the growing cost of higher education. Affordability was a major part of the deliberations associated with the renewal of the Higher

Education Act in 2008 (Higher Education Opportunity Act, 2008). Most recently there was a call for the wealthiest universities to spend a larger percentage of their endowments on student financial aid to help reverse the trend of rapid tuition growth ("Should colleges be required to spend more from their endowments?," 2008).

Having an understanding of price misperception and its impacts could be used as a way to combat the impacts that higher prices have on decreasing access. The growing opportunity gap between African-American and Caucasian students, and rich and poor students, cited earlier in this section could be targeted for mitigation. If there is a disparate impact of price perception between these underrepresented groups, information campaigns could be targeted toward these groups to maximize the impact that marketing budgets have on access. Second, emphasis can be placed on removing hurdles that negatively impact student choice. Efforts can be focused on the pipeline in targeting students in under-represented groups so that they graduate from high school with the requisite skills to enroll and succeed in college.

#### *High School Guidance Counselors and Principals*

Those who are influential in informing students of their post-secondary school options are keys to shaping perceptions of price. These individuals can provide accurate information on college price to students and their parents, and then work to make sure that capable students are placed on appropriate paths to achieve college enrollment. These individuals have the opportunity to impact educational outcomes and this study gives them a tool by which they can better succeed in this objective.

#### *College Admissions Officers*

Public and private college administrators might have differing views on providing information to individuals making choices about attending their individual colleges. Private

college admission officers have little incentive to make known the tuition-discounting that is part of their admissions strategy. However, to the extent that these professionals understand the non-financial factors that impact choice to attend college, they can develop strategies that will target specific groups of students and increase the pool of available applicants. Public colleges can use the information about misperceived price to reduce pressure from legislatures and family members regarding escalating prices. They too can benefit from enacting strategies to enlarge the pool of available applicants by helping to eliminate hurdles for those who are from underrepresented groups.

#### Further Study

Over and above the further data gathering that should result from this study, the data set being examined in this study has a wealth of information on educational outcomes. Several follow-up studies would be appropriate: a) application of the impact of price perception from this study to known measures of misperceived cost of attendance today in order to quantify the possible cost of this misinformation to society in the first decade of the 21<sup>st</sup> century; b) examination of the 1992 follow-up to examine educational outcomes as well as matriculation when the misperceived price is factored into the explanatory model measuring life results such as income and job satisfaction (Adelman, 2006); and c) using the financial data contained in HS&B to evaluate the return on investment of higher education in a more direct way than has been done before.

#### Delimitations

There are three major delimitations to this study – its longitudinal nature, the age of the data, and the limits of the variables that can be tested.

*Problems with Longitudinal Studies*

Longitudinal studies have inherent problems related to contacting the original cohort, and inducing them to respond when they are contacted. Fortunately, as will be examined in depth in Chapter Three, the final return rate of the 15,000 surveys sent out to 1980 sophomores two years after the base study was 90.6%. This was achieved through execution of an exhaustive five-part process (National Center for Educational Statistics, 1986).

*Age of the Study*

Optimally, the binomial regression model that was developed would have used data gathered more recently than 1986. Allowances should be made based on the relative value of the data. First, more current data measuring the perceived cost of college attendance in a longitudinal study is not available (Long, 2004). Second, the regression model served mainly to create a control function to study the independent variable of interest (perceived price) on the dependent variable (matriculation). The results of the study illustrate human response to an economic situation. Current information would likely impact the magnitude of this response, but not the direction of the response.

Reiterating the previous point, this study may help solve this problem for other researchers who have been challenged to look at this phenomenon (Long, 2004). Ignoring the most recent available data, despite its age, contributes to a spiraling downward problem in the availability of this data element. Currently administered longitudinal studies will continue to ignore this important factor unless some evidence of the impact of this phenomenon on college attendance is quantified (Horn et al., 2003; Ikenberry & Hartle, 1998; Long, 2004; Mumper, 1996).

### Organization of the Study

This dissertation uses the alternate dissertation option, which specifies that two papers ready for submission to appropriate journals be included as the final two chapters. The reader should consider the document as three separate parts. Except for minor changes, Chapters One, Two and Three were prepared in the prospectus stage, approved by the dissertation committee in September, 2008.

Chapter One defined the lack of information and explored the federal policies and circumstances that have led to the college opportunity gaps between Black and White, and rich and poor that currently exist. It then laid the groundwork for a theoretical model to explore the possible impact that this one phenomenon has had on the other. It identified the purpose of the study, posed four research questions, and examined the significance and delimitations of the study. Chapter Two provides a literature review, using the prominent literature on human capital investment and student choice to determine the general variables that impact matriculation and make the case that price of attendance is in fact a significant variable in the prediction of matriculation. Chapter Three explains the methodology that was laid out for the study in the prospectus phase of this dissertation.

Chapter Four serves as a "bridge" chapter explaining some of the methodological decisions made after the prospectus was approved. Chapters Five and Six represent the two stand alone manuscripts in their final form. Readers should view Chapters Five and Six as independent documents that can be read without reference to the first four chapters. They address some of the more compelling findings of the study and may deviate from the issues identified in the first three chapters. The first journal article is about the impact of misperceived price in general. The

second studies the possible interaction effects that misinformation has on Black students who also over-estimate the price of attendance.

## Chapter 2

### REVIEW OF LITERATURE – THEORETICAL CONSTRUCT

Three bodies of work combine to create the theoretical construct used as the basis for this study: human capital theory; microeconomic analysis of student behavior; and the impact of information on college-going behavior.

#### Human Capital Theory

The foundation of this study is laid by the work of Gary Becker, the Nobel-Prize winning economist, in his theory of human capital investment (Becker, 1964). Human capital is the available effort an individual can expend to receive valued rewards. An individual chooses to work, learn, rest, or consume. With each of these choices comes a reward. Human capital theory is the study of how those choices are made (Becker, 1964, 1993). Becker wrote about the application of this general theory in 1964 and applied it directly to higher education in the 1993 update to his book. As applied to higher education, this theory argues that both individuals and the government will make decisions on the level of expenditures for higher education by evaluating a cost versus benefit equation. For the individuals, if the long-term economic benefits of having a college degree instead of just a high school diploma are greater than the short-term costs of attendance, then they will choose to attend college. The long-term benefits have to be discounted back to current year dollars. The short-term costs of attendance include the value of the salary from the job students might have begun had they not been spending time on the pursuit of a degree (Becker, 1964, 1993).

Becker's Nobel Prize was based on his application of microeconomic theory, not to human capital theory, but to the analysis of many simple non-financial situations. He hypothesizes that the majority of human behavior can be explained through analyzing the trade-

offs implied in the basic microeconomic premise (Fuchs, 1994). That premise is that individuals maximize utility in the choices they make. Becker's work expanded this microeconomic theory to include non-financial elements. His thesis is that each choice an individual makes is a cost-benefit analysis (Fuchs, 1994). While traditional economists would limit the inputs and outputs to quantifiable monetary denominations, Becker said that it was useful to look at all costs and all benefits to explain human behavior. Becker would say that these non-financial variables cause individuals to make what might otherwise appear to be irrational decisions. This theory can be extended to explain where and how students and families spend their funds on higher education. He theorizes that the individual is able to factor in all monetary and non-monetary costs and benefits in making the college choice decision. Everything that is positive about the perceived college experience (including life-long earnings) is netted against all that is perceived as negative. This set of perceived outcomes is compared to the perceived benefits and choice is made based on the difference (Becker, 1993).

Using Becker's hypothesis, students go through a complex cost-benefit analysis to determine if they are going to college, and which college they choose to attend (Manski, 1993). Applying Becker's theory, having faulty information on the price of attendance would result in people incorrectly weighting the cost-benefit equation and making what could be considered irrational decisions in the presence of complete information. This is the thesis being tested in this study.

For illustrative purposes, it is useful to apply Becker's theory to Mumper's (1993) findings. As a background, Mumper identifies three reasons why students from low-income families do not attend college.

First, disadvantaged students are less likely to aspire to college. They either place an unrealistically low value on the benefits of attendance in general, or they feel that they do not have the ability to turn opportunity into benefits. They might think that even if they attend college, they will not succeed and, therefore, might as well enter the work force immediately (Mumper, 1996). In Becker's terminology, these students discount the future benefits of a college education significantly because of the risk associated with success after attempt or completion. Assuming a correct perception of price, the benefits side of the equation is the cause of this decision not to attend, not the cost side.

Second, low-income students are less likely to take the high school courses necessary to succeed in college (Mumper, 1996). This second reason points to the need to examine the student's perceived cost-benefit analysis before the point that taking college preparatory classes has past. This will be examined in the section on student choice theory.

Finally, even those who believe that college is in their best interest are likely to overestimate the real price of attendance (Mumper, 1996), failing to take advantage of an economic opportunity that actually exists. In Becker's terminology, the cost side of the equation is incorrectly analyzed, leading to a potentially faulty decision.

To illustrate this phenomenon, researchers working with Mumper (1996) performed a study using Appalachian youth in southern Ohio as participants. More than 60% of the students felt that going to college was necessary to attain financial security and more than 75% of parents felt that college was a necessity. Eighty percent of high school seniors said that they wanted to go to college, and 84% of their parents said they wanted their children to attend. However, only 40% of the area high school graduates attended some form of higher education.

The reason for this discrepancy was that more than two-thirds of Appalachian high school seniors and their parents said that they could not afford, or were unsure whether they could afford, college. These fears were based on false assumptions about the cost of attendance. More than 50% of the seniors and more than 60% of their parents thought a year at a four-year college would cost more than \$10,000. More than 50% of the parents thought that a year at a two-year college would cost more than \$5,000. In the year that the study was conducted, the actual cost of attending a state university in Ohio ranged from \$5,000 to \$6,000 including room and board. Tuition at a local community college was less than \$3,000 (Mumper, 1996).

Before accepting Mumper's (1996) analysis, it is necessary to dissect the level to which perceived cost actually predicts college-going behavior. To do this, a model needs to be developed that explains other factors in the college choice process. Only then may the perceived price variable be accurately studied.

#### Micro-Economic Theory as Applied to Higher Education

The first assumption to consider in reviewing the literature is whether students respond to tuition changes in a manner consistent with neoclassical microeconomic theory. That is, are they more likely to attend an institution of higher education if the price is lower, and do they reduce their consumption of higher education if the price goes up? Leslie and Brinkman (1987) set out to see if the assumptions drawn from demand theory regarding higher education were valid. Specifically they sought to determine if (a) enrollment rates are negatively correlated with tuition rates; (b) if enrollment rates are positively associated with student aid spending; and (c) if enrollments in higher education institutions are related to the price charged by their competitors. Leslie and Brinkman (1987) performed a meta-analysis on the 25 student demand studies conducted by various investigators between 1969 and 1982. Every one of the 25 studies found a

downward sloping demand curve – enrollment declined when prices rose and increased when prices went down. To determine the slope of the demand curve, the authors, following up on a previous study by Jackson and Weatherby (1975), standardized the results from the 25 works they studied and developed a student price response coefficient (SPRC) for each study, determining what impact a \$100 change in the price of tuition had on attendance for 18-24 year olds with a standardized tuition rate of \$3,420. All other factors held constant, the mean price response was about 0.7 percentage points in the rate of participation. Since there was a 33% participation rate of 18-24 year olds in 1982, the base year for the study, this translates into a decline of about 2.1% in the total enrollment of the country for each \$100 increase in tuition. The authors point out that the 2.1% rate may be misleading because most of the studies were done on freshmen and they believe that upper classmen would be less price-responsive. Leslie and Brinkman also point out that the modal response rate (as opposed to the mean response rate) was 0.6%, corresponding to a change in enrollment of 1.8%. They postulate that this number is the most appropriate for use in making public policy.

After determining that there is a predictable response, Leslie and Brinkman (1987) studied whether or not scholarships or financial aid had an equivalent impact as a corresponding reduction in price. They speculated that financial aid was often offered after the admission decision.

Leslie and Brinkman (1987) go on to say that the landscape seemed to be changing over time, acknowledging that early empirical work clearly showed that students are more sensitive to tuition than aid, but later studies did not find the same phenomenon. Importantly, the authors state “(p)erhaps the scene is changing as students become more aware of aid opportunities” (p. 197). A year later, the authors included a chapter titled “The Effects of Student Financial Aid” in

their book *The Economic Value of Higher Education* (1988). This analysis focused much more closely on the effect of financial aid than on tuition; however they did not perform a meta-analysis that derived an equivalent student price response coefficient. They found that approximately 16% of the individuals enrolled in college at the time were there because of the existence of need-based grant (20-40% of low-income students and 13% of middle-income students). Their assessment was that financial aid is an effective tool. "Because of aid, more low-income individuals have been able to study at the college level, attend relatively costly and prestigious institutions, and stay in school longer than would otherwise have been the case" (p. 179-180).

Heller's (1997) analysis of studies completed since Leslie and Brinkman's work confirmed previous findings. He found an inverse relationship between tuition and attendance in all studies, and found that the range of student responses to a \$100 change in tuition price was from 0.5 % to 1.0 %. Heller focused considerable attention on financial aid and its impact on student access and choice. He found that it was difficult to compare the impact of aid and tuition, but concluded that enrollment was in fact sensitive to changes in financial aid in an inverse manner. He found that different types of aid have different impacts on student enrollment, with grants having a larger impact than loans. However, he concludes by asserting that even when calculating the subsidy value of loans, students do not seem to react to financial aid in the same way as they do to changes in the "sticker price." He says that "in practice it appears that students are not always rational economic actors, and they react differently to various forms of financial aid and tuition changes, even if the economic value of each is the same" (p. 630).

While not well-disseminated in the higher education literature, research at the Kennedy School of Government (S. M. Dynarski, 2000, 2004; S. M. Dynarski & 2002; S. M. Dynarski,

2003) is casting doubt on the original student demand studies. The traditional approach for determining whether lower tuition expands demand is to perform a regression analysis to determine the relationship between aid and a variable used to measure the level of schooling. This is problematic because of the correlation between aid and many other variables that affect the level of schooling achieved. For example, there obviously is a correlation between aid received by an individual and their socio-economic status since some aid programs are limited only to low income families. Therefore, Dynarski (2000, 2002, 2003, 2004) looked for a situation where there was a change in the amount of aid provided to one group of students and not to another. Then she measured the change in attendance between the two groups over a period of time, attempting to account for as many of the extraneous variables as possible. She found two opportunities to explore this natural experiment. First was the elimination of the college benefit paid to recipients of Social Security at the beginning of the Reagan Administration. The second was the implementation of the Hope Scholarship in Georgia in 1993.

In the first example, elimination of the college tuition subsidy for Social Security recipients lowered the rate of attendance for individuals with a deceased parent by approximately 4%. In the second, the impact on a \$1,000 decrease in tuition for Georgia students compared to other students in the southeast was a 4-6% increase in college attendance (accounting for extraneous factors including the relevant unemployment rate in each state). However, very importantly for this study, the effect was almost completely limited to white and upper-income youth (S. M. Dynarski, 2000, 2004; S. M. Dynarski & 2002; S. M. Dynarski, 2003).

Human capital theorists recognize that individuals make decisions with a great deal of uncertainty, including in the face of social discrimination. They also acknowledge that different individuals have completely different systems for valuing inputs and outputs in the cost-benefit

equation. For instance, two individuals might place very different weights on the value of leisure (Beattie, 2002).

