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Financial Aid and the College Enrollment Decision:

A Causal Model

by

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(ABSTRACT)

The primary purpose of this study was to construct and test a model of the factors affecting high school students' first time entry into different types of postsecondary institutions. To test the model, a sample (N = 5395) of high school students was drawn from the sophomore cohort of High School and Beyond data. These students were enrolled in different types of postsecondary institutions: four year colleges and universities, two year junior colleges, community colleges, and vocational technical colleges.

The path model is a set of structural equations that considers the college enrollment decision of the students to be a function of four exogenous variables and six endogenous variables. The exogenous variables were: socioeconomic status of the student's family, student's academic ability, academic performance, and educational aspiration. The endogenous variables in the model were: high school program, encouragement for college attendance, cost of the postsecondary institution, size of the postsecondary institution, and student aid both in the form of grant and loan. These variables were arranged in a fully-identified block recursive model. Because of possible interactions caused by different parameters between blacks and whites, the model was analyzed separately for black students and white students. The model also was estimated separately for male and female students.

The computer program, GEMINI, was used to estimate the model. Results indicated that tuition cost, academic ability, and educational aspiration were the most important influences on

students' enrollment choice between four year colleges and other postsecondary institutions. Financial aid variables, both grants and loans, exerted significant positive effect on the college enrollment decision as well. The effects of these variables were found to be similar for blacks and whites, and for males and females.

Recommendations for future research include further work on college going behavior with different populations. The studies of non-traditional patterns of attendance and the impact of current financial aid policy on these patterns would contribute to better understanding of college attendance behavior.

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Table of Contents

Chapter 1	1
Introduction	1
Statement of the Problem	4
Significance of the Study	5
Limitations of the Study	7
Organization of the Study	9
Chapter 2	11
Conceptual Framework and Review of Related Literature	11
College-Going Behavior	11
Factors That Affect College Attendance and College Choice	13
Student Characteristics	14
Socioeconomic Status	14
Academic Ability	16
Educational Aspiration	18
High School Effects	19
Curriculum Placement	19
Table of Contents	vi

Perceived Encouragement at High School	21
Institutional Characteristics	23
Cost and Size of the Institution	23
Financial Aid	26
CHAPTER 3.	31
Data , Model and Method	31
Data	32
High School and Beyond Data	33
Sophomore Data Collection	35
Data Verification and File Preparation	36
Recoding and Constructing New Variables	38
Cooperative Institutional Research Program	39
Model	40
Analysis of Data	46
Variable Specification	48
Summary	55
Chapter 4	57
Results	57
Demographic and Academic Characteristics of the Sample	58
Correlations Among the Variables of the Model.	68
Estimation of the Model	70
Direct Effects	72
Indirect Effects	75
Total Effects	76
Results related to race and gender effects	76
The Effects of the Variables	90

Financial Aid (Grants)	101
Financial Aid (Grants) and Race	102
Financial Aid (Grant) and Gender	103
Financial Aid (Loan)	104
Financial Aid (Loan), Race and Gender	105
College Cost	105
High School Program and Perceived Encouragement at High School	108
Background and Personal Characteristics	109
Summary	111
Chapter 5	116
Summary, Conclusions and Recommendations	116
Summary	116
Discussion	117
Implications	122
Recommendations for New Research	124
References	127
Vita	135

List of Illustrations

Figure 1. Illustrative Model of Variables	37
Figure 2. Path Diagram of the Decision to Enroll at a College	43
Figure 3. Causal Model of College Enrollment (Path Coefficients)	74

List of Tables

Table 1.	Demographic Characteristics of the Sample (N=6722)	59
Table 2.	Academic Characteristics of the Sample	61
Table 3.	Academic and High School Characteristics of the Sample	62
Table 4.	High School Characteristics of the Sample	63
Table 5.	Description of Choices of Postsecondary Institutions	65
Table 6.	Means and Standard Deviations of Variables in the Model	66
Table 7.	Correlation Matrix for Variables in the Model	69
Table 8.	Structural Parameter Estimates for the Model	71
Table 9.	Unstandardized Indirect Effects in the Model	73
Table 10.	Total, Direct, Indirect effects (Standardized) in the Model	77
Table 11.	Total, Direct and Indirect effects (metric) in the Model	78
Table 12.	Correlation Matrix for variables in the Model (Blacks)	80
Table 13.	Correlation Matrix for Variables in the Model (Whites)	81
Table 14.	Structural Parameter Estimates for the Model (Blacks)	82
Table 15.	Structural Parameter Estimates for the Model (Whites)	83
Table 16.	Unstandardized Indirect Effects in the Model (Whites)	84
Table 17.	Unstandardized Indirect Effects for the Model (Blacks)	85
Table 18.	Total, Direct and Indirect (Metric) Effects (Blacks)	86
Table 19.	Total, Direct and Indirect (Metric) Effects (Whites)	87
Table 20.	Total, Direct and Indirect (Standardized) Effects (Whites)	88
Table 21.	Total, Direct and Indirect (Standardized) Effects (Blacks)	89