Racial and ethnic minorities have had different educational trajectories and occupational experiences than majority individuals (Beattie, 2002). Minorities have lower expectations over time, perhaps due to depressed family financial resources rather than because of membership in a specific group (Beattie, 2002). Many racial differences in educational achievement are partially accounted for by including measures of family background and SES (Beattie, 2002). Another variation unaccounted for when viewing these results without controlling for other factors are the quality of the schools they are likely to attend (Roscigno 1998, 2000 as cited in (Beattie, 2002)).

People of color are also disadvantaged in the labor market. English ability is one factor acting as a roadblock for those whose primary language is not English. Therefore, members of minority groups may rationally use the information available to them to respond quite differently than individuals from majority groups when they make educational decisions (Beattie, 2002).

Another important finding is that college freshman do not have knowledge about simple economic issues (Avard, Manton, English, & Walker, 2005). Sedaie (1998) found that knowledge of economics is a predictor in determining the college-going behavior of students. Their low level of knowledge about basic economic premises limits their ability to make informed choices.

#### *Summary of Micro-economic Theory as Applied to Higher Education*

Becker's theoretical construct is based on the model of human capital. Individuals will spend money on education to the extent that benefits, both tangible and intangible, exceed the costs. Leslie and Brinkman (1987) found definitive evidence in the review of 25 studies that

there is in fact an inverse relationship between price of education and demand for education. Heller followed up on that study in 1997 and reconfirmed those findings.

Therefore, the literature supports the hypothesis that traditional micro-economic theory can be used to predict the college-going behavior. Studying a wide range of variables in the student choice to attend college will test Becker's (1993) theory. To examine the enrollment gap, and to carry out the purpose of the study, it is first necessary to determine as many factors as possible that lead to college attendance. This was done through the development of a regression model. A review of the literature was used to build a theoretical framework from which that model can be constructed.

#### Student Choice Theory

The college choice process is complex and dependent upon the interplay of many variables, not just tuition, grants, or aid (St. John, 1991; St. John, Kirshstein & Noell, 1991). This is consistent with the theoretical construct developed in the first part of this literature review. Becker (1993) acknowledges that the choice to attend college is a combination of all economic and non-economic variables. However, to isolate the economic variables that impact choice, it is first necessary to determine which non-economic variables must be controlled. Vossenstyn's literature review found that sociological factors dominate economic factors (2005).

To determine the sociological variables that impact a student's choice to attend college I want to examine literature categorized as "student choice," by focusing on micro-level choice, and choice related to college attendance in general, not attendance at a particular college. This includes environmental, institutional, and student characteristics that help predict whether a student attends college or not, (Paulsen, 1990).

Smith and Fleming (2006) define college choice as “a process that captures the academic, social, economic, and familial influences that shape a child’s journey” (p. 76) through the educational system.

*Student Choice Model.* Many times the choice process is disaggregated into a multistage model. Jackson (1982, cited in Smith & Fleming, 2006) says that both sociological and econometric perspectives could be used to describe college choice. Litten (1982, cited in (Smith & Fleming, 2006), used a similar approach, taking into account how race, gender, academic ability level, parental education level, and geographic location added explanation to the choice process.

Hossler and Gallagher’s 1987 model “has become the starting point for research or discussion about college choice” (Smith & Fleming, 2006, p. 79). In general, there are three stages to the college choice process: the predisposition phase, the search phase, and the choice phase. The first of these, the predisposition phase, is where students develop their preference for college attendance in general as opposed to going straight into the workplace. In the second phase, the search phase, students who have decided in the earlier phase to attend college begin to determine which college they want to attend. Finally, in the choice phase, the student goes through the application process, picking a college (Hossler & Gallagher, 1987). The most important phase for the purposes of this study is the predisposition stage. However, the search phase is important for purposes of this study because many good students needlessly eliminate certain types of institutions because of lack of awareness about the of various options (Hossler & Gallagher, 1987).

### *Parental Influence*

Parental influence has been found to be significant, if not the most important variable in explaining college matriculation (Hossler, Hu, & Schmit, 1999; Hossler & Stage, 1992; Parents:

A key to college choice," 1986) Student decisions are influenced by parent involvement and the choices that are made for the student by the parent. We also know that degree aspirations are a function of education and income levels (Cabrera & La Nasa, 2000a, 2000b; Davies & Guppy, 1997; Dixon & Martin, 1991; Flint, 1992; Smith & Fleming, 2006). While there is obviously overlap in the phases, it is during the disposition phase that parents use their knowledge of the cost of college as one of the factors in influencing the student's predisposition to attend.

Hossler, Schmidt and Vesper (1999) further divided parental influence into two components – parental encouragement and parental support. I have also included parental education as a third category in this literature review.

*Parental encouragement.* By far the biggest impact on a student's plans to attend college when they were in ninth grade was the level of parental encouragement they had received up to that time (Hossler, Schmit, & Vesper, 1999). This confirmed earlier work that also found that parental encouragement was the best predictor of post-secondary aspirations (Falsey & Haynes 1984; Hearn 1984; Sewell & Shaw, 1978, Tillery 1973 as cited in (Hossler, Schmit & Vessler, 1999).

Parents had higher educational aspirations for their children in these formative years (Hossler, Schmit et al., 1999) and those aspirations led directly to encouragement (Horn & Chen, 1998). This early family involvement was particularly important for students who were in "at-risk" categories (Horn & Chen, 1998). The impact of parental encouragement over time declined for those individuals with low income and low GPAs (Hossler, Schmit & Vesper, 1999).

*Parental support.* Parental support measures more tangible actions by the parents such as saving money for college, taking them on visits to college campuses, and attending financial aid workshops (Hossler, Schmit & Vesper, 1999).

*Parental education.* Although parental encouragement was by far the most important variable in a model predicting college attendance of ninth graders, parental education was the third most significant variable (Hossler & Stage, 1992).

Children who have the benefit of educated parents with high-status jobs are more likely to attain high levels of education than other children (Beattie, 2002). These parents place a high value on education and pass those values to their children. As the student choice process progresses through the predisposition stage to the choice phase, this variable becomes more important. Therefore, education of the parents has a greater relative impact on the actual matriculation of students than it does on their predisposition to attend. As parental education level increases, children are more likely to plan to go to college (Hossler, Hu & Schmit, 1999; Hossler & Schmit, 1995).

#### *Impact of Others on Student Choice*

Students who were exposed to individuals having experience with college, have a higher pre-disposition to attend themselves (Hossler, Hu et al., 1999). Peer influence plays a significant role in student choice (Hossler, Schmit, & Vesper, 1999). For low-income and at-risk students, the plans of friends is important in determining their attendance (Horn et al., 2003). Students with siblings, near family members, or friends who had attended or were attending college were also statistically more inclined to aspire to university attendance (Hossler, Schmit & Vesper, 1999). One survey cited in Hossler and Gallagher (1987) said that there was a 31% differential in attendance between individuals who had, and had not, been exposed to others who had been to college.

Hossler, Hu & Schmit (1999) did not find any relationship between teacher and counselor support and educational aspirations. The influence of guidance counselors in private schools is

more important, but it probably has a greater relationship to the income of the parents (Hossler, Schmit, & Vesper, 1999).

### *Background and Demographic Characteristics*

Examining parental education naturally leads to a discussion of socioeconomic variables. Certain background characteristics and demographic variables are known to be positively correlated with college attendance.

*Socioeconomic status.* Socioeconomic status is one of the most important factors (Bishop, 1977; Kohn, Manski and Mundel, 1976; Miller, 1976; and Peters, 1977 as cited in (Hossler & Gallagher, 1987). In fact, Peters' study concluded that high SES students are four-times more likely to attend an institution of higher education than their low-SES counterparts (Hossler & Gallagher, 1987).

*Student characteristics.* Gladieu and Swail (1998) assert that aspiration and preparation are probably the most important variables predicting an individual's participation in higher education.

Ability is also positively correlated with college attendance. Students with high academic ability begin the choice phase much earlier than those without (Hossler & Gallagher, 1987). This was affirmed by other studies Coleman (1966), Falsey and Haynes (1984), Russell, (1980), and Tillery (1973 as cited in (Hossler, Schmit, & Vesper, 1999).

When held constant for other variables, student academic success plays a significant role in choice (Hearn & Longanecker, 1985; Hossler, & Schmit, & Vesper, 1999. Of the A students, 91% attended a four-year college. Of the B students, 65% attended a four-year college. For students with mostly C's only 28% attended a four-year college (Horn et al., 2003). Better grades

lead to more encouragement from parents (Hossler, Schmit et al., 1999; Weiss, 1999) and from peers and other family members.

In Hossler's most complex study, student achievement was the second most important variable in predicting aspirations for college (Hossler, Schmit, & Vesper, 1999). This finding is consistent with previous research (Shepard, Schmit & Pugh 1992; Bishop 1977; Jackson 1978; Sharp et al 1996; Tuttle, 1981 as cited in (Hossler, Schmit, & Vesper, 1999).

Another interactive variable impacting college attendance is the range of non-class experiences in which students are involved. Participation in student government, debate, drama, and journalism were positively correlated with attending the more selective institutions (Hearn, 1984, in (Hossler & Gallagher, 1987). Another study found that involvement in leadership and other athletic and artistic competitions are related to success in college (Williamson, 1970 in (Hossler & Gallagher, 1987). While neither of these related directly to the predisposition phase, schools that have opportunities for students to be involved in non-classroom activities have a higher number of college attendees than those without such opportunities (Hossler & Gallagher, 1987).

### *School Characteristics*

The rigor of an individual's high school program has a small impact on whether or not that person attends college (Gladieux & Swail, 1998). The quality of the school curriculum also has an impact on the predisposition phase. Graduating from a high school with more choices of math, science and college preparatory curriculum had a positive, but weak correlation with attendance. This is true even when SES variables are controlled in studies. Characteristics of high schools including the income level of the surrounding community and academic track of students also influenced educational aspirations (Hossler, Schmit, & Vesper, 1999).

Student geographic location played a part in the predisposition phase. Students living close to a college are more likely to take advantage of higher education opportunities, even though it might not be the school that they live near (Hossler & Gallagher, 1987). Students who live in urban and suburban areas are also more likely to attend college than are those who live in rural settings (Hossler & Gallagher, 1987).

*Socioeconomic status.* There is a relationship between socio-economic status and higher education attendance in almost every country in the world (Gladieux & Swail, 1998). All studies analyzed by Leslie & Brinkman (1987) and Heller (1997) concluded that socio-economic background – in terms of parents' education and income – are the strongest predictors for whether or not students pursue a higher education (Vossenstyn, 2005).

McPherson and Schapiro (1991) found that students from lower socio-economic classes not only attend college at a lower rate, they are much more likely to attend a two-year college than a four-year college (Gladieux & Swail, 1998). This leads to the idea that there is not a single binary variable to be explored. It could be informative to determine not only if the student matriculated into any institution of higher education, but also if the student attended a four-year institution, or a two-year institution.

Using NELS data, Cabrera and La Nasa (2000a) found that of the 1988 eighth graders, 54% of those in the highest SES had enrolled in a 4-year institution by 1994. Only 14% of the lowest SES students had enrolled. The gap between low SES and high SES students narrows from 51% to 15% once factors such as at-risk characteristics and parental involvement are taken into account (Cabrera & La Nasa, 2000b).

Seventy-seven percent of students in the lowest SES have parents with no collegiate experience (Cabrera & La Nasa, 2000b). More than 99% of those in the upper SES had parents with some experience of post-secondary education (Cabrera & La Nasa, 2000b).

However, Hossler's team found that parental income by itself was not a good predictor of educational plans when other variables were held constant (Hossler, Schmit, & Vesper, 1999). Bateman (1990) also found no statistically significant relation between parental income and aspiration to attend (Hossler, Schmit, & Vesper, 1999).

*Racial, ethnic and gender variables.* This area is perhaps the most studied area in student choice during the past two decades. Some researchers have shown that the college enrollment process varies across racial/ethnic groups (Beattie, 2002; Kaltenbaugh, St. John, & Starkey, 1999; Lindholm, 2006; Smith & Fleming, 2006).

There is another group of researchers who believe that other variables, specifically SES and parental encouragement, account for the differences. There is no statistically significant difference in African-Americans and Caucasians in aspirations (Hanson, 1994; Hossler, Hu, & Schmit, 1999; Hossler & Stage, 1992; St. John et al., 2005).

Smith and Fleming (2006) however found that there was a difference between how parents of African-Americans influenced their males and female children. Because the parental influence was mostly from the mother, daughters received more encouragement to attend four year colleges. Human capital theory researchers have not determined how individual background characteristics may cause students to react differently to the same or similar situation as their counterparts. There may be interaction effects between variables that need to be explored. For example, two individuals might see the same labor market and come to two very different conclusions based on their past experiences and pre-conceived notions (Beattie, 2002).

In summary, the following non-financial variables of interest are supported in the literature and will be examined carefully when developing the regression model for this study.

- Parental variables – encouragement, support, parental education
- Exposure to others who have attended college
- Socioeconomic status
- Student ability
- Student aspiration
- Student achievement
- Geographic

## CHAPTER 3

### PROPOSED METHODOLOGY

The purpose of this study was to determine the impact that perceived cost of attending college has on matriculation. A model using purely non-financial variables was developed to project the probability that a given individual with known characteristics would (a) plan to attend college as a high school sophomore, and (b) actually attend college within four years of their scheduled high school graduation. By isolating these characteristics, it was possible to determine if perceived price had an impact on matriculation. Further, the study examined the enrollment gap between White and Black individuals, and higher and lower socioeconomic students. It helped provide insight into whether any of this opportunity gap was statistically attributed to differential impacts that perceived price has for those of different races.

The following research questions were answered by this study:

- 1) Is perceived price a significant factor in determining whether an individual sophomore plans to matriculate at an institution of higher education?
- 2) Is perceived price a significant factor in determining actual matriculation in college for high school sophomores?
- 3) Is perceived price a significant factor in determining individuals who planned to attend college and did not? Or vice versa, was it a significant factor in determining individuals who as sophomores did not plan to college and eventually did?
- 4) Is the opportunity gap in college attendance between Black and White individuals, and individuals of high and low socio-economic status partially explained by a different effect of the perceived price on matriculation between the two groups?

Brief Outline of Methodology

The study can be briefly outlined as follows:

1. Used the 1980 HS&B data to develop a binary logistic regression model of planned matriculation of high school sophomores. Determined if the perceived price is a significant variable in the model. The resulting model is referred to as Model 1.
2. Used the 1986 HS&B data to develop a binary logistic regression model of actual matriculation of those who were high school sophomores in 1980. Determined if matriculation was a function of perceived price. This model is referred to as Model 2.
3. As outlined in Matrix 1 below, found the subset of individuals who planned to attend college in 1980 and had not matriculated by 1986. An individual in this category is defined as “disappointed.”

Matrix 1 - Analysis of Planned versus Actual Attendance

	<b>Did not matriculate</b>	<b>Matriculated</b>
<b>Planned to attend as 10<sup>th</sup> grader</b>	<i>Disappointed</i>	Expected yes
<b>Did not plan to attend as 10<sup>th</sup> grader</b>	Expected No	Unexpected matriculation

4. Found the subset of individuals that Model 2 would have predicted would attend college who did not matriculate. Those in this subset are termed as “lost opportunities.”

Matrix 2 - Analysis of Predicted versus Actual Attendance

	<b>Did not matriculate</b>	<b>Matriculated</b>
<b>Predicted to Attend as 10<sup>th</sup> grader</b>	<i>Lost Opportunity</i>	Expected yes
<b>Not predicted to Attend as 10<sup>th</sup> grader</b>	Expected no	Overachieved

5. Used “Disappointed” and “Lost Opportunities” as dependent variables and determined binary logistic regression models to predict what factors influenced these outcomes. In addition to the variables used in developing Model 1 and Model 2, certain intervening variables were examined to see if they are significant in determining those who are either disappointed or who were in the group of individuals considered lost opportunities. These are models 3a and 3b.
6. Examine the dependent variable race to determine if there is an interaction between it and perceived price. This will help to answer research question four.

#### The Data Series – High School and Beyond

The population being studied is the U. S. sophomore class of 1980, the individuals who would make up the high school graduating class of 1982 if they successfully finished high school on a normal schedule.

The sample from which data for this study were drawn is one of two cohorts of students who were studied in the High School and Beyond (HS&B) longitudinal study that began in 1980. The HS&B study also included high school seniors, but these individuals were not included in this particular study due to the additional data that is available for the sophomore class, and the information that can be discerned from the information obtained from individuals prior to their graduation (National Center for Education Statistics, 1980).

In the larger study, a two-stage stratified process was used to select the sample of sophomores and seniors. First, 1,122 schools from a total universe of 26,095 schools were selected with probability of being selected proportional to the estimated enrollment in their 10<sup>th</sup> and 12<sup>th</sup> grades. Certain types of schools were over-sampled due to the design criteria. These special criteria included (a) alternative public schools, (b) Cuban public schools, (c) Cuban

Catholic Schools, (d) other Hispanic public schools, (e) high performance private schools, (f) other non-Catholic private schools, and (g) Black Catholic schools. Due to this over-sampling, certain schools had 100% chance of selection. These over-sampled schools were proportionally weighted to make sure that accurate estimates of the population were included in the final study (National Center for Education Statistics, 1980).

At each of these 1,122 schools, 36 sophomores and 36 seniors were randomly chosen for participation in the study. If schools enrolled fewer than 36 sophomores or seniors, all students were invited to participate (National Center for Education Statistics, 1980). When schools refused to participate in the study, substitutions were selected. There was no substitution for students who refused to participate, whose parents refused to participate, or those who were absent on the date the survey was administered or make-up day on which it was administered (National Center for Education Statistics, 1980).

#### *1980 First Wave*

Data for the longitudinal study were obtained through a myriad of methods. The primary means was from questionnaires and tests administered to the participants in the student sample. The questionnaires elicited data about a number of areas including background characteristics, school activities, out-of-school activities, attitudes, and post-high school plans/aspirations. Information was also gathered regarding second language ability, twin siblings, and friendship pairs; a school questionnaire filled out by the principal; a teacher comment form; information on schools obtained from field staff reports; and printed materials from schools (National Center for Education Statistics, 1980).

A sample of approximately 6,000 parents of each cohort (sophomores and seniors) was drawn and data from them were collected through a questionnaire. These data concentrated on

financing of higher education and demographic characteristics used to validate the student responses (National Center for Education Statistics, 1980).

Data were collected between February 1, 1980 and May 15, 1980. A field representative from NCES was available on-site to explain survey procedures and to answer questions. A total of 30,030 sophomores were included in the sample (National Center for Education Statistics, 1980).

### Instrumentation

The primary tool used in this study to accumulate data was the original (1980) sophomore questionnaire in the HS&B and the test administered to these sophomores. The sophomore questionnaire consisted of 114 items in the main instrument that led to the development of more than 350 factors related to each student. There were another 23 items in a student identification instrument (National Center for Education Statistics, 1980).

Following are some of the examples of questions that were included in the study. Question 3 asked – Do you expect to graduate from high school? The possible answers included the obvious “yes” and “no” answers, but also included “probably” and “probably not” as intermediate alternatives (National Center for Education Statistics, 1980).

Question 7 asked- Which of the following best describes your grades so far in high school? The possible answers asked students to assign not only an alpha grade, but asked them to identify these alpha grades with a numerical scale. For instance, the answer “Mostly B’s” was followed by an explanation that this corresponded to a numeric score of 80-84. The answer “About half B’s and half C’s corresponded to a numerical score of 75-79 (National Center for Education Statistics, 1980).

Question 69 asked how far the student thought they would get in school. The scale ranged from dropping out of high school to receiving a Ph.D. or other professional degree (National Center for Education Statistics, 1980).

Of special interest in this study were questions 107 – 112. Questions 107-110 determine what kind of college a participant intends on attending (if they do intend to go to college). Question 111 asks ‘How much do you think each of the following kinds of schooling would cost for a year? Just answer about expenses for tuition, fees, books, and so on, not living expenses.’ There are seven possible answers for each of three types of colleges (public or junior; four-year state; four-year private). Each of the questions had seven identical possible answers: (a) under \$500, (b)\$500-\$1,000, (c)\$1,001-\$2,000, (d)\$2,001-\$3000, e)\$3,001-\$5,000, f)\$5,001-\$7,000, and (g) don’t know. Finally, question 112 asked the individual whether they planned to attend college – right after high school or later (National Center for Education Statistics, 1980).

The battery of tests administered to sophomores included timed tests on vocabulary (21 questions in seven minutes), reading (20 questions in 15 minutes), mathematics (38 questions in 21 minutes), science (20 questions in 10 minutes), writing (17 questions in 10 minutes), and civic activities (10 questions in five minutes) (National Center for Education Statistics, 1980).

The items from the questionnaires and items from the tests were combined into several composite scores that provided integrated data for use in statistical analysis. This included two separate SES composite scores; a self-concept composite score; a locus of control composite score; a work orientation composite score; a family composite scale score; and a community orientation composite score. There were also standardized scores for performance on the test battery based on total answers correct in each category and a formula score that applied a penalty for incorrect answers (National Center for Education Statistics, 1980).

*First and Second Follow-ups*

The first follow-up was in 1982, the year in which the sophomore cohort of 1980 was scheduled to graduate. The National Opinion Research Center attempted to survey all of the sophomores in that group. This included a supplementary questionnaire for all sophomores, and a transcripts survey that included a subsample of the sophomore cohort. The methodology of the second follow-up in 1984 was identical in design as the 1982 follow-up.

*Third Follow-Up 1986*

At the initiation of the third follow-up of the 1980 sophomores, mail-back questionnaires were used as the first means of data gathering. Approximately 15,000 survey packets were mailed. Three weeks later post cards were sent to those who had not responded. Two weeks after the cards had been sent, trained telephone interviewers attempted to contact the individuals who had still not responded. When contact was made, the individuals were urged to fill out the original survey packets. About 65.5% of the sample members mailed back their questionnaires. For those who did not mail in the questionnaires, the firm conducting the survey actually conducted interviews that replicated the surveys either by phone or in person. Approximately 25% of the original group completed the survey either by telephone or in person. The data gathering began in February 1986, and was completed in September, 1986. The overall response rate was 90.6% (NCES, 1980).

**Data Validity and Reliability**

Validity measures the extent to which investigators can draw meaningful and useful information from an instrument (Creswell, 2003). HS&B provides two novel opportunities to test the validity of the answers provided in the student questionnaires. First the follow-up surveys administered to about 6,500 of the parents of each group of study participants (sophomores and

seniors) asked many of the identical questions originally asked of the students. Second, the high school transcripts of more than half of the students were examined (Zahs et al., 1995).

The validity based on parent follow-up questionnaires on individual items in the instrument was found to be relatively high. For instance, the alpha validity coefficient for a question asking about the father's level of education was 0.90. The same measure for occupation was only about 0.60. The alpha validity coefficient for the composite level of socioeconomic status (SES) was 0.80. Validity fell based on the period of time that had elapsed between when the participant responded to the item and the data element of interest. For instance, a question asking the student to estimate the percentage of time that their mother had worked during their school years had an alpha validity coefficient of 0.71 for work during high school, 0.64 for work during middle school, and 0.53 for work during elementary school. More subjective information tended to have a lower validity than objective measures. For instance, the alpha coefficient for mother's aspiration for a child's education was only about 0.64 (Zahs et al., 1995).

Reliability indicates the extent to which results are consistent when the instrument is used across time and populations (Creswell, 2003). NCES also had a novel approach to measure the reliability of HS&B. All individuals in the sample who were members of a pair of twins had their sibling added to the sample. There were therefore more than 500 sets of twin data. The twin data are used to measure the reliability of various objective factors such family characteristics. For example, the sophomore reliability index for SES was 0.82, while the father's occupation reliability was only 0.56. Reliability on the question of whether the twins had attended kindergarten was 0.93 (NCES, 1980).

Another important factor is the percentage of individuals who were in the 1980 sample of sophomores who completed the 1986 follow-up. Great lengths were taken to make sure that a

high percentage of the sophomores of 1980 completed the 1986 follow-up which resulted in a (National Center for Education Statistics, 1986).

#### Data Collection Procedures

A brief outline of this proposed methodology was sent to Institutional Review Board for Research involving Human Subjects (IRB) at my home institution. Once IRB approval was granted, the study commenced.

The data set was available on-line from the International Archive of Educational Data (<http://webapp.icpsr.umich.edu/cocoon/IAED-SERIES/00106.xml>).

#### Data Analysis Procedures

Based on the literature review of likely factors for a group of variables were selected for analysis. These factors were: (a) parental variables – encouragement, support, parental education; (b) exposure to others who have attended college; (c) teacher/counselor support; (d) socioeconomic status; and (e) student ability, aspiration, academic success, grade point average. Following are some of the questions in the instrument that were examined:

##### *Parental Variables*

- father lives with you; mother lives with you;
- father's education
- mother's education level
- how close attention does mother and father pay to education
- talked a great deal or some with father or mother about school
- father or mother's assistance in post-high school plans

##### *Exposure to Others Who Have Attended College*

- how many older brothers or sisters do you have

- friends plan on attending college

*Teacher/Counselor Support*

- talked a great deal or somewhat with guidance counselors and teachers about school
- guidance counselor feels you should go to college
- teacher feels you should go to college

*Student Ability, Aspiration, Success and Grade Point Average*

- self-described grades in high school
- kindergarten attendance
- composite variable for self-concept
- how far do you think you will go in school
- did you expect to go to college when you were in sixth grade

*Socio-Economic Status*

The composite score from the HS&B analysis that was calculated by Pelavin Associates employed five variables derived from the score (a) father's occupation, (b) father's education, (c) mother's education, (d) family income, and (e) material possessions of the household (NCES, 2006). SES was tested for validity through the parent follow-up method and received a validity score of 0.80 (NCES, 1980).

The first step in determining the answers to the research questions was to determine if there was a correlation between quantifiable knowledge of price and the plans of individuals to attend college. This was done by developing a binomial logistic regression model that used planned attendance as a sophomore in high school as the dependent variable. I entered all the variables that the literature review suggested would predict the likelihood of planning to attend

college into the regression model. Those found to be statistically significant were included in the final model.

In the aggregate, we know that the number of individuals who will attend college is inversely proportional to the price (Leslie & Brinkman, etc). However, the model that was developed at this stage (Model 1) predicted the probability of *one individual's attendance and the odds that an individual who answered a certain way did plan to attend college.*

The critical step in this process was determining that the categorical variable indicating the estimated cost of attendance was (a) statistically significant, and (b) added predictive power to the model developed using the statistical principle of parsimony. At this step I was able to determine the answer to the first research question by illustrating the odds ratios for each categorical variable in the estimated cost question. If the odds ratio was inversely correlated with the price in the estimate, then there was a similar relationship between the estimated cost and the probability of attendance. This indicated that the individual who thought the price was low was more likely to attend college than the individual who thought it was high – all other things held constant. That is, the answer to the first research question is yes, perceived price is a significant factor in determining college plans for high school sophomores.

Model 2 was developed to answer the second research question. The only difference between the design of Model 1 and Model 2 was that actual matriculation by 1986 was used in the second model instead of planned attendance in 1980 in Model 1.

Research question three was answered by dividing individuals into the groups described in the previous matrices. Those individuals categorized as “disappointed” ones who planned to attend college when they were high school sophomores and yet had not matriculated by the survey in 1986 was the first group examined through the development of Model 3a.

The derived variable “disappointed” was used as the dependent variable in the next model. The most basic analysis done at this point was to determine that perceived price was a significant variable in the model. Research question three is thus partially answered by determining the significance of perceived price in the model. However, it was important to look at whether other variables could also have helped predict that a person would be disappointed. For instance, an individual could have wanted to go to college as a high school sophomore, and yet by their senior year did not have necessary grades to gain entry. All variables analyzed in previous model development were tested to develop a full model to determine why an individual would be in the group labeled “disappointed.” In addition to the previously analyzed variables, I examined variables that happened between 1980 and 1986 that might have had an impact on attendance. For instance, 11<sup>th</sup> and 12<sup>th</sup> grade academic performance could be an intervening variable that was a good predictor of “disappointed.” Another intervening variable that might have had an impact on matriculation was whether or not the individual became a parent in 11<sup>th</sup> or 12<sup>th</sup> grade.

Conversely, if the binomial regression model predicted that an individual would attend college, and they did not, they were classified as “lost opportunities.” That is, they represented the gap between those who would logically have been expected to attend college and did not. Statistically they are the errors in the model. In the first order analysis, the single categorical variable for price was used with the derived dependent variable “lost opportunities.” If there was a statistically significant relationship, with the odds ratio inversely proportional to the estimated price, then the individual’s attendance was a function of their overestimation of the price of attendance. After doing this simple analysis, a more complex model was developed that introduced other intervening variables that could have impacted attendance.

Research question four was answered by determining if race was a significant variable in the model used to explain either “disappointed” individuals or “lost opportunities.”

### Conclusion

The final result of this study was the development of a set of models that assisted with the determination if the perceived price of college attendance was statistically significant in explaining college matriculation. The meticulous studies already performed on the reliability, validity, and accuracy of the HS&B data set provide a high degree of confidence that the results being achieved can be confidently added to the body of knowledge on this topic.

### Note to Reader

This dissertation uses the alternate dissertation option, which specifies that two papers ready for submission to appropriate journals be included as the final two chapters. The reader should consider the document as three separate parts. Except for minor changes, Chapters One, Two and Three were prepared in the prospectus stage, approved by the dissertation committee in September, 2008.

Chapter Four serves as a "bridge" chapter explaining some of the methodological decisions made after the prospectus was approved. Chapters Five and Six represent the two stand alone manuscripts in their final form. Readers should view Chapters Five and Six as independent documents that can be read without reference to the first four chapters. They address some of the more compelling findings of the study and may deviate from the issues identified in the first three chapters.

CHAPTER 4:  
POST-PROSPECTUS METHODOLOGY

This chapter serves as a bridge between the prospectus approved by my dissertation committee in September, 2008 and the two papers that resulted from extensive analysis to determine the impact of perceived cost on planned and actual college matriculation. It provides information on some of the key decisions made in the analysis stage, and details the plans to submit the two papers resulting from this dissertation process.