Table 22. Correlation Matrix for Variables in the Model (Males)	91
Table 23. Correlation Matrix for Variables in the Model (Females)	92
Table 24. Structural Parameter Estimates for the Model (Females)	93
Table 25. Structural Parameter Estimates for the Model (Males)	94
Table 26. Unstandardized Indirect Effects in the Model (Females)	95
Table 27. Unstandardized Indirect Effects in the Model (Males)	96
Table 28. Total, Direct and Indirect (Metric) Effects (Females)	97
Table 29. Total, Direct and Indirect (Metric) Effects (Males)	98
Table 30. Total, Direct and Indirect (Standardized) Effects (Females)	99
Table 31. Total, Direct and Indirect (Standardized) Effects (Males)	100
Table 32. Rank Ordering of Total Effects (Blacks and Whites)	112
Table 33. Rank Ordering of Total Effects (Males and Females)	113
Table 34. Rank Ordering of Total,Direct,Indirect Effects (Standardized)	114

Chapter 1

Introduction

One of the most consequential decisions a high school student faces is what to do after high school. The decision whether or not to seek post-secondary education, and if so, what post-secondary option to choose has far reaching consequences both for the individual and society. Educational attainment is one of the highest values in our society both for financial and social reasons. It is an avenue of upward mobility and status gain. The decision to continue schooling after high school is a complex one and is influenced by many environmental and social-psychological factors. The present research sought to determine the effect of certain social, psychological and financial variables on the students' decision to enroll at a four year college or university as opposed to a two year junior college, a vocational or technical college or a community college.

The final enrollment at a college is conceptualized as a culmination of a series of decisions. The first decision faced by a high school student is whether or not to continue his/her education. If this decision is made in the affirmative, then several subsequent decisions are made

serially. For example, it is an important decision whether a student decides to enroll at a four year college or a two year junior or community college. Then there are other choices to be made: to which college or colleges should one apply, and which college to select from among the admitting institutions.

The purpose of the study was to examine those influences that led students to make the choice to enroll at different types of postsecondary institutions. It is a model of enrollment choice between four year colleges and other postsecondary options. Why do students choose four year colleges? Does the availability of financial aid increase the probability that students would choose four year colleges over two year colleges and vocational and technical colleges. Does the higher cost of four year colleges act as a negative factor, lowering the utility of that choice for the student, and rendering that choice economically unsound. How important are test scores, high school grades, and socioeconomic background in determining college enrollment? These are some of the questions that the study attempted to examine. Since it is in the context of many complex personal, social, psychological, and financial variables that the decision leading to the enrollment at a college must be studied, an attempt was made to explore the relationships among these variables and to understand the underlying causal patterns among them by the method of causal modeling. The method of causal modeling attempts to determine the plausibility of postulated causal patterns in non-experimental data.

The model of college enrollment behavior was developed from the earlier studies on the determinants of educational attainment (Blau and Duncan,1967; Duncan,1969; Featherman and carter,1976; Scarr and Weinberg,1978; Sewell, Haller and Portes,1969; and Sewell and Hauser, 1975). Certain personal and social factors are important to all educational attainment including college going behavior. These factors have been largely identified by the research efforts of sociologists in the area of educational attainment. Some of these factors are parents' educational and occupational status, their expectations and aspirations for their children, students' academic ability, performance and motivation, and characteristics of secondary schools attended (Duncan et al.,1972; Sewell and Shah, 1967; Sewell and Hauser, 1975; Trent, 1970;

Trent and Medsker, 1968; Litten, Sullivan and Brodigan, 1983;). Primary background influences considered here are socioeconomic status of the student's family, his/her academic ability and performance, and educational aspirations. In the absence of these factors, it is unlikely that students would choose to continue their education even if all financial help were available to them. These influences work in tandem. They reinforce one another. There is a dynamic interplay of many influences leading to the final decision to enroll. These influences can best be studied in relation to each other to understand their unique part in the educational decisions.

In addition to background and student characteristics, rising college costs have become an important factor in the students' choice of different postsecondary options. Financial aid is intended to counter the negative effect of college costs both on access and choice of college. Thus these variables were included as factors in the model, as well. The research examined the impact of financial aid and college costs along with the effects of other prior factors on the final enrollment decision.

The model is well grounded in earlier research in the area of educational attainment, and in the economic research in the field of individual demand for higher education. The model included both social-psychological variables and economic variables as both kinds of influences act and interact to crystallize the students' choice between four year colleges and other types of postsecondary institutions.

Thus, the decision to enroll at a college is seen as a function of four categories of influences: 1. student characteristics, 2. high school characteristics, 3. characteristics of postsecondary institutions, and 4. financial aid.