Execution of the Study

The following paragraphs describe the data, and summarize the steps taken to prepare the data and make decisions on variable inclusion in the study. Institutional Review Board approval was required, and received on January 9, 2009, since this was a study involving human subjects.

I took the entire HS&B data sets available from the 1980, 1982, 1984, and 1986 and downloaded them into SPSS. I then reduced the variables down from several thousand to around 500 based on those I anticipated would be helpful in completion of the study. At that point I divided the data set into two halves, one to use as a “learning sample” and one to use as a “test sample.” Each sample had approximately 12,000 entries.

At each stage the data set was weighted by the HS&B 1986 follow-up participant file. This file adjusted for over-sampling of some groups to make sure that a representative sample of the population was obtained.

*Degree of Overestimation in the Data Set*

To gauge the degree of the student overestimation found in the HS&B data set, the first step was to determine the distribution of price estimates for each type of institution. That information from the College Board (2008) is shown in Table 1.

Table 1

*Distribution of Perceived Prices; Weighted Average Actual Price (Tuition and Fees)*

	4-year Public	4-year Private	2-year Community
Weighted Average Actual Price 1980	\$738	\$3,225	\$355
Under \$500	1.2%	1.0%	1.0%
\$500-\$1000	4.7%	1.9%	1.9%
\$1001-\$2000	14.7%	4.4%	4.4%
\$2001-\$3000	18.9%	8.7%	8.7%
\$3001-\$5000	19.6%	15.2%	15.2%
\$5001-\$7000	7.4%	29.1%	29.1%
Don't Know	33.4%	39.8%	39.8%
Approximate Percentage Who Have An Accurate Perception of Price	5.9%	31.2%	1.0%

The weighted average annual price of tuition and fees for a 2-year community college was \$355 in 1980. Only 1.0% of the students in the sample answered with a price in the “Under \$500” range. For a 4-year public college, the weighted average annual price was \$738 per year. 5.9% of the individuals either answered “Under \$500” or “500 - \$1000.” So we know that at best this is the number who had a reasonably accurate perception. The average annual price of attendance for a 4-year private college was \$3,225, on the low end of the \$3001-\$5000 range. Therefore, at most 31.2% of individuals had a perception that was much lower than the actual price or answered in a reasonably accurate range.

### *Recoding of Variables*

Prior to data analysis I performed a series of transformations, primarily by creating binary variables from categorical variables. Following are some of the data transformations that played a large part in the final model development and subsequent analysis:

The dependent variable used in the regression analysis was derived from the answer to the question: “Do you plan to attend college in the future” (Variable 115). The possible answers were: (a) Yes, right after high school; (b) Yes, after staying out one year; (c) Yes after a longer period out of school; (d) Don’t know; (e) No. If the individual student planned to attend college at any time in the future the variable was coded as “1”, signifying an answer of “yes” to the question. Therefore, the binary variable in part one of the study is “Does the individual have definitive plans to attend college in the future.” The conversion is illustrated in Tables 2 and 3. The first shows the distribution of answers before the data transformation was conducted. The second shows the data in binary form.

Actual matriculation was much more difficult to recode into a binary variable. Through the 1986 study there was no unique question that asked if a person had attended college or not.

Table 2

*Raw Question – Do you have college plans in the future?*


---

Response	% of All Respondents	Cumulative
Next Year	38.0%	38.0%
After 1 Year Out	9.5%	47.5%
After Longer Time	1.6%	49.1%
No	10.9%	
Don't Know	16.6%	
Did Not Answer/Other	23.3%	

---

Table 3

*Derived Variable of Interest: Had definitive college plans in the future.*

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Response	Percentage of Total
Yes	49.2%
Other Answers	50.8%

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Note. This table categorizes the answers in Table 2 into a binary variable. Rounding accounts for 1% difference between Table 2 and Table 3.

The questions were asked in each follow-up regarding the period of time since the last questionnaire. So, to determine whether an individual high school sophomore of 1980 attended some college by 1982, the 1984 and 1986 survey answers were combined. The resulting variable represents matriculation at some college by 1986. I refer to this variable as “Matriculation by 1986.”

Then I recoded several variables that were potential independent variables in the base model. The variables for highest level of schooling of mothers and fathers were recoded from a series of answers to a binary variable, indicating whether or not the person attended any college at all.

#### *Variables Considered for Inclusion*

The first step in determining the data model was to use the literature review to determine the likely factors for consideration in the model. These factors were: (a) parental variables – encouragement, support, parental education; (b) exposure to others who have attended college; (c) teacher/counselor support; (d) socioeconomic status; and (e) student ability, aspiration, academic success, grade point average. Following are some of the items in the instrument that were examined:

#### *Parental Variables*

- father lives with you; mother lives with you;
- father’s education
- mother’s education level
- how close attention does mother and father pay to education
- talked a great deal or some with father or mother about school
- father or mother’s assistance in post-high school plans

*Exposure to Others Who Have Attended College*

- how many older brothers or sisters do you have
- friends plan on attending college

*Teacher/Counselor Support*

- talked a great deal or somewhat with guidance counselors and teachers about school
- guidance counselor feels you should go to college
- teacher feels you should go to college

*Student Ability, Aspiration, Success and Grade Point Average*

- self-described grades in high school
- kindergarten attendance
- composite variable for self-concept
- how far do you think you will go in school
- did you expect to go to college when you were in sixth grade

*Socio-Economic Status*

The composite score from the HS&B analysis that was calculated by Pelavin Associates employed five variables derived from the score (a) father's occupation, (b) father's education, (c) mother's education, (d) family income, and (e) material possessions of the household (NCES, 2006). SES was tested for validity through the parent follow-up method and received a validity score of 0.80 (NCES, 1980).

The next step was to look at the correlations between the variables to see which should be included and which should be deleted from further consideration. All variables with over a 0.250 correlation with planned attendance were included.

Using the nine variables in Table 4, the model, and all variables in the model (including subcategories) were significant. The Nag R-squared was 0.469. The model correctly predicted 79.4% of all the cases, and 85.5% of the cases of individuals with definitive plans to attend.

To develop a more parsimonious model, the first step was to eliminate the three variables that contributed the least to the Nag R-squared. The first three variables each add over 0.035 to the Nag R-squared. Therefore, the remaining three variables were examined for multicollinearity with the top three variables. The largest correlations were Base Year SES (0.439) with Base Year Test Composite, and Grades with Base Year Test (0.533) Composite. Based on these cross-correlations, and since Homework is a measure of effort and motivation that is not otherwise included, I decided to keep Homework and drop Base Year SES and Grades.

The Planned Attendance model is therefore stated as follows:

Planned attendance is a function of:

- Mother's desire for student to attend (expressed as binary variable)
- Base-year standardized test score (nominal variable)
- Hours per week spent on homework (categorical)
- Best friend planned to attend college in 1980 (expressed as binary variable)

Table 4

*Correlations of Variables of Interest with "Plans to Attend"*

	Correlation with Plans to Attend
Best Friend Plans	0.473
Mother wants student to attend	0.591
Base Year Test	0.398
Time Homework	0.298
Grades	0.373
Base Year SES	0.342
Mother Attended Some College	0.306
Mother Monitors Schoolwork	0.359
Total School Activities	0.300

The Nag R-squared for this model is 0.452 with a probability of 78.5% of predicting the right outcome. Therefore, dropping the five variables led to a reduction in Nag R-squared of only 0.014 and a 0.09% chance of correctly predicting the answer in the sample data.

The second model developed was for actual matriculation. Actual Grades replaced Time Spent on Homework in the actual Matriculation Model. Also, Socio-economic status by quartile became more important. Finally, the variable “Percent of High the 78-79 High School Class Attending College” (from the student’s school) became a variable because of the increase in Nag R-Square. Results from adding perceived price variables are also found in Chapter 5 and 6.

The methodology outlined in Chapter 3, written as part of the prospectus, was followed during the execution of this study. Extensive results were recorded. Research questions were modified based on findings and then there was extra focus placed on the research questions posed in the following two papers.

Chapter 5 is titled “Perceived Price and its Influence on Students’ College Plans.” It was written for possible submission to *The Journal of Higher Education*. Chapter 6 is titled “Exploring How Perceived Price Impacts the Rate of College Attendance Between Black and White Students” and it was written for possible submission to the *Journal of Diversity in Higher Education* after such time that Chapter 5 is printed in another publication.

## Chapter 5

## PERCEIVED PRICE AND ITS INFLUENCE ON STUDENTS' COLLEGE PLANS

Researchers have consistently found that students and their parents have a distorted view of the costs of college attendance (Grotsky & Jones, 2004; Horn, Chen, & Chapman, 2003; Ikenberry & Hartle, 1998; Mumper, 1996). Those who are able to give an estimate of the tuition for various higher education alternatives often overestimate the actual price. When asked to estimate the tuition that in-state undergraduates would pay at four-year colleges in a given year, most students and their parents thought that the price was twice the actual amount (Horn et al., 2003b). Seventy-one percent of all individuals, and 83% of African-Americans believed that college was unaffordable for most families. The majority of individuals over-estimated the price by several thousands of dollars (Hartle, 1998).

In a 2004 literature review, Bridget Long found that very little work had been done to link inaccurate price perceptions to college access and choice. Long concluded that “[i]t is vitally important that researchers find a way to examine the role of college (tuition) perceptions (Long, 2004, p. 24).” By extrapolating well-accepted economic principles, the inference drawn from this problem is that an individual who might be well qualified to attend college, does not do so because they believe they cannot afford it.

The federal government, through the National Center for Education Statistics (NCES), has a long history of gathering longitudinal data about individuals in high school with an attempt to measure later outcomes of these groups. This began with the National Longitudinal Study of the High School Class of 1972, and includes High School and Beyond (1980-1986), the National Educational Longitudinal Study of 1988 and the Educational Longitudinal Study of 2002 (Long, 2004). In the longitudinal surveys that were used to study the high school sophomores and

seniors in 1980, there were data gathered on what individuals thought it would cost to attend college. According to Long's [2004] literature review, this was the last time this question was asked on a national study. Specifically, students were asked what they thought it would cost for a year of instruction at: (a) 2-year public colleges, (b) 4-year public colleges, and (c) 4-year private colleges. There have been hundreds of studies using this data that have ranged from investigation of dropout rates to analysis of earnings based on educational choices. However, the data gathered on the perceived cost of education is one of the many variables in that data set that has not been examined (<http://nces.ed.gov/surveys/hsb/index.asp>).

### Purpose

The purpose of this study is to determine if perceived price (the independent variable) is a statistically significant factor in determining whether an individual sophomore plans to matriculate at an institution of higher education (the dependent variable). This paper is written with the acknowledged premise that the data in the study that was initially collected in 1980 is too old to help policy makers of today find solutions to the problems of misperceived cost. However, it challenges the premise that there is no value in studying the data. The primary goal of this analysis is to determine whether future longitudinal studies should gather information regarding the perceived cost of attendance, and it lays out a methodology for studying potential data gathered from future surveys to determine if there are significant ramifications to any current misperceptions.

### Literature Review

Since the study focuses on the impact that the perceived price has on attendance, I have focused this literature review on the findings concerning the actual price of education on attendance. The first assumption to consider is whether students respond to tuition changes in a

manner consistent with neoclassical microeconomic theory. That is - are students more likely to attend an institution of higher education if the price is lower, and do they reduce their consumption of higher education if the price goes up? Leslie and Brinkman (1987) tested to determine if the assumptions drawn from demand theory regarding higher education were valid. Specifically they sought to determine if (a) enrollment rates were negatively correlated with tuition rates, (b) if enrollment rates were positively associated with student aid spending, and (c) if enrollments in higher education institutions were related to the price charged by their competitors. Leslie and Brinkman (1987) performed a meta-analysis on the 25 student demand studies conducted by various investigators between 1969 and 1982. Every one of the 25 studies found a downward sloping demand curve – enrollment declined when prices rose and increased when prices went down.

Heller's (1997) analysis of studies completed since Leslie and Brinkman's work confirmed previous findings. He found an inverse relationship between tuition and attendance in all studies. Heller focused considerable attention on financial aid and its impact on student access and choice. He found that it was difficult to compare the impact of aid and tuition, but concluded that enrollment was in fact sensitive to changes in financial aid in a predictable manner. He found that different types of aid had different impacts on student enrollment, with grants having a larger impact than loans. However, he asserted that even when calculating the subsidy value of loans, students do not seem to react to financial aid in the same way as they do to changes in the "sticker price."

#### Theoretical Construct

The foundation of this study is laid by the work of Gary Becker, the Nobel-Prize winning economist, in his theory of human capital investment (1964). Human capital is defined as the

available effort an individual can expend to receive valued rewards. An individual chooses to work, learn, rest, or consume. Under this model, Becker attempts to explain why individuals choose to invest time and effort into education and training instead of working for immediate monetary remuneration. With each of these choices comes a reward. Human capital theory is the study of how those choices are made (Becker, 1964, 1993). Becker hypothesizes that the majority of human behavior can be explained through analyzing the trade-offs implied in the basic microeconomic premise. That premise is that individuals maximize utility in the choices they make. Becker's work expanded this microeconomic theory to include non-financial situations. His thesis is that each choice an individual makes is a cost-benefit analysis (Fuchs, 1994).

Becker wrote about the application of this general theory in 1964 and applied it directly to higher education in the 1993 update to his book. As applied to higher education, this theory posits that both individuals and the government will make decisions regarding the level of expenditures for higher education by evaluating a cost versus benefit equation. For the individuals, if the long-term economic benefits of having a college degree (instead of just a high school diploma) are greater than the short-term costs of attendance, then they will choose to attend college. The long-term benefits have to be discounted back to current year dollars. The short-term costs of attendance include the value of the salary from the job students might have begun had they not been spending time on the pursuit of a degree (Becker, 1964, 1993).

Using Becker's hypothesis, students go through a complex cost-benefit analysis to determine if they are going to college (Manski, 1993). Applying his theory, having faulty information on the price of attendance would result in incorrectly weighting the cost-benefit equation. This could lead to economically "irrational" decisions when viewed in light of the

actual equation result with complete information. This is one of the theories being tested in this study.

For illustrative purposes, it is useful to apply Becker's (1993) theory to Mumper's (1993, 1996) findings. As a background, Mumper identifies three reasons why students from low-income families do not attend college. First, disadvantaged students are less likely to aspire to college. Either they place an unrealistically low value on the benefits of attendance in general, or they feel that they do not have the ability to turn opportunity into benefits. They might think that even if they attend college, they will not succeed and, therefore, might as well enter the work force immediately (Mumper, 1996). In Becker's terminology, these students discount the future benefits of a college education significantly because of the risk associated with success after attempt or completion. Assuming a correct perception of price, the benefits side of the equation is the cause of this decision not to attend, not the cost side. Second, low-income students are less likely to take the high school courses necessary to succeed in college (Mumper, 1996). Finally, even those who believe that college is in their best interest are likely to overestimate the real price of attendance (Mumper, 1996), failing to take advantage of an economic opportunity that actually exists. In Becker's terminology, the cost side of the equation is incorrectly analyzed, leading to a potentially faulty decision.