Statement of the Problem

The primary purpose of this study was to test a model of the influences affecting entry into four-year colleges and other postsecondary institutions. For purposes of this study, postsecondary institutions selected by students were categorized in two groups: four year degree institutions and all other postsecondary institutions except proprietary institutions. Two year junior colleges, community colleges, and vocational technical colleges fall in the second category. The influences considered are broadly categorized as: student characteristics, high school characteristics, postsecondary institutions' characteristics, and financial aid offers. Specifically, the study was guided by the following research questions:

1. What effects do financial aid offers (grants and loans) have on the decision to enroll at different types of colleges?
2. What effects do postsecondary institutional characteristics such as college cost and college size have on the college entry decision?
3. What effects do high school variables, curriculum placement, teachers, guidance counselor, and peers, have on the choice between different types of colleges?
4. What effects do background and student characteristics of ability, high school performance, and educational aspiration have on college enrollment decision of a sample of high school students?
5. To what extent does the model which postulates both direct and indirect effects among the independent variables explain the choice of college for the sample?

6. Does this model explain the process leading to college enrollment equally well for black and white students, and for male and female students? In other words, is the process of choosing a type of college similar for the groups? Are there any race and gender effects, per se, on the students' enrollment at four year colleges?

Significance of the Study

The study contributes to the understanding of college-going behavior. Despite the fact that the value and worth of higher education are sometimes challenged, actual statistics on poverty rates, hourly wages, and lifetime earnings are an evidence of the importance of increased years of schooling. The number of years of schooling is related not only to economic gains but to better health and life satisfaction. It is a primary vehicle for upward mobility for minorities and low socio-economic groups (Edsall,1984; Kolstad,1982; Ostar,1976;). There is no doubt that equality of educational opportunity is a vital issue and can best be understood in relation to the determinants of educational attainment. Who goes to college and where? What factors determine the choice between different types of institutions? These are important questions because of the enormous power of education in delivering economic and status benefits.

The environment in which students make their college choices has changed significantly in the last decade. College costs have risen dramatically and in addition, the attitudes of students and their families about the importance of college may have changed during these years. In the light of the importance of cost-related issues in attendance and choice decisions, it is timely to study the role of financial aid in college attendance and choice decisions. The scope of financial aid had expanded greatly from 1972 to 1981 when a downward trend in federal fi-

nancial aid started. Although substantial amount of funds are funneled into need-based programs nationally as well as at the state level, little empirical research has been conducted to determine the effects of these programs on the individuals' decisions to seek higher education and to choose a college to enroll in. While social action programs are extremely difficult to evaluate, empirical research can provide some basis for judgment regarding the impact of financial aid on college-going behavior.

Financial aid is just one variable in a complex process of decision making leading to enrollment at a college. To examine the process by which the twin decisions of attendance and choice are made, the influences of many variables have to be modeled and tested. These processes of decision-making are complex and just beginning to be understood by researchers. This research should provide some insights into the decision-making processes regarding college attendance and college choice. It is only by examining a constellation of factors involved in the postsecondary choice process that effective policies can be developed.

The issues surrounding federal and state student aid programs are many and complex but they are not directly relevant to the present study. The focus of the study is on the possible relation between student financial aid and the decision to enroll at colleges. It was postulated that a positive link exists between the offers of student aid and the choice of institution. This postulated relationship between the financial aid awards and the enrollment at four year colleges and other postsecondary institutions was tested in the study.

Many studies on college attendance have not taken into account the complexity of individual characteristics, high school effects, characteristics of admitting postsecondary institutions and financial aid awards. Research designs are limited to the effects of only a few variables. Studies on financial aid are often descriptive, documenting the sources, distribution and average amounts of grants and loans. Although these research studies present much hard data concerning student financial aid, inference of any causal patterns between student aid and

college attendance is difficult from these studies. There are few empirical studies which assess the impact of many related factors on college-going behavior. This research provided useful insights into the process leading to final enrollment at colleges.

Limitations of the Study

The study has certain limitations. These are related to sample, measures of the variables, and the methods used. They are not flaws in the study but define the scope or boundaries of the study. Some of these are related to the use of extant data sets with inherent problems of missing responses, the original intent of sample selection, and the reduction in sample due to the merging of data sets. Despite these problems, the advantages of using large scale data bases far outweigh any disadvantages.

The sample for the study was drawn from High School and Beyond data (henceforth called HSB). In the original HSB sample, hispanic and black students were oversampled to make separate studies possible on these minorities. The sample for this study reflects this bias. Although the impact of this bias is not considered seriously damaging to the results of the study, it does affect the external validity of the study. Representativeness of the sample is limited in that sense.

Another limitation of the study is intrinsic to the use of precollected large scale survey data. This limitation has to do with the problem of missing data. Missing responses introduce a certain degree of bias in any study that uses survey data. In the present study, two data sets were merged in order to get the data on all variables in the model. The procedure led to further loss of data. When the zero-order correlation matrix was generated for this study, only

those cases were included that had non-missing values for all variables. Despite some loss of data at these steps, the sample size (N = 5395) remained fairly large. The effect of the bias, due to missing data, is assumed to be minor due to the large sample size.