To illustrate this phenomenon, researchers working with Mumper (1996) performed a study using Appalachian youth in southern Ohio as participants. More than 60% of the students felt that going to college was necessary to attain financial security and more than 75% of parents felt that college was a necessity. Eighty percent of high school seniors said that they wanted to go to college, and 84% of their parents said they wanted their children to attend. However, only 40% of the area high school graduates attended some form of higher education.

The reason for this discrepancy was that more than two-thirds of Appalachian high school seniors and their parents said that they could not afford, or were unsure whether they could afford, college. These fears were based on false assumptions about the cost of attendance. More than 50% of the seniors and more than 60% of their parents thought a year at a four-year college would cost more than \$10,000. More than 50% of the parents thought that a year at a two-year college would cost more than \$5,000. In the year that the study was conducted, the actual cost of attending a state university in Ohio ranged from \$5,000 to \$6,000 including room and board. Tuition at a local community college was less than \$3,000 (Mumper, 1996).

### Methodology

The base model examines the probability that a given individual with known characteristics would (a) plan to attend college as a high school sophomore; and (b) actually attend college within four years of their scheduled high school graduation. Once the base model was developed, the additional variable that measures perceived price of attendance was added.

The following two research questions were posed in this study:

1. Was the accuracy or inaccuracy of perceived price a significant factor in determining whether an individual sophomore planned to matriculate at an institution of higher education in 1980?
2. Was the accuracy or inaccuracy of perceived price a significant factor in determining whether someone matriculated by 1986, within four years of their expected high school graduation?

The sample population being studied is the U. S. sophomore class of 1980, the individuals who would make up the high school graduating class of 1982 if they successfully finished high school on a normal schedule. The sample from which data for this study were drawn is one of

two cohorts of students that were studied in the High School and Beyond (HS&B) longitudinal study that began in 1980 (NCES).

### *Misperception in the HS&B Data Set*

Before moving further in the paper, it is useful to look more closely at the HS&B data set to determine whether the misperceptions found in the subsequent studies by Mumper (1996) and Heller (1997) are evident in the period measured by the longitudinal survey. Was there a misperception of price in the 1980 HS&B sophomore cohort?

Table 5 shows the extent that the individuals in the study overestimated the price of attendance for all three types of colleges. The top line in the table shows the actual average cost of attendance that year according to the College Board (2008). The data includes tuition and mandatory fees only, and excludes room and board. In all cases, the misperception of the price was identifiable. The weighted average annual price of tuition and fees for a 2-year community college was \$355 in 1980. Only 1.0% of the students in the sample answered with a price in the “Under \$500” range. For a 4-year public college, the weighted average annual price was \$738 per year. 5.9% of the individuals either answered “Under \$500” or “500 - \$1000.” So we know that at best this is the number who had a reasonably accurate perception. The average annual price of attendance for a 4-year private college was \$3,225, on the low end of the \$3001-\$5000 range. Therefore, at most 31.2% of individuals had a perception that was much lower than the actual price or answered in a reasonably accurate range.

### *Binary Logistic Regression*

The primary means of analysis used in this study is binary logistic regression. This method is preferred when the dependent variable is discrete or binary. The dependent variable can be the answer to a yes/no question, or the presence or absence of a condition (Pampel, 2000;

Table 5

*Weighted Average Actual Price (Tuition and Fees); Distribution of Perceived Prices*

	4-year Public	4-year Private	2-yr Community
Weighted Average Actual Price 1980	\$738	\$3,225	\$355
Under \$500	1.2%	1.0%	1.0%
\$500-\$1000	4.7%	1.9%	1.9%
\$1001-\$2000	14.7%	4.4%	4.4%
\$2001-\$3000	18.9%	8.7%	8.7%
\$3001-\$5000	19.6%	15.2%	15.2%
\$5001-\$7000	7.4%	29.1%	29.1%
Don't Know	33.4%	39.8%	39.8%
Approximate Percentage Who Do Not Overestimate Price	5.9%	31.2%	1.0%

Warner, 2007). In this study, the variable of interest is whether or not an individual planned to attend college, and whether or not they did in fact attend college.

There are several simple considerations when thinking about binary logistic regression compared to multiple regression. In multiple regression analysis, the coefficient of the independent variable represents the change in the value of the dependent variable given a one-unit change in the independent variable. In logistic regression, the natural log of the coefficient represents the “odds” of an event occurring (Wuensch, 2008). The odds indicate the number of times an event occurs divided by the number of times that it does not occur (Warner, 2007).

While multiple linear regression analysis measures the fit of a distribution against a straight line, binary logistic regression measures the fit of a distribution against an S-curve. The binary logistic regression model’s “goodness of fit” is measured using the Wald Chi-Square statistic. The overall effect size, an indication of the model’s overall predictive strength, is expressed using one of a number of pseudo R-squared tests (Allen, J. & Lee, H., 2008). In SPSS, the two calculated pseudo R-square statistics are the Cox and Snell R-square and the Nagelkerke’s R-square. The Cox and Snell R-square achieves a maximum of less than one in models using discrete data. The Nagelkerke’s R-square is a derivation of that statistic that normalizes the values to between zero and one, therefore making it more intuitively comparable to the classic R-square in the multiple linear regression model (Allen & Le, 2008). Therefore I used the Nagelkerke’s R-squared as a measure of the size effect in this paper and abbreviated this term as “Nag R-squared.”

When reporting the regression equation or individual components of the equation I have used the odds ratios since they provide a more intuitive representation of the interpretation. The basic regression equation can be derived directly from the tables that include the odds ratios.

*Data Description*

I took the entire HS&B data sets available from the 1980, 1982, 1984, and 1986 and combined them into SPSS. This resulted in more than 3000 variables. I then chose variables that were germane based on the literature and relevant research completed to date. These included: a) detailed job status, including salary, by month, during the period of the survey; b) military service; c) participation in post-graduation activities not related to collage attendance; d) use of various technology; e) variables included in composites created by NCES; e) movement between schools, colleges, and jobs; and f) detailed information on courses taken during high school and college.

Each sample had approximately 12,000 cases. At each stage of the study, the data set was weighted by the HS&B 1986 follow-up participant file. The HS&B weighting at each survey period attempted to create a data set representing all the 10<sup>th</sup> and 12<sup>th</sup> grade students in the U. S. in 1980. Weights were developed by high school, and then down to the student level. Over-sampling of underrepresented populations including Blacks, Hispanics, Native Americans and various religious groups was performed to assure that accuracy (within sampling error) could be assured down to the sub-group level. Further weighting occurred at each follow-up date to account for the small percentage of individuals who could not be located (NCES, 1980).

The dependent variable used in the regression analysis was derived from the answer to the question: "Do you plan to attend college in the future." The possible answers were: (a) Yes, right after high school; (b) Yes, after staying out one year; (c) Yes after a longer period out of school; (d) Don't know; and (e) No. If the individual student planned to attend college at any time in the future variable was coded as "1," signifying an answer of "yes" to the question.

Therefore, the binary variable in part one of the study is the answer to the question “does the individual have definitive plans to attend college in the future.”

Using the study weights, in total, 49.1% of the sophomores in the study expressed definite intention to attend college at some time in the future. To be conservative, this study assumes that none of the individuals who left this question blank intended to attend college. This represented about 23% of the total responses.

Actual matriculation was much more difficult to recode into a binary variable. Through the 1986 study there was not a unique question that asked if a person had attended college or not. The questions were asked in each follow-up regarding the period since the last questionnaire. Therefore, to determine whether an individual high school sophomore of 1980 attended some college by 1986, the 1982, 1984 and 1986 survey answers were consolidated. The resulting variable represents matriculation at some college by 1986. I refer to this variable as “Matriculation by 1986.”

#### *Basic Relationship Between Perceived Price and Planned Attendance*

Before beginning the multiple variable model development, I tested the basic relationship between perceived price and planned attendance without accounting for other variables. In other words, if researchers only had information on an individual’s perceived cost for all three types of college, how well would they be able to predict planned attendance?

The assumption was that every individual faced exactly the same set of market prices. Therefore, any variance in planned attendance related to price was based on perception instead of reality. However, a simple statistical significance in the variable perceived price would not be sufficient to make any conclusions about the hypothesis I was testing. The model would need to

show statistical significance and illustrate a downward sloping demand curve indicating an negative correlation between price and demand. Table 6 illustrates the results.

The results of this initial test used the perceived price question for all three types of schools in the instrument – 2-year community colleges; 4-year public colleges; and 4-year private colleges. There were seven possible answers to each price perception variable for each of the three school types. Six were ranges of price, and the last was “Don’t Know.” The final answer was used as the comparison. This meant that each school type had a set of odds ratios for the series of prices compared to the “Don’t Know” answer. The model showed a positive relationship between the perceived price profile and planned attendance. The model had an Nag R-squared of 0.060, and correctly predicted 65.6% of all the cases. As shown on Table 6, the odds ratios were significant in all except two of the 18 perceived price categories.

The results were mixed. For 4-year public colleges, there was indication of a downward sloping demand curve. Discounting the statistically insignificant odds ratio for the “Under \$500” category, each subsequent odds ratio was lower than the one for the lower price above it. As an example of the interpretation, the odds of a person who thought the price of a 4-year public school education was between \$500 and \$1,000 per year are 2.783 times the odds of someone attending that answered that they did not know the price. The \$500 – \$1,000 range is important because it represents the range containing the actual price of a year’s attendance. I’ll refer to that as group 2. Going one step further in the interpretation, it is possible to compare the odds of a person in the \$500 - \$1,000 range with someone in the \$3,001 - \$5,000 range that had an odds ratio of 1.498 compared to a “Don’t Know” answer. I’ll call that group 5. Dividing the 2.783 odds ratio of group 2 by the 1.498 odds ratio for group 5 yields an odds ratio of 1.858 that a person in group 2 would plan to attend college compared to a person in group 5.

Table 6

*Odds Ratio for Each Price Perception Category by College Type*

Cost Range	4-year Public	4-year Private	2-year Community
Under \$500	0.954 *	0.312	0.909
\$500-\$1,000	2.783	0.428	0.695
\$1,001-\$2,000	2.173	0.658	0.737
\$2,001-\$3,000	1.530	1.001**	1.177
\$3,001-\$5,000	1.498	1.548	1.389
\$5,001-\$7,000	1.106	1.791	0.456
(Constant)	1.326		
Don't Know	1.000	1.000	1.000
(Comparison)			

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\* p = .051. \*\* p = .950, all other p <= 0.001

This classic demand curve is not illustrated by the results in the 4-year private category or the 2-year community college category. In fact, the 4-year private category shows a clear upward-sloping demand curve. Therefore, the reliability of the data for 4-year private schools is in question. This also casts a shadow on other results found later in this study that use only the 4-year public school data. The odds ratios in the 2-year community college category do not have an apparent slope.

#### Development of Multi-Variable Model

Once the basic relationship was established for 4-year public schools, I developed a multiple variable model to serve as a basis to test the question of whether perceived price actually had a statistically significant impact on planned attendance.

#### *Variables Considered for Inclusion*

The first step in determining the data model was to use the literature review to determine the likely factors for consideration in the model. This literature is referred to as student choice theory. Smith and Fleming (2006) provided an excellent summary of the literature on student choice. Significant contributions to the development of the theory came from Hossler and Gallagher (1987). They developed a three-phase model to study choice. For this study, the predisposition stage of that model is the critical stage. Other significant contributions to the literature came from Stage & Hossler (1989); Paulson (1990a & 1990b); Dixon & Martin (1991); St. John (1991); Hossler & Stage (1992); Hossler & Schmidt (1995); Paulsen & St. John (1997); Hossler, Hu, & Schmidt (1999); and Cabrera & La Nasa (2000).

Based on the literature review five different categories of likely factors were selected for analysis. These factors were: (a) parental variables – encouragement, support, parental education; (b) exposure to others who have attended college; (c) teacher/counselor support; (d)

socioeconomic status; and (e) student ability, aspiration, academic success, grade point average.

Following are the questions in the instrument that I used in the analysis:

*Parental Variables*

- father lives with you; mother lives with you
- how close attention does mother and father pay to education
- talked a great deal or some with father or mother about school
- father or mother's assistance in post-high school plans

*Exposure to Others Who Have Attended College*

- how many older brothers or sisters do you have
- friends plan on attending college

*Teacher/Counselor Support*

- talked a great deal or somewhat with guidance counselors and teachers about school
- guidance counselor feels you should go to college
- teacher feels you should go to college

*Student Ability, Aspiration, Success and Grade Point Average*

- self-described grades in high school
- kindergarten attendance
- composite variable for self-concept
- how far do you think you will go in school
- did you expect to go to college when you were in sixth grade

*Socio-Economic Status*

The composite score from the HS&B employed five variables derived from the score (a) father's occupation, (b) father's education, (c) mother's education, (d) family income, and (e) material possessions of the household (NCES, 1980).

After extensive correlation analysis using the variables listed above, and stepwise regression to fine-tune the results, the following model was developed:

Planned attendance is a function of:

- Mother's desire for student to attend (binary variable)
- Base-year standardized test score (continuous variable)
- Best friend planned to attend college in 1980 (binary variable)
- Hours per week spent on homework (categorical)

Table 7 lists the odds ratio for each variable and sub-variable for this base model. In summary, it is 6.3 times as likely that someone whose mother wanted them to go to college would plan attendance compared to someone whose mother did not definitively desire their attendance. For each point scored on the standardized test score, it is marginally (1.07 times) more likely that that person would plan attendance. If a student's friend planned attendance it was 3.3 times more likely that the student planned attendance than if the friend did not. For the categorical variable homework, it was more than 4.3 times more likely that someone who studied over 10 hours per week would plan college attendance than someone who did not do any homework (or did not answer the question). The effect size test shows that the Nag R-squared for this model was 0.452 with 78.5% of all cases predicted correctly.

Table 7

*Base Model for Planned Attendance Without Regard to Perceived Price*

Variable <sup>a</sup>	Odds Ratio	Change in Nag R-Squared Using Stepwise Regression <sup>b</sup>
Mother desired attendance = yes	6.328	0.371
Base-year standardized test score	1.072	0.066
Friend planned attendance =yes	2.636	0.037
Hours on homework per week <sup>c</sup>		0.014
Don't do homework	0.817	
Under 1 hour per week	1.016	
1-3 hours per week	1.346	
3-5 hours per week	1.579	
5-10 hours per week	1.893	
Over 10 hours per week	3.470	
Constant		

<sup>a</sup>78.5% of all cases are correctly predicted using the sample.

<sup>b</sup>Total Nag R-squared for model is 0.452.

<sup>c</sup>Comparison is with someone who said they were not assigned homework.

## Results

The research questions can be answered by determining if the variable “perceived price” adds statistical significance when added to a binary logistic model of non-financial variables predicting college attendance. First, the independent variable of interest is measured in its raw form (categorically) with six perceived price ranges and a seventh variable included in the analysis, “don’t know,” as asked in the original survey in 1980.

### *Planned Attendance*

Using stepwise regression analysis that added perceived price to the previously developed model, that variable increased the Nag R-squared by 0.007. This change was significant at the  $p < 0.001$  level. The number of correct answers predicted by the model with and without perceived price was 81%. However, the important element of research question one really was whether or not there was an inverse relationship between price and planned attendance as would be predicted using Becker’s (1964, 1993) framework.

Figure 1 shows a graphical depiction of the odds ratios for all possible combinations of perceived price for 4-year public schools. There is a downward sloping trend. However, it is not completely consistent throughout the range of answers. Compared to someone who answers that they do not know the price of attendance, it is approximately:

- 2.1 times as likely that a person who thinks the price is between \$500 and \$1,000 is planning to attend college
- 1.7 times as likely for a person who thinks the price is between \$1,001 and \$2,000
- 1.2 times as likely for a person who thinks the price is between \$2,001 and \$3,000

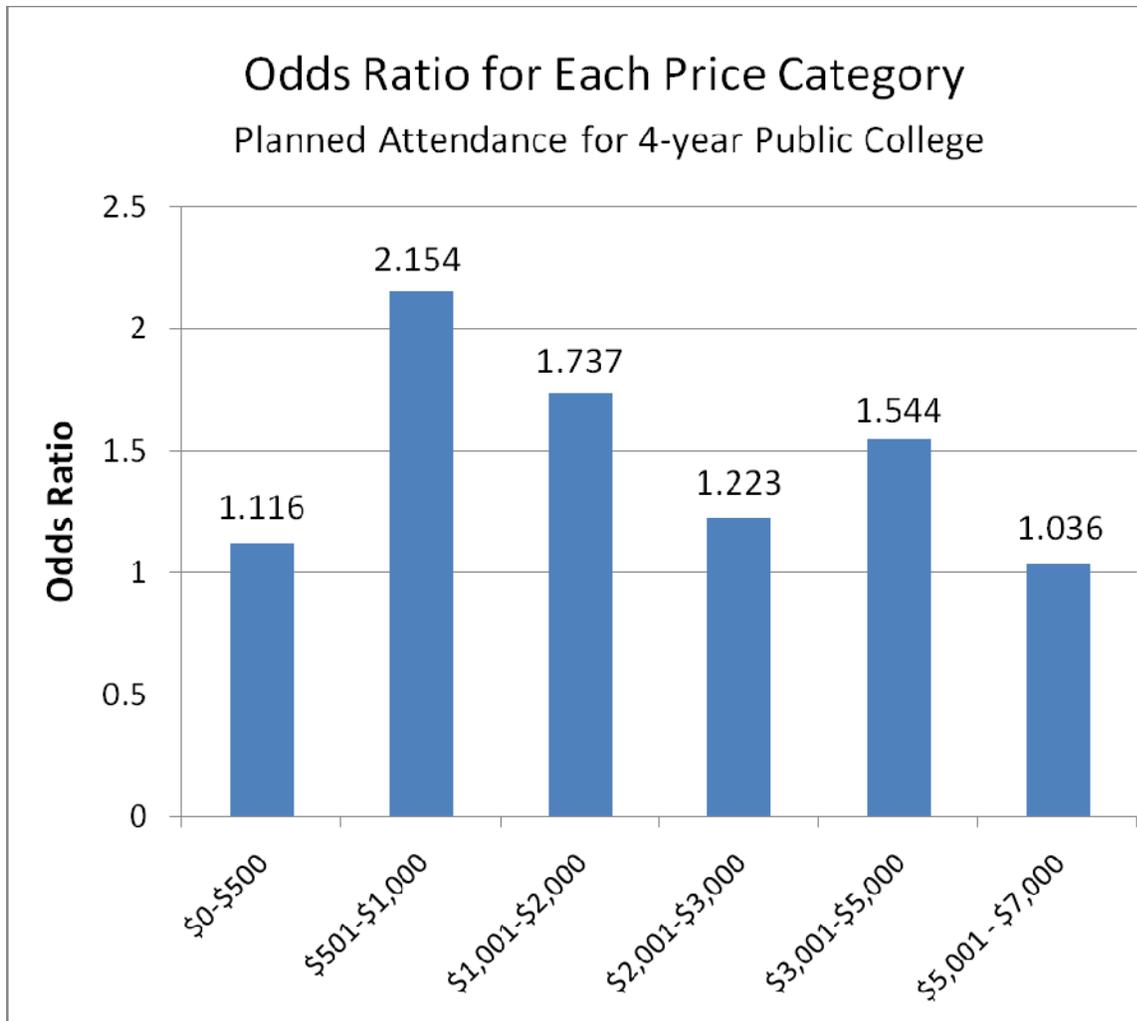


Figure 1. Odds of planned attendance for each category of price perception.

- and 1.5 for someone who thinks the price is between \$3,001 and \$5,000.

A person who thinks the price is between \$5,001 - \$7,000 had almost the same likelihood of planning to attend college as someone who did not know the price.

On the surface there appears to be some unanticipated fluctuation in the categories. The size difference in range found in each response option explains this result. There is a \$1,000 range in the fourth category and a \$2,000 range in the fifth category. Hence, a 1.2 odds ratio for a \$1,000 categorical range cannot be compared directly to a 1.5 odds ratio with a \$2,000 price range. This also skewed the second category, \$500 - \$1,000 understating the odds since it was only half the size of the third range. These range differences make data difficult to interpret.

#### *Simplified Interpretation*

To simplify the presentation of this data, and to correct for the problem of non-uniform sizes of perceived price categories, it was useful to collapse the categories into three groups – low to accurate; high; and unknown. Since the actual price of four-year public college attendance was \$917 in 1980, those who answered that the price was in either the \$0-\$500, or the \$501-\$1,000 categories were put in the “low to accurate” classification. The other four numerical categories were placed into the “high” classification. To simplify, by comparing an individual’s answers with the data on average college prices: (a) a person who overestimated price, (b) a person who had a reasonable estimate or who estimated that the price was lower than it really was, and (c) someone who answered that they did not know or chose not to answer the question. This enabled a direct comparison of high estimation to “Did Not Know” and a comparison of reasonable or low estimation to “Did Not Know.” Further, it allowed the important third comparison of high perceived price to reasonable or low perceived price.

Using the same base regression model developed previously, and substituting the three-category perceived price variable instead of the seven-category variable, I obtain the summarized results in Table 8. All variables were statistically significant at the  $p \leq 0.001$  level.

It is 1.860 times more likely that a person who is in the “Low or Accurate” category will plan to attend college compared to someone who is in the “does not know category. The odds ratio for someone in the “High Price” category is 1.402 times as likely to plan college as the person in the “Does Not Know” category. This means that the odds that someone with low or accurate price perception compared to high perception is 1.329 ( $1.860/1.402$ ) likely to plan to attend college.

Because of the statistical significance, and that the findings are consistent with Becker’s hypothesis, I concluded that the answer to research question one is “yes” four-year public schools. There is a statistically significant difference between the college plans of someone who believes the price is higher than for someone who thinks it is equal to or lower than it actually is. Further, higher perceived price leads to lower planned attendance as expected in classical economic theory.

#### *Actual Matriculation*

A nearly identical technique was used to determine the components of the model for actual matriculation. Two intervening variables were added to the analysis – follow-up (1982) SES; percent of the graduating class of 1979 in the student’s high school who were attending college in 1982. A stepwise regression model was conducted. “Follow-up SES” was the third largest contributor to the model. “Grades in High School” was more important than time spent studying. “Percent of ’78 – ’79 High School Class” was kept in the model because it provided

Table 8

*Odds of Planned College Attendance Compared to “Do Not Know”*

Variable	Odds Ratio Compared to “Do Not Know”	p-value
Low or accurate price	1.860	< 0.001
High price	1.402	< 0.001

*Odds of planned attendance for someone with low or accurate perception compared to someone with high price perception is  $1.329 = (1.860/1.402)$ .*

insight on the quality of the school at which the student attended and about older friends who the student might know. The Actual Matriculation Model is stated as follows:

Matriculation is a function of:

- Mother's desire for student to attend (binary variable)
- Base-year standardized test score (continuous variable)
- Self-Reported Grades (categorical variable)
- 1982 Socio-Economic Status Quartile (categorical variable)
- Percent of 1978-79 high school class that went to college (continuous variable)

Table 9 shows a summary of the results. This model resulted in a Nag R-squared of 0.452. The model correctly predicted 76.5% of all cases, and 80.2% of those who said they had plans to attend. The base model developed was used with the seven-answer categorization of perceived price to determine the impact.

As shown in Table 10, the variable perceived price was significant for all except one answer. The addition of the perceived price variable for the overall model was also statistically significant. However, as seen in the table distribution does not have the shape of a demand curve as the planned attendance model did. While the variable perceived price is statistically significant, the results do not illustrate a demand curve where lower price yields higher demand.

To analyze this further, the categories were collapsed as they were in the final version of the planned analysis section. The results shown in Table 11 indicate that the opposite result is obtained from the planned attendance model. It is less likely that someone who had a low or accurate perception of price would attend than someone who thought the price was high. It is only 0.870 times as likely that the person with the low or accurate price perception actually matriculated.

Table 9

*Base Model for Actual Matriculation Without Regard to Perceived Price*

Variable	Odds Ratio <sup>c</sup>	R-Squared Added in Stepwise Regression <sup>d</sup>
Mother desired attendance = yes	3.543	0.270
Base-year standardized test score	1.068	0.106
Best Friend = yes	1.793	0.012
Self-Reported Grades <sup>a</sup>		0.044
A's Mostly	4.596	
A's and B's	3.998	
B's Mostly	2.652	
B's and C's	2.055	
C's Mostly	1.626	
C's and D's	0.793	
D's Mostly	0.939	
1982 Socio-Economic Status Quartile <sup>b</sup>		0.022
Highest 25% (76%-100%)	4.139	
51% - 75%	2.231	
26% - 50%	1.294	
Percent of 1978-79 High School Class Attending College	1.015	0.010
Constant	0.002	

<sup>a</sup> Comparison is with someone who said they made Below D's

<sup>b</sup> Comparison with someone in the lowest quartile (0% - 25%)

<sup>c</sup> p-values < .001 except "D's Mostly" (.186)

<sup>d</sup> Nag R-squared = -0.452.

Table 10

*Odds Ratio for Price Categories Using Matriculation Model*

Cost	Odds ratio 4-year Public	p-value
Under \$500	0.924	0.011
\$500-\$1,000	1.536	< .001*
\$1,001-\$2,000	1.436	< .001*
\$2,001-\$3,000	1.842	< .001*
\$3,001-\$5,000	1.530	< .001*
\$5,001-\$7,000	1.431	< .001*
(Constant)	0.004	< .001*
Don't Know (Comparison)		

\* Statistically Significant

Table 11

*Simplified Presentation: Odds of Matriculation, High Perception versus Low Perception*

Variable	Odds Ratio Compared to “Don’t Know” <sup>a</sup>	p-value
Low or accurate price	1.430	< 0.001*
High price	1.643	< 0.001*

\*p < .001.

<sup>a</sup> Odds of planned attendance for someone with low or accurate perception is 0.870 ((1.430/1.643)).

Therefore, the answer to research question two is “no.” Perceived price does not influence the actual matriculation of an individual in the way that would be predicted by classical economic theory.

### Delimitations

There are four major delimitations to this study – its longitudinal nature; the age of the data; the limits of the variables that can be tested; and the question of cause and effect.

#### *Problems with Longitudinal Studies*

Longitudinal studies have inherent problems related to contacting the original cohort, and inducing them to respond when they are contacted. The final return rate of the 15,000 surveys sent out to 1980 sophomores two years after the base study was 90.6%. This was achieved through execution of an exhaustive five-part process (NCES, 1986).

#### *Age of the Data*

Optimally, the binomial regression model that was developed would have used data gathered more recently than 1980-1984. Allowances should be made based on the relative value of the data. First, more current data measuring the perceived cost of college attendance in a longitudinal study is not available (Long, 2004). Second, the regression model served mainly to create a control function to study the independent variable of interest (perceived price) on the dependent variable (matriculation). The results of the study illustrate human response to an economic situation. Current information would likely affect the magnitude of this response, but not the direction of the response.

#### *Lack of Desired Variables*

Some of the variables that I would most liked to have examined were not available, or they had a very low response rate. For example, I would have liked to have known the self-

reported grades of individuals in 1982. That data was not available. I believe this would have been a significant intervening variable between planned and actual matriculation. I believe a significant variable would have been the number of siblings in the individual's family would have also been a significant variable. This would have been especially true if the data could have been divided into older and younger siblings. The information gained by having an elder sibling who investigated the college process might have added significant predictive ability to the models. Perhaps most importantly, the study would have been better if individuals had given a dollar estimate for their perceived cost of education rather than picking from a range. The range values placed many constraints on how the data was manipulated.

#### *Question of Cause and Effect*

Cause and effect is not explicitly apparent in this study, nor is it in any multiple regression analysis. It is possible that individuals who plan to go to college have a better appreciation for price because of information they have gathered due to their plans. If so, the model could be predicting whether individuals gathered correct information instead of whether the information they gathered had an impact on their plans.

#### Discussion and Conclusions

##### *Planned Attendance as a Function of Perceived Price*

The results when answering the first research question do not lead to a rejection of the hypothesis that over-estimating price leads to lower planned demand than would be otherwise expected. It indicates that one factor in determining planned attendance is an individual's perception of the price of higher education. When the study participants perceived the price to be higher than it actually was, they were less likely to plan attendance.

*Implications*

This economic experiment with the high school class of 1982 shows an inherent characteristic that can be predicted from study of basic economics. Becker's 1993 findings remain valid. Since individuals in the 21<sup>st</sup> century still believe the cost of college attendance is higher than it actually is, people who overestimate the cost of attendance today are less likely to plan attendance.

*Policy Ramifications*

Assuming that the relationship between perceived price and college attendance was real in 1980 and continues today, there are several public policy ramifications. The public can be educated on what it actually costs to attend college. The sensationalist news stories regarding the "sticker price" of private institutions give a false sense of reality. This is exacerbated when parents and students hear about students who receive between \$100,000 and \$200,000 of "scholarships" to attend private schools. Need-based scholarships that come automatically make it appear that college education costs much more than it really does. These parochial misperceptions are punctuated by the political debate about the increase in the cost of higher education that has occurred during the past three decades. For example, one of the results of the Higher Education Opportunity Act of 2008 will be that the Department of Education will prominently post information on its web site about high-priced institutions and institutions that are raising prices the fastest. The web site will make available lists of the top five percent of institutions that have the highest tuition and highest net price and the top five percent of institutions who had the largest percentage increase in tuition and fees and in net price. While government has the ability to put pressure on colleges to examine their prices, it also has a responsibility not to exaggerate the true cost of higher education.

Second, regulators can continue to encourage higher education to be more transparent in revealing the actual price of education. Progress is being made on this front. The Higher Education Opportunity Act of 2008 is also forcing colleges to address this situation. Beginning in 2011, institutions of higher education must post a net price calculator on their web sites. After entering pertinent information such as income, age, marital status, and residency, the calculator will provide an estimated total cost of attendance along with an estimate of the grant aid they will receive. The Department of Education will also list the 10% of institutions that have the lowest total price and net prices on their web site (American Council of Education, 2008). This should help members of the public make more informed choices regarding the true cost of college attendance.

Third, this paper had demonstrated that further study on college price perception is justified. Perhaps other researchers who have been challenged to look at this phenomenon will be encouraged to do so if the variable perceived price is included in future longitudinal studies (Long, 2004). Ignoring the most recent available data, despite its age, contributes to the continuation of this problem. Quantifying the impact of perceived cost on plans for college attendance helps justify the reintroduction of this variable in current or future longitudinal studies (Horn, Chen, & Chapman, 2003a; Ikenberry & Hartle, 1998; Long, 2004; Mumper, 1996).