The study also has limitations in regard to the validity of measures used to define the psychological constructs in the study. These measures describe the variables operationally. A complex psychological construct such as ability or aspiration can have several conceptions and, according to different conceptions, can be measured by different instruments and methods. Thus the use of a particular measure in a study can always be debated. For example, in this study, standardized test scores on math, reading and vocabulary are used as a measure of the academic ability. Although the use of test scores as a measure of ability is widespread among researchers, ability has several conceptions and the use of test scores as a sole measure of ability can be debatable. It is true of the measures of educational aspiration and high school effects which may be measured in many different ways. The results of the study are limited in this sense to certain conceptions and measures of psychological and social factors.

Finally, there are several levels of interpretation of the results in such studies. One level of interpretation which is conceptually clear and technically sound is that these factors together predict the college enrollment status of this sample of students. Thus it is a predictive model. A Second level of interpretation is that these factors explain the underlying influences that led to the final enrollment decision and thus it is reasonable to view it as a process model. The functional relationships among these variables undergird the decision making process involved in the final enrollment at a college. In that sense one can infer causal patterns among these chronologically discrete events and influences that took place prior to enrollment. Social scientists in their pursuit of understanding causation often use nonexperimental correlational data. It is important to be alert to the dangers of drawing causal inferences from correlational data in ex post facto studies. An inference of causation should be based on sound theory and rigorous replication of specified relationships on data. There is always the

danger of overlooking the long established principles of scientific inference in one's enthusiasm and zeal to use new and complex methodologies which may sometimes mask the fact that although correlation does not preclude causation it does not establish it.

Since the method of causal modeling is based on correlations among variables, the debate whether causation can be inferred from correlation is a valid one. The assertion that the relationships postulated by the model are causal in nature is always dependent on the soundness of theory. In fact, these data support the existence of certain relationships and point to the possibility of causal links but they do not necessarily provide the evidence of causation. Evidence of causation can only be provided in strictly controlled experimental studies which are rare in social sciences. Such evidence as is presented by these analyses only indicate that the causal model proposes relationships that are theoretically plausible.

Despite these limitations, the study yielded many substantive and statistically significant findings in regard to modeling college enrollment behavior. These findings provide useful knowledge of the effects of various social, psychological and financial variables on attendance and choice decisions. Important strengths of the study were the large sample size, well constructed measures of the variables and methodologically sound design of the study. The conceptual framework on which the study is based is well researched area of educational attainment.

Organization of the Study

The purpose of this study was to determine whether a model of college enrollment behavior can adequately describe the process of college enrollment for the sample. The first step was

to conduct a comprehensive literature review to develop a conceptual framework for the model and to select the variables which have been found to be associated with continuation of postsecondary education. The causal model was theoretically dependent on this search and was developed to reflect direct and indirect relationships among the variables. The second step involved testing the model to assess its ability to explain college enrollment in a sample of high school students who entered postsecondary institutions after graduating from high school. Results were examined to assess the relative magnitudes of direct, indirect, and total effects.

The dissertation is divided into five chapters:

A brief introduction to the study, the statement of the problem, significance of the study and limitations of the study are presented in Chapter 1.

A conceptual and theoretical framework of the study is contained in Chapter 2. A review of the literature related to the development of the model is presented.

The sources and nature of the data, and the process of file preparation prior to analyses are described in Chapter 3. The model of college entry is outlined and the methods of the study are described. Description of the variables is presented in the last section of the chapter.

The results of the study are presented in Chapter 4. First, a descriptive profile of the sample and its demographic and academic characteristics are provided. Then, the results of testing the model are presented. Finally, comparisons of structural coefficients, direct and indirect effects of the variables on the outcome variable of choice of the different types of colleges are discussed. Results related to race and gender effects are presented in the last section.

A discussion of the results related to the testing of the model is contained in Chapter 5. Discussion of findings is followed by suggestions and recommendations for future research.

Chapter 2

Conceptual Framework and Review of Related Literature

A theoretical and conceptual frame-work of the study is presented in this chapter. Studies that form the core research in the area of educational attainment and individual demand for higher education are reviewed in order to provide a framework for the development of the model. Various research studies cited here have informed the formulation of the model. Theoretical basis for the study and the rationale for model specification are derived from previous research.

College-Going Behavior

There is a large body of research that focuses on different aspects of postsecondary educational attainment : college or non-college options after high school (Munday, 1976; Bowers,

1978;), college plans, application process, choice among various postsecondary alternatives and final enrollment decision (Jackson, 1977; Nolfi et al, 1978; Kohn et al, 1976; Chapman, 1977; Sewell and Shah, 1967; Manski and Wise 1983). This study proposed and tested a model of enrollment choice between four-year colleges and other postsecondary institutions. The study is well grounded in the earlier research on educational attainment (Blau and Duncan, 1967; Featherman and Hauser, 1978; Porter, 1974, Sewell, Haller and Portes, 1969; Sewell and Hauser, 1975; Thomas et al, 1979; Wolfle, 1985) and examines similar social and psychological constructs in order to assess their impact on the enrollment decision. The inclusion of the policy relevant variables of cost and financial aid is a more recent advance in conceptual orientation in models of college going behavior.

Postsecondary schooling has an important impact on many aspects of life : personal, economic, social and political. Attainment of postsecondary education is a primary avenue of upward social mobility. Educational attainment also determines later occupational roles that are differentially related to status and earnings. The importance of higher education continues to grow due to the increasingly complex nature of many occupational roles in a post industrial society. In a technologically advanced society, increased skills are required for employment. Lenski (1966) and Wanner and Lewis (1982) concluded that higher levels of educational attainment are necessary for employment in a technologically advanced society. Higher levels of education narrow the gap in earnings and status among different racial groups (Freeman, 1976). The inequitably distributed economic and status outcomes are a function of different levels of education and training to a large extent.

The linkage between education and earnings is so well established that in the last two decades society has made a strong commitment to the equality of educational opportunity. Increasing the equality of educational opportunity by removing the cost barriers for low income families was the primary goal of federal and state financial aid programs. There is no doubt that postsecondary educational attainment determines many social and economic outcomes for the individual.

Despite obvious benefits of education many high school graduates choose not to continue their education after high school. They opt for non-educational alternatives: employment, military service and home-making. The high school graduates who want more education face several options : four-year degree college, vocational technical college, two-year junior or community college. Who chooses postsecondary education? What institutional type does one choose? What are the determinants of the postsecondary education? Is cost a barrier to many prospective students? Does low family income prevent some students from enrolling and how effectively does student aid remove the cost barrier? These are all important questions and the studies reviewed in this chapter contribute to answers of these questions in different ways. The present study deals with the enrollment choice at different types of colleges. The study explores the determinants of college-going behavior, and it was motivated by issues of policy concern.

Factors That Affect College Attendance and College Choice

Much notable research has been done in the area of educational attainment and some factors are identified as being important factors in the continuation of education after high school. Despite the fact that different orientations and models have driven the research in college attendance and choice behavior, certain variables have been shown consistently to affect college decisions. Among these are family background characteristics, ability, prior achievement as well as other educational and financial variables. In the present study, these factors are arranged in four broad categories: student characteristics, high school characteristics, postsecondary institutional characteristics, and financial aid awards. Major studies that ex-

amined the effects of these factors on various aspects of college-going behavior are reviewed here. Since the model is specified on the basis of certain well-identified factors, it is anchored in the earlier research.

Student Characteristics

Socioeconomic Status

Studies of educational and occupational attainment have consistently viewed family background characteristics as important part of the process of educational attainment (Blau and Duncan, 1967; Hauser, 1973; Heyns, 1974; Wolfe, 1985). One characteristic that has invariably been associated with educational attainment is the socio-economic status of the student's family. Socio-economic status has a strong effect on college-going behavior (Duncan et al., 1972; Sewell and Shah, 1967; Sewell and Hauser, 1975; Sewell et al., 1976; Trent, 1970; Trent and Medsker, 1968). Sociologists, studying educational attainment, have consistently found evidence that family background characteristics exert strong effects on the postsecondary choices. Influence of parents' educational and occupational status is consistently positive on postsecondary educational achievement of the children (Thomas et al, 1979). Parents' educational and occupational status has been found to be related to children's verbal and quantitative skills (Scarr and Weinberg, 1978; Walberg and Marjoribanks, 1976). Higher levels of verbal and quantitative skills, in turn, are associated to both attendance and choice decisions (Sewell and Shah, 1967). Belz and Geary (1984) found that father's level of formal education correlates highly with SAT scores and other achievement measures. SAT and achievement scores are used as one of the criteria for admission at many four-year colleges.

Using NLS data, Thomas et al (1979) found that students whose fathers had completed college were two and one half times more likely to attend college than those whose fathers had not completed high school.

Families' economic resources, a component of socio-economic status, has an effect on postsecondary choices too, net of other factors. In 1977, 28 percent of persons of college age were attending or had completed some college in families with incomes of less than \$10,000, while the figure for families with incomes of \$20,000 or over was 66 percent (Suter, 1980). Although there is some evidence that direct effects of socio-economic background have declined over the years (Hauser and Featherman, 1977; Wolfle, 1985) but it remains an important determinant of educational attainment. Later models of educational attainment included measures of IQ, thereby removing from SES variables the component they share with IQ. There also is some evidence that this weakening of the relationship of SES and postsecondary educational attainment is due to the large scale need-based student aid programs during 1970's and early 1980's (Manski and Wise, 1983). These programs have made it possible for the students from low socio-economic status to enter college and have weakened the link between family income and attendance decision.