#### *Further Study*

The findings of this study show the complexity of the college decision-making process. Price is insignificant in comparison to other variables, but does have an impact on plans. Several avenues of further investigation are pertinent due to insights gained in this study. First, since the evidence suggests that there is a relationship between people who overestimate the price of four-

year public school price and their planned attendance (with all other variables held constant) further study needs to be completed to quantify this relationship. Work needs to be done to see if this relationship has continued into the 21<sup>st</sup> century, or if it is no longer present. Second, the 1992 follow-up study to the HS&B Sophomore Class of 1980 has information about students 10 years after they were slated to graduate from high school. This information - particularly information on their college success, their earnings, and their overall satisfaction - could be studied to determine if their degree of college price perception had impacts on any of these outcomes in the intermediate term. Third, the counter-intuitive findings regarding the inverse demand curve for four-year private colleges merits more careful consideration. There are economists who theorize the existence of certain products for which the demand increases corresponding to price (Veblen goods). The inverse demand curve found for private school prices and for actual matriculation in both public and private schools is worthy of continued examination in this context. Given the overwhelming dominance of the mother's desire for a student to attend college in determining planned and actual attendance, it makes sense to study the mother's knowledge of price and the effect this has on planned attendance and matriculation. Examining this perception at different stages in the college decision-making process also would provide greater insight into the perceived price effect.

As noted earlier, some theorize that non-White individuals, and individuals who are in lower socio-economic classes, might feel that the risk of achieving the benefits promised from college attendance is too high (Long, 2004). This study did not examine the interaction effect between race, socio-economic status, and perceived price. Socio-economic status did have an impact on actual matriculation, but did not have an impact on planned matriculation. However, race was not an important variable in the models developed to predict matriculation or

attendance. The interaction effects of these variables with perceived price on matriculation and planned attendance is worthy of further examination.

To perform these studies, variables on perceived price need to be included in future longitudinal data gathering. Bridget Long who has done the most extensive academic analysis of this topic says, “it is imperative that perceived price enter the consciousness of those who can influence public policy” (2004). NCES can help in this effort by including questions about perceived college price in their forthcoming longitudinal studies. Since the phenomenon of planned attendance was measurable in a single year’s data, the results can be analyzed as soon as the question is asked. However, the results of subsequent waves of the longitudinal study will be valuable in understanding how misperception regarding the price of attendance influences the college-going behavior of potential U.S. students.

## Chapter 6

EXPLORING HOW PERCEIVED PRICE IMPACTS THE RATE OF COLLEGE  
ATTENDANCE BETWEEN BLACK AND WHITE STUDENTS

Researchers have consistently found that students and their parents have a distorted view of the costs of college attendance (Horn, Chen, & Chapman, 2003; Ikenberry & Hartle, 1998; 2004; Mumper, 1996). Those who are able to give an estimate of the tuition for various higher education alternatives often overestimate the actual price. When asked to estimate the tuition that in-state undergraduates would pay at four-year colleges in a given year, most students and their parents thought that the price was twice the actual amount (Horn et al., 2003). Seventy-one percent of all individuals, and 83% of African-Americans believed that college was unaffordable for most families. The majority of individuals over-estimated the price by several thousands of dollars and few had any idea of what financial aid was available to them (Hartle, 1998). This study examines this difference in response between Blacks and Whites when they overestimate the cost of higher education.

As shown in Figure 2, in 1974 there was parity between the numbers of Blacks and White high school graduates who went on to college – 47.2% for each group. There was near parity until 1979 when the statistic was 49.9% of Whites and 46.7% of Blacks (U. S. Department of Education-NCES, 2008). Between 1979 and 1986 the gap grew to 19.9% (53.8% versus 36.9%). The gap shrunk in 1987 due to an increase in Black participation, but since then the gap has been volatile. It has ranged from 6.4% to 19% since 1987. In 2006, the gap was 13% (U. S. Department of Education-NCES, 2008).

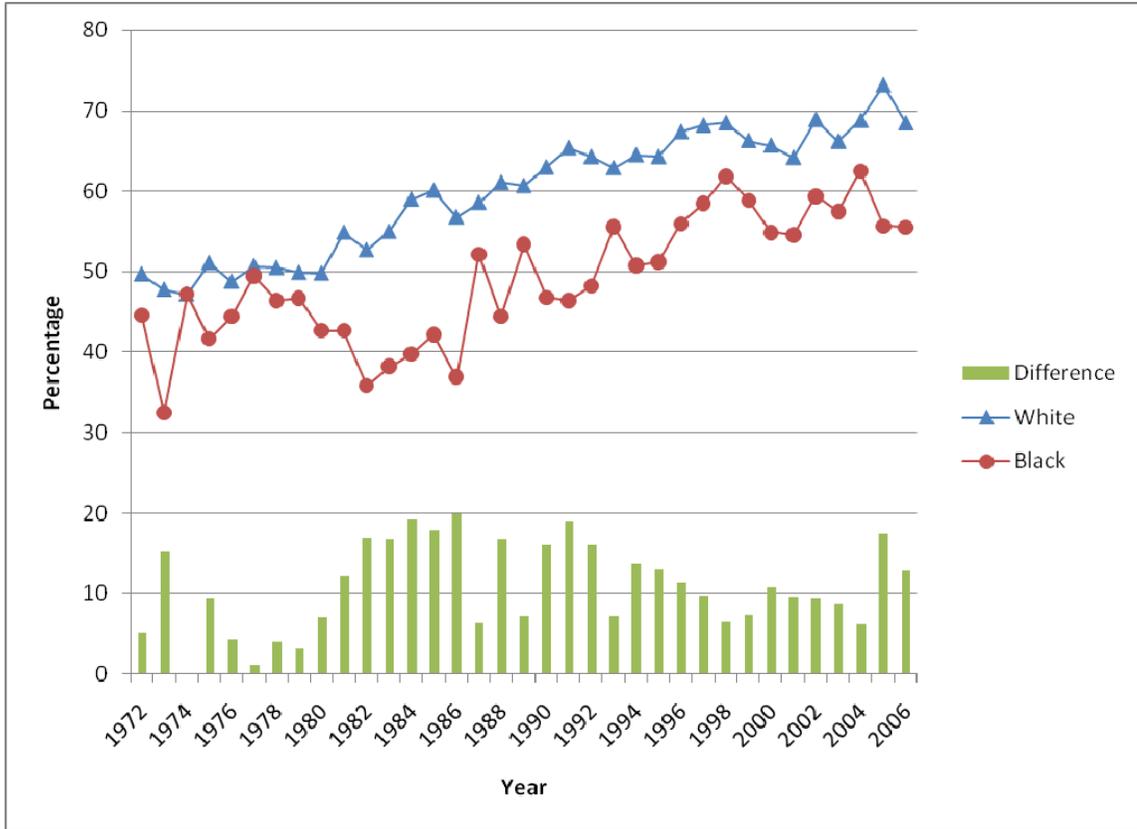


Figure 2. Percentage of Blacks and Whites graduating from high school who immediately went to college the following fall.

A study by Hall (2009) (see Chapters 4 and 5) used data from the 1980 High School and Beyond database to determine if overestimating price led to lower than expected attendance. The findings suggested that the odds were 1.39 times more likely that an individual who had an accurate or low estimate of price would plan to attend a 4-year college than a person who overestimated the price. The 1980 data was used because it was the last time a question on a major national educational survey that examined perceived price was asked (Long, 2004). This study used that same data to examine the relationship between race and perceived price. The study is limited to analysis of planned attendance for 4-year colleges because this is the only category in the study where there was a statistically significant result with a logically shaped demand curve.

#### Purpose Statement

The purpose of this study was to determine the impact that perceived cost of attending college had on matriculation plans for high school sophomores in 1980, especially Black students. I specifically attempted determine if this misperception impacts potential Black students in a different way than it does for Caucasian students. A binary logistic regression model that isolates the impact of perceived price was used as a tool. The study tested the hypothesis that misinformation about college costs is partially responsible for gap between Black and White attendance that widened drastically between 1977 and 1986.

The study is also intended to illustrate whether there is value in adding questions about perceived price to future longitudinal studies that examine student behavior. Currently administered longitudinal studies will continue to ignore this important factor unless some evidence of the impact of this phenomenon on college attendance is quantified (Horn et al., 2003; Ikenberry & Hartle, 1998; Long, 2004; Mumper, 1996).

*Lack of Cost Information*

Although a primary reason for lack of college attendance by low-income urban students is that resources are not available (Oliverrez & Tierney, 2005), there are other important reasons. In a 2004 literature review, Bridget Long (Long, 2004) of Harvard found that very little work had been done to link inaccurate price perceptions to college access and choice. Her conclusion was that “(i)t is vitally important that researchers find a way to examine the role of college (tuition) perceptions” (Long, 2004, p. 24).

Parents and students know little about college costs and financial aid opportunities. Those who give an estimate of the tuition for various higher education alternatives often overestimate the actual level. They also underestimate the availability of financial aid programs (Long, 2004). In general, the public has a distorted view of the costs of college attendance (Ikenberry & Hartle, 1998). When asked to estimate the tuition that in-state undergraduates would pay at four-year colleges in a given year, most students and their parents thought that the price was twice the actual amount (Horn, Chen, & Chapman, 2003). These faulty perceptions place unnecessary constraints on student choice.

The news media are likely to report only on the actual tuition prices of the most elite and expensive institutions. They also report on the annual growth in tuition prices compared to costs of other items and on the sticker shock felt by parents with college-age children. The variance in prices between these elite institutions and other colleges is ignored. For instance, many colleges charge less than 20% of the cost of an Ivy League university (Long, 2004).

Of particular note is that the information known about price varies significantly between racial groups. Parents of African-American children are less likely to be able to estimate the level of tuition (Long, 2004). There is also a correlation between parents' socioeconomic status and

their knowledge about financial aid programs (Long, 2004). In addition to this lack of information about aid, navigating the process of receiving aid is complex and cumbersome. Part of this is because minority students, students who come from families with a low socioeconomic status, and students from rural areas, are less likely to have adequate guidance counseling (Long 2004).

### Theoretical Construct

The foundation of this study was laid by the work of Gary Becker, the Nobel-Prize winning economist, in his theory of human capital investment (Becker, 1964). Human capital is the available effort an individual can expend to receive valued rewards. An individual chooses to work, learn, rest, or consume. With each of these choices comes a reward. Human capital theory is the study of how those choices are made (Becker, 1964, 1993). Becker wrote about the application of this general theory in 1964 and applied it directly to higher education in the 1993 update to his book. As applied to higher education, this theory argues that both individuals and the government will make decisions on the level of expenditures for higher education by evaluating a cost versus benefit equation. For individuals, if the long-term economic benefits of having a college degree instead of just a high school diploma are greater than the short-term costs of attendance, then they will choose to attend college. (The long-term benefits have to be discounted back to current year dollars). The short-term costs of attendance include the value of the salary from the job students might have begun had they not been spending time on the pursuit of a degree (Becker, 1964, 1993).

Becker's Nobel Prize was based on his application of microeconomic theory not to human capital theory, but in the analysis of many simple non-financial situations. He hypothesizes that the majority of human behavior can be explained through analyzing the trade-

offs implied in the basic microeconomic premise (Fuchs, 1994). That premise is that individuals maximize utility in the choices they make. Becker's work expanded this microeconomic theory to include non-financial elements. His thesis is that each choice an individual makes is a cost-benefit analysis (Fuchs, 1994). While traditional economists would limit the inputs and outputs to quantifiable monetary denominations, Becker said that it was useful to examine all costs and all benefits to explain human behavior. Becker would say that these non-financial variables cause individuals to make what might otherwise appear to be irrational decisions. This theory can be extended to explain where and how students and families spend their funds on higher education. He theorizes that the individual is able to factor in all monetary and non-monetary costs and benefits in making the college choice decision. Everything that is positive about the perceived college experience (including life-long earnings) is netted against all that is perceived as negative. This set of perceived outcomes is compared to the perceived benefits and choice is made based on the difference (Becker, 1993).

Using Becker's hypothesis, students go through a complex cost-benefit analysis to determine if they are going to college, and which college they choose to attend (Manski, 1993). Applying Becker's theory, faulty information on the price of attendance would result in people incorrectly weighting the cost-benefit equation and making what might be considered irrational decisions in the presence of complete information. This is the thesis being tested in this study.

#### *Becker's Theory Applied to Mumper's Findings*

For illustrative purposes, it is useful to apply Becker's theory to Mumper's (1993) findings. As a background, Mumper identifies three reasons why students from low-income families do not attend college.

First, disadvantaged students are less likely to aspire to college. They either place an unrealistically low value on the benefits of attendance in general, or they feel that they do not have the ability to turn opportunity into benefits. They might think that even if they attend college, they will not succeed and, therefore, might as well enter the work force immediately (Mumper, 1996). In Becker's terminology, these students discount the future benefits of a college education significantly because of the risk associated with success after attempt or completion. Assuming a correct perception of price, the benefits side of the equation is the cause of this decision not to attend, not the cost side.

Second, low-income students are less likely to take the high school courses necessary to succeed in college (Mumper, 1996). This second reason points to the need to examine the student's perceived cost-benefit analysis before the point that taking college preparatory classes has passed.

Finally, even those who believe that college is in their best interest are likely to overestimate the real price of attendance, failing to take advantage of an economic opportunity that actually exists (Mumper, 1996). In Becker's terminology, the cost side of the equation is incorrectly analyzed, leading to a potentially faulty decision.

To illustrate this phenomenon, researchers working with Mumper (1996) performed a study using Appalachian youth in southern Ohio as participants. More than 60% of the students felt that going to college was necessary to attain financial security and more than 75% of parents felt that college was a necessity. Eighty percent of high school seniors said that they wanted to go to college and 84% of their parents said they wanted their children to attend. However, only 40% of the area high school graduates attended some form of higher education.

The reason for this discrepancy was that more than two-thirds of Appalachian high school seniors and their parents said that they could not afford, or were unsure whether they could afford, college. These fears were based on false assumptions about the cost of attendance. More than 50% of the seniors and more than 60% of their parents thought a year at a four-year college would cost more than \$10,000. More than 50% of the parents thought that a year at a two-year college would cost more than \$5,000. In the year that the study was conducted, the actual cost of attending a state university in Ohio ranged from \$5,000 to \$6,000 including room and board. Tuition at a local community college was less than \$3,000 (Mumper, 1996).

### *Race and College Choice*

Individuals will spend money on education to the extent that benefits, both tangible and intangible, exceed the costs. Leslie and Brinkman (1987) found evidence in a review of 25 studies that there is in fact an inverse relationship between price of education and demand for education. Heller followed up on that study in 1997 and reconfirmed those findings.

Human capital theorists recognize that individuals make decisions with a great deal of uncertainty, including in the face of social discrimination. They also acknowledge that different individuals have completely different systems for valuing inputs and outputs in the cost-benefit equation. For instance, two individuals might place very different weights on the value of leisure (Beattie, 2002).