Socio-economic status is both a measure of social position and the economic resources of the family. Usually the characteristics that are measured in constructing an index of SES are educational levels and occupations of the parents and a measure of family income. Hauser and Featherman (1977), in order to assess how much educational difference is due to all the forces in the family, analyzed the data on siblings and concluded that as much as two-thirds of the variance in length of schooling among U.S. men is due to family influence in some way. Jencks and his colleagues (1972) concluded that family's social position explains fifty percent of the variation in educational attainment. The social-psychological component of SES probably affects the first stage of the attendance decision process by creating a desire for higher education. The economic component is more related to the later stage of the college choice process. Studies have concluded that low-income families are more sensitive to price and

attend college less frequently (Kohn et al.,1974; Mcpherson, 1978; Leslie and Fife, 1974; Bishop,1977). Trent (1970) found that SES is related to both the decision to go to college and the choice of a particular college.

In the present study, socio-economic status of the student's family is an exogenous variable in the model. SES composite variable is based on parents'education, father's occupation, family income and material possessions in the household. Variable SES and how it was constructed is described in more detail in Chapter 3 under section on variable specification.

Academic Ability

Another student characteristic that is strongly related to the attainment of education is the academic ability of the student. The ability of the student is an important variable in college-going behavior and some measure of academic ability is included in all empirical studies of educational attainment. One consistent finding of these studies is that ability is a strong determinant of college attendance. There are two different conceptualizations of ability as measured by social scientists. Some have tried to tap "intelligence" through the use of published intelligence tests and some have used performance as a measure of ability. They have used such measures as achievement test scores, high school grade point average, high school rank etc.

Despite different ways of measuring academic ability, all measures have shown potent effects on later academic decisions. Whether and where a student continues formal education after high school is a direct function of academic ability (Thomas,1979; Sewell and Shah, 1967; Kohn et al, 1974). Thomas et al (1979) used NLS-72 data and concluded that academic credentials strongly determine college access for all groups. Scholastic ability has direct effects on college plans, actual attendance decisions and college graduation (Sewell and Shah, 1967).

Sandell and Johnson (1977), using National Survey of Labor Market Experience (Parnes Survey), concluded that effects of measured I.Q. on college plans and attendance were strong. Jackson (1978) found that ability as measured by test scores, class rank and course grades had the highest explanatory power in college attendance except for college plans. Ability also has strong indirect effects on college plans and attendance of postsecondary institutions through such intervening variables as aspiration and performance (Mackinnon and Anisef, 1979). Mental ability directly affects the choice of a college (Sandell and Johnson, 1977). Peng et al (1977) reviewed the results of many studies which used NLS-72 data and concluded that lower ability students were more likely to go to two-year colleges.

Many studies have concluded that ability has a strong positive relationship with the decision to attend college. Ability and SES are found to be related and the two interact to increase the probability of educational attainment (Duncan et al.,1972; Sewell and Shah,1967;). Trent and Medsker (1968) operationalized ability as test scores on School and College Ability Test (SCAT) and found that high school students who are in the top ability group had a .60 probability of attending college and students who were in the lowest ability group had a probability of less than .10 of attending college.

The Wisconsin Study (Sewell and Shah ,1968) measured ability on a test of mental maturity and concluded that there is a strong relationship between ability and college attendance. Males that were in the highest ability and highest SES group had a .907 probability of attending college, while those in the lowest SES and lowest ability had a probability of .063. Males in highest SES -lowest intelligence cell had .388 probability of attending while males in the lowest SES-highest intelligence cell had a probability of .524 (Sewell and Shah, 1967). They found approximately similar effects of SES and intelligence on college plans and attendance for males, and higher effects of SES relative to intelligence on plans and attendance for females. Thomas et al (1979) found that among whites, SES had a greater effect than ability on college plans for both males and females, controlling for class rank and curriculum.

Ability is also associated to discretionary financial aid as some state and institutional aid is merit-based. Academic ability and need both are assessed to make financial aid awards.

This study included two exogenous variables that are measures of academic ability: test scores on verbal and quantitative skills and class grades.

Educational Aspiration

Another set of individual characteristics that have been found to impact on college decisions are aspirations, expectations and motivation. Educational aspirations are a powerful determinant of continuation of education at the postsecondary level. Some of the studies cited above included a measure of educational aspiration and examined its effect on educational attainment. Their results confirmed that educational aspiration affects decisions about college attendance and college choice. In a general sense, aspiration refers to a person's plans and desires to accomplish some goals in future. The rationale for including these variables in the models of educational attainment is that what a person aspires to or desires to do greatly affects what he/she actually does, net of other factors. Sewell and Shah (1975) report a correlation of .66 between educational attainment and college plans and of .51 between educational attainment and occupational aspirations. Aspirations have substantial net effects on educational attainment (Otto and Heller, 1979; Sewell and Hauser, 1975; Spenner and Featherman, 1978).

College attendance process is a series of decisions and is affected by the aspirations and expectations of the individual at all points of the process (Jackson, 1977; Sewell and Shah, 1968; Rosenbaum, 1980). Generally economists have ignored the role of aspirations in the models of college-going behavior. When measures of aspirations are included in studies of college attendance process, their impact have been found to be positive on college attendance and choice (Sewell and Shah, 1967; Sewell and Hauser, 1975). The Wisconsin study found

that aspiration is causally related to ability and SES. All three are related to college attendance. Tierney (1980) made a scale of degree plans to measure the aspiration: more than a bachelor's degree, a bachelor's degree, and less than a bachelor's degree. He was interested in predicting enrollment at public and private institutions. He found that enrollment at private institutions is related to both high SES and high aspiration. Jackson (1977), using NLS data, found that educational aspiration had the strongest explanatory power in predicting college application and attendance behavior. In his study, the highest variance in the application to college and in attendance was explained by the response to a question on how many years of education a student would like to have. These studies show the substantial net effects of aspiration on educational attainment.

Often aspiration is formed before the end of high school and is reflected in the course taking patterns and curriculum placement during high school years. High school effects are dependent on individual characteristics but some effects of the high school are independent of student characteristics.

High School Effects

Curriculum Placement

High school characteristics and high school experiences also affect post-secondary educational decisions. High School experiences are a function of both the type of high school a student attends and such student characteristics as ability, aspiration and SES. There are many ways in which the high school variables can influence a student's postsecondary plans:

1. Curriculum placement; 2. through the kinds of peers a student has (called peer influence or the immediate social context of the postsecondary plans); 3. teacher and counselor effects (teacher encouragement, counselor encouragement, and the information a counselor makes available.)

High school effects are both a function of such prior student factors as socio-economic status, ability and aspirations of the student and such characteristics of high school as courses offered, normative climate of the school, quality of teachers and guidance counselors. Whatever the sources of high school effects, they do exert an influence on the further continuation of education after high school. One powerful determinant of postsecondary educational attainment is the curriculum placement in high school (Alexander and Cook, 1982; Alexander and McDill, 1976; Wolfle, 1985; Alexander, Riordan and Pallas, 1982; Fennessey, Alexander, Riordan and Salganik, 1981; Heyns, 1974). Previous studies have found evidence that curriculum placement in different tracks in high school is a powerful mechanism that separates students and later affects their decisions regarding pursuit of further education. Curriculum placement, although based on ability and aspiration and often determined by a process of self selection, stratifies students and reinforces the prior characteristics of the students. For example, students in college preparatory track take more courses in academic subjects like mathematics and foreign languages. They develop verbal and quantitative skills necessary for admission and matriculation from postsecondary institutions. They associate and interact with other students of higher abilities and aspirations. Their peers, being similar in interests, reinforce their aspirations and values and affect their decisions about continuation of education after high school (Hauser et al, 1983; Alexander and McDill, 1976; Heynes, 1974). Generally children from families of higher socio-economic status have higher probability of being in academic track in high school than children of lower status parents. Students of higher ability are more likely to be in academic track than students of lower ability.

Various studies have concluded that being in a non-academic track depresses the chances of college attendance (Bowers and Others, 1978; Alexander and McDill, 1976; Alwin, Hauser

and Sewell, 1975; Duncan, Heller and Portes, 1968). Being in a general or vocational high school curriculum not only impedes the post-secondary attendance immediately after high school but also later (Peng,1977). Alexander and McDill (1976) point out that the effect of tracking may be through lower test scores, lowered self-esteem and differences in peer contact. Jencks and others (1972) concluded that being in a college track increases the probability of going on to college but if everyone were in a college preparatory track, the special advantage would be lost. Thomas and her associates (1979) found that SES and race were associated with curriculum placement even when ability was controlled. But the verbal ability is the strongest predictor of the curriculum placement (Alexander and McDill, 1976).

Perceived Encouragement at High School

Beside the effect of tracking and course taking patterns, high schools affect students by their normative culture. Counseling and teacher encouragement is part of the psychological climate of the school. These effects are often minor but have been included in some studies of postsecondary educational attainment. Counseling may affect aspirations by providing the knowledge of the post-secondary options and the financial aid programs. But once the student characteristics are controlled these effects tend to disappear (Bowers and others,1978; Mott and Moore,1976). Sewell and Hauser (1975) examined the effect of teacher encouragement on student's post-secondary plans and found that perceived teacher encouragement was a function of student's academic ability and performance and was unaffected by the socio-economic origins of the students. Although this effect is based on merit, a modest effect of parental income on teacher encouragement was reported, indicating that teachers may be sensitive to a student's financial resources in encouraging them to continue their education. Sewell and Hauser (1975) concluded, "Far from reflecting overt or covert discrimination, teachers' expectations appear to be based on ability and performance, and as such, make a

fundamental though modest contribution to the equalization of educational opportunities.”
(p.105)