Racial and ethnic minorities have had different educational trajectories and occupational experiences than majority individuals (Beattie, 2002). Minorities have lower expectations over time, perhaps due to depressed family financial resources rather than because of membership in a specific group (Beattie, 2002). Many racial differences in educational achievement are partially accounted for by including measures of family background and SES (Beattie, 2002). Another

variation unaccounted for when viewing these results without controlling for other factors is the quality of the schools they are likely to attend (Roscigno 1998, 2000 as cited in (Beattie, 2002).

People of color are also disadvantaged in the labor market. English ability is one factor acting as a roadblock. Therefore, members of minority groups may rationally use the information available to them to respond quite differently than individuals from majority groups when they make educational decisions (Beattie, 2002). Another important finding is that college freshmen do not have knowledge about simple economic issues (Avard, Manton, English, & Walker, 2005). Sedaie (1998) found that knowledge of economics is a predictor in determining the college-going behavior of students. Their low level of knowledge about basic economic premises limits their ability to make informed choices.

There is another group of researchers who have found that other variables, specifically SES and parental encouragement, account for these differences since they found there was no statistically significant difference between African-Americans and Caucasians in aspirations (Hanson, 1994; Hossler, Hu, & Schmit, 1999; Hossler & Stage, 1992; St. John, Paulsen, & Carter, 2005).

Smith and Fleming (2006) however found that there was a difference between how parents of African-Americans influenced their male and female children. Because the parental influence was mostly from the mother, daughters received more encouragement to attend four year colleges. Human capital theory researchers have not determined how individual background characteristics cause students to react differently to the same or similar situation as their counterparts. There may be interaction effects between variables that need to be explored. For example, two individuals might see the same labor market and come to two very different conclusions based on their past experiences and pre-conceived notions (Beattie, 2002).

## Methodology

A previously developed model using purely non-financial variables was developed to project the probability that as a high school sophomore a given individual with known characteristics would plan to attend college. By isolating these characteristics, it was possible to determine the impact that perceived price had on matriculation. Further, the study examined interaction effects between race and perceived price. It helped provide insight into whether any of the opportunity gap in attendance between Black and White students could be statistically attributed to this interaction effect. The study answered these two research questions:

1. Were Blacks less likely to attend college than Whites in 1980 when other statistically significant variables were held constant?
2. Was there an interaction effect between perceived price and either Black or White students in 1980?

The population studied was the U. S. sophomore class of 1980, the individuals who made up the high school graduating class of 1982 if they successfully finished high school on a normal schedule. The sample from which data for this study were drawn is one of two cohorts of students that were studied in the High School and Beyond (HS&B) longitudinal study that began in 1980 (NCES, 1980). It is important to note that the under-represented groups were over-sampled and the final data set had an appropriate weight applied to each individual.

In that study the classification of individuals by race was limited to five categories and “other.” This study deals primarily with the classifications “White” and “Black.” The terminology is arguably outdated for the late 2000s, but is used in relation to the conduct of this statistical study to maintain consistency with the original 1980 study categories.

### Delimitations

There are three major delimitations to this study – its longitudinal nature, the age of the data, and the limits of the variables that can be tested.

Longitudinal studies have inherent problems related to contacting the original cohort, and inducing them to respond when they are contacted. The final return rate of the 15,000 surveys sent out to 1980 sophomores two years after the base study was 90.6%. This was achieved through execution of an exhaustive five-part process (NCES, 1986).

Optimally, the binomial regression model that was developed would have used data gathered more recently than 1980-1984. Allowances should be made based on the relative value of the data. Two factors help to mitigate that delimitation. First, more current data measuring the perceived cost of college attendance in a longitudinal study is not available (Long, 2004). Second, the regression model served mainly to create a control function to study the independent variable of interest (perceived price) on the dependent variable (matriculation).

Finally, the data available in the study provided challenges in the original study methodology and more particularly in answering ancillary questions that came from analysis of the available data. For example, having perceived price as a categorical variable made design set-up difficult. Only having the perceived price information for students became frustrating when the primary driver of the data models was the mother's desire for their child to attend college. The perceived price would almost certainly have had more of an impact on the person who had this much influence and was more likely to pay for college than the student.

#### *Binary Logistic Regression Analysis*

The primary means of analysis used in this study was binary logistic regression. This method is preferred when the dependent variable is discrete or binary. The dependent variable

can be the answer to a yes/no question, or the presence or absence of a condition (Pampel, 2000; Warner, 2007). In this study, the variable of interest was whether or not an individual planned to attend college, and whether or not they did in fact attend college.

There are several simple considerations when thinking about binary logistic regression compared to multiple regression. In multiple regression analysis, the coefficient of the independent variable represents the change in the value of the dependent variable given a one-unit change in the independent variable. In logistic regression, the natural log of the coefficient represents the “odds” of an event occurring (Wuensch, 2008). The odds indicate the number of times an event occurs divided by the number of times that it does not occur (Warner, 2007).

While multiple linear regression analysis measures the fit of a distribution against a straight line, binary logistic regression measures the fit of a distribution against an S-curve. The binary logistic regression model’s “goodness of fit” is measured using the Wald Chi-Square statistic. The overall effect size, an indication of the model’s overall predictive strength, is expressed using one of a number of pseudo R-squared tests (Allen & Lee, 2008). In SPSS, the two calculated pseudo R-square statistics are the Cox and Snell R-square and the Nagelkerke’s R-square. The Cox and Snell R-square achieves a maximum of less than one in models using discrete data. The Nagelkerke’s R-square is a derivation of that statistic that normalizes the values to between zero and one, therefore making it more intuitively comparable to the classic R-square in the multiple linear regression model (Allen & Le, 2008). I used the Nagelkerke’s R-squared as a measure of the size effect in this paper (Warner, 2007) and abbreviated this term as “Nag R-squared.”

When reporting the regression equation or individual components of the equation I have used the odds ratios since they provide a more intuitive representation of the interpretation. The basic regression equation can be derived directly from the tables that include the odds ratios.

### *Base Model*

An extensive literature review was conducted (Hall, 2009) (See Chapters 4 and 5) to develop a base logistic regression model to predict whether individuals would plan to attend college and whether they would actually attend. The Planned Attendance Model is stated as follows:

Planned attendance is a function of:

- Mother's desire for student to attend (binary variable)
- Base-year standardized test score administered to the HS&B sophomores (continuous variable)
- Best friend planned to attend college in 1980 (binary variable)
- Hours per week spent on homework (categorical)

For this study, base-year socio-economic status by quartile, was added as a categorical variable to factor out the price elasticity. This was done to assure that the impact of race is not magnified by the average socio-economic status of these races.

The odds ratios of each variable in the base model are shown in Table 12. This model resulted in a Nag R-squared of 0.454. The model correctly predicted 78.3% of all cases, and 84.6% of those who said they had plans to attend.

Table 12

*Base Model for Planned Attendance Without Regard to Perceived Price*

Variable <sup>a</sup>	Odds Ratio	Change in Nag R-Squared Using Stepwise Regression <sup>b</sup>
Mother desired attendance = yes	6.083	0.323
Base-year standardized test score	1.059	0.073
Friend planned attendance =yes	2.478	0.038
Hours on homework per week <sup>c</sup>		0.012
Don't do homework	0.791	
Under 1 hour per week	1.011	
1-3 hours per week	1.323	
3-5 hours per week	1.541	
5-10 hours per week	1.876	
Over 10 hours per week	3.439	
Socioeconomic status by quartile <sup>d</sup>		0.008
Upper quartile	2.106	
Second quartile	1.666	
Third quartile	1.418	
Constant		

<sup>a</sup>78.3% of all cases are correctly predicted using the sample.

<sup>b</sup>Total Nag R-squared for model is 0.454.

<sup>c</sup>Comparison is with someone who said they were not assigned homework.

<sup>d</sup>Comparison is with someone in the lowest socioeconomic quartile.

## Results

### *The Influence of Race on Planned Attendance*

When race was entered into this price-based model for 4-year public colleges, the change in Nag R-squared was statistically significant at the  $p < 0.001$  level - 0.005. This information is found in Table 13. Table 14 shows that all races have a higher odds ratio of planning to attend college when examining the data in context with the base model with perceived price added as a variable. This means that in all cases, the odds ratio for non-White individuals planning to attend college is higher than the odds ratio for a White individual. A Black individual is 2.483 times more likely to attend college once mother's preference, homework, base year test score, friend's likelihood to attend college, and socio-economic status are all factored into the model. Therefore, the answer to the first research question is "no." While there is a statistically significant difference between planned attendance and race when the perceived price variable is included, Blacks were more likely to attend than Whites.

Hall (2009) (See Chapters 4 and 5) developed a methodology to compare planned attendance at an institution of higher education for someone who had an accurate or low perception of price versus someone who thought the price was higher than it really was. By comparing an individual's answers with the data on average college prices in 1982, three groups were created: (a) a person who overestimated price, (b) a person who had a reasonable estimate or who estimated that the price was lower than it really was, and (c) someone who answered that they did not know or chose not to answer the question. This enabled a direct comparison of high estimation to "Did Not Know" and a comparison of reasonable or low estimation to "Did Not Know." Further, it allowed the important third comparison of high perceived price to reasonable or low perceived price. This technique was similarly used in this study.

Table 13

*Odds Ratio for Planned Attendance Compared to “Don’t Know” - Base Model*


---

Cost	Odds ratio 4-year Public	p-value
Under \$500	0.968	.198
\$500-\$1,000	2.461	<.001*
\$1,001-\$2,000	1.667	<.001*
\$2,001-\$3,000	1.168	<.001*
\$3,001-\$5,000	0.887	<.001*
\$5,001-\$7,000	0.008	<.001*
(Constant)		<.001*
Don’t Know (Comparison)		
Change in Nag R-sq	0.008	

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\*Statistically significant.

Change in Nag R-squared = .005

Table 14

*Odds Ratio for Race Compared to White*

	Odds ratio	p-value
Hispanic or Spanish	1.270	< 0.001*
American Indian	1.901	< 0.001*
Asian, Pac Islander	3.349	< 0.001*
Black	2.483	< 0.001*
Other	5.897	< 0.001*

\* Statistically significant

*Interaction of Race and Price on College Plans*

To determine if there is an interaction effect between race and price, the model was run separately for both Black and White individuals. Table 15 shows the results for the three categories of price knowledge – low or accurate; high; don't know. There is a visible difference between the effect of perceived price on planned attendance between the two races. For Whites, the odds are 1.355 times higher that a person who has an accurate or low perception of price will plan to attend college than someone who overestimated price (1.638/1.209). For Blacks, the ratio is 1.129 (2.114 /1.873). For someone who had a low or accurate perception of price (compared to a high perception of price), this means a White individual would be 1.200 times as likely to plan college attendance compared to a Black individual.

The second research question asked if there was an interaction effect between race and price perception in the plans of high school sophomores in 1980. By analyzing Black and White individuals, it was determined that there was an interaction effect. White individuals who had an accurate perception of price had an odds ratio of 1.2 times compared to Black individuals who had an accurate perception.

## Discussion and Analysis

The first research question revealed that there was no inherent reason that Black students would be less likely to plan college attendance after they graduated from high school. After taking into account the five variables used in the base model to predict college attendance in 1980, a Black individual was more likely to plan college attendance than a White individual. Significantly more qualified White individuals actually attended college between 1982 and 1986. This means that the races differed in the five predictive variables – Blacks were

Table 15

*Odds of Planned College Attendance Compared to “Do Not Know” Answer*

	Odds Ratio Compared to “Do Not Know” All	Odds Ratio Compared to “Do Not Know” White	Odds Ratio Compared to “Do Not Know” Black
Low or accurate price	1.732	1.638	2.114
High price	1.254	1.209	1.873
Low or accurate vs. High	1.381	<b>1.355</b>	<b>1.129</b>

Low vs. High for

White vs. Black  $= (1.355/1.129) = 1.200$

less likely than Whites to have a mother who wanted their child to attend college; Blacks scored lower on standardized tests than Whites; Blacks spent less time on homework than Whites; Black students were less likely than White students to have a best friend who planned to attend college; and Black students were more likely than White students to be in a lower socio-economic class.

The second research question provides insight into how the perceived price of attendance may play into this phenomenon. Whites were more likely to attend college if they had an accurate perception of the price when all of other variables were held constant (odds ratio = 1.355). Blacks were also more likely to attend college even if they had an accurate price perception. However, the odds ratio for Black individuals was lower than whites – 1.129. Dividing the odds ratio of Whites by the odds ratio of Blacks shows that when holding all other variables constant, Whites were 1.2 (1.355/1.129) times as likely to plan attendance as Blacks.

#### *Future Research*

The most important future research would be a pilot study that measured the teenagers' perceived cost of higher education. With relatively few questions patterned after the relevant questions in the HS&B study, the relationship between the variables "Perceived Cost" and "Plans to Attend" could be discerned for both White and Black individuals. All except one of the differentiating questions could be asked directly – a) does your mother want you to attend college, b) does your best friend want to attend college, and c) what grades do you make in high school, and (d) what is your race. Determining the "base-year test composite" would require exponentially more work. However, in 1980 there was a 37% correlation between either parent having some college attendance and the intelligence test. Questions regarding the mother and father's attendance at college could be substituted for the intelligence test.

If the proposed study showed the same results as were found in this study of 1980 high school sophomores, the need to do further research in perceived cost would be validated. The issue could be addressed with current data and policy makers could take action based on the findings.

The ramifications of price misinformation, and the general lack of information, are significant and may affect college choice decisions. Much more important than a senior in high school deciding not to go on to college based on the lack of information is the plan that parents, counselors and students develop early in the middle and high school career. If they believe that they cannot afford college in eighth grade, it is likely that they will not take the college preparatory classes necessary to successfully gain admittance into college, and will not be prepared even if they do attend. This misinformation may also lead to a lack of savings for college that might otherwise occur if individuals felt they could afford to send that child to college early in their lives (Long, 2004).

Legislators are increasingly interested in the growing cost of higher education. Affordability was a major part of the deliberations associated with the renewal of the Higher Education Act during the most recent term of Congress. As a result of this concern the House of Representatives passed the College Affordability Act of 2008 (Higher Education Opportunity Act, 2008). Most recently, Congressional leaders called for the wealthiest universities to spend a larger percentage of their endowments on student financial aid to help reverse the trend of rapid tuition growth (*Should colleges be required to spend more from their endowments?*, 2008).

Having an understanding of price misperception and its impact could be used as a way to combat the effects that higher prices have on access. The opportunity gap between White and Black students cited earlier in this section could be targeted for mitigation. If there is a disparate

impact of price perception between African-Americans and Caucasians, information campaigns could be targeted toward African-Americans to maximize the affect that marketing budgets have on access.

Optimally, some questions about the perceived price of attendance would be included in the next wave of student longitudinal studies conducted by the Department of Education. An intermediate step would be to encourage that agency to sponsor a pilot project to accelerate study of the perceived price phenomenon. The results relating to planned attendance could be available in the year that the study is completed. A follow-up study could also be conducted to determine how planned attendance translates into actual matriculation.

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DATE: January 9, 2009

MEMORANDUM

TO: Roderick Hall

FROM: Carmen Green 

SUBJECT: **IRB Exempt Approval:** "Exploring the Relationship Between Perceived Cost of Attendance and College Matriculation" , IRB # 09-010

I have reviewed your request to the IRB for exemption for the above referenced project. The research falls within the exempt status. Approval is granted effective as of January 9, 2009.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in the research protocol. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.
2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

cc: File