Fewer studies have examined the effect of the guidance counselor on students' postsecondary plans and decisions although the effect of the guidance counselor has been studied as part of the perceived psychological climate of the high school (Alexander et al, 1979 and Jencks, 1972). Minor effects of guidance counselor's encouragement have been found in some studies (Bowers et al,1978). The most important function of the guidance counselor in regard to college going behavior is in providing information about various postsecondary options. Bowers and others (1978) used NLS-72 data and found that "high school counseling programs show only slight and restricted effects on postsecondary attendance "(p.143). This is rather unfortunate because the knowledge of postsecondary options and information about financial aid can affect a student's plans and aspirations after high school. Bowers (1978) found that effect of counseling was important only in immediate attendance at vocational and technical programs and, to a lesser degree, at two year college programs.

Effect of peers on postsecondary plans has been studied by several researchers (Sewell and Hauser, 1975; Jackson, 1977; Alexander and Eckland, 1975). Peers' effect is part of the contextual effect of high school. Peers form the immediate social context of post-secondary plans. Some studies have included a measure of peer influence on the student's decision to continue his/her education after high school. There is some evidence to support the idea that what a student's friends are planning to do will affect his/her plans too (Alexander and McDill, 1976). Jackson (1977) found that the effect of friends' plans varied with student's grades. He observed, " C students whose friends are mostly going to college is 11.4 percentage points more likely to do so as well" (p. 24). In The Wisconsin study (Sewell and Shah, 1967) data were included on friends' plans of college. It was found that the effect of friends' plans on the students' educational attainment is of same magnitude as the effect of parents' aspirations. Peer effect is generally positive but not large. Kerckhoff (1971) reported that effects of

friends' expectations are not apparent until boys reach the beginning of high school. He was comparing models of educational expectations among 6th, 9th and 12th grade boys.

In the present study, there are two variables that measure high school effects. They form the first block of endogenous variables and are seen as both causes and effects of other variables in the model. The first high school effect variable is high school program that denotes placement in different tracks. The second high school effect variable is a composite variable of perceived encouragement to attend college from various sources : teachers, guidance counselors, peers and peers' own postsecondary plans. The variables are described in detail in Chapter 3.

Institutional Characteristics

Cost and Size of the Institution

Institutional characteristics are characteristics of the post-secondary educational institutions that students applied to and, finally, chose to enter. There is a wide variety of post-secondary options and patterns of attendance among them vary over time. They differ in price, quality, size, control, offerings, racial and religious compositions. But most of the variance among institutions can be explained by a few characteristics : size, cost, control and selectivity. These characteristics are associated with student characteristics and high school experiences. For example, more able students apply to more selective colleges. Thus, selectivity is related to student ability. Students applying to more selective colleges are more likely to attend. Higher tuition cost is related to both selectivity and ability. More able students choose

more expensive colleges. Willingness to pay higher tuition is related to increased levels of attendance (Bishop, 1977; Tierney, 1980; Radner and Miller, 1975). While the quality of an institution may be hard to assess for prospective students, the estimate of the size of an institution is readily available to students and is a factor in choice. Chapman (1979) has concluded that other things being equal students are more likely to choose larger school with graduate orientations. The effect of size is not consistent on choice of college; some studies show that students prefer smaller colleges.

Cost is an important factor in the choice of a college. There is no uniform cost for postsecondary institutions. Postsecondary institutions have wide range of cost and net cost of any option depends on the financial aid available to a student. Several studies have examined the effect of cost on college attendance decision (Jackson, 1977; Jackson and Weathersby, 1975; Mcpherson, 1978). Enrollment trends and College Costs, a monograph prepared by American Association of State Colleges and Universities in 1980, analyzed college and university enrollments, evaluating the impact of tuition and inflation, student aid, expiration of veterans' benefits, institutional location and the unemployment rate. It identified college costs as the most influential factor affecting attendance.

There is little doubt that cost has a definite effect on all decision points in the process leading to final enrollment at a college. These include attendance or non-attendance decision, choice of colleges to apply to and the final decision to enroll. Studies analyzing the role of cost in attendance decisions do not have uniform results. Cross-study comparisons are hard to make because of differences in methods and theoretical perspectives and assumptions. Still some studies are reviewed here which examine the relationship between cost and attendance decision. Cost is significantly related to the initial decision to attend or not to attend college (Jackson, 1977; Weathersby, 1975; McPherson, 1978). Studies differ on the actual magnitude of the effect. This effect is naturally stronger for low-income families compared to middle and high income families. Jackson and Weathersby (1975) reviewed several studies on the relationship of cost and attendance and concluded - 1. Individuals from low-income families re-

spond more to cost changes in higher education than do individuals from middle and high income families; 2. at any income, increasing costs decrease the proportion of individuals attending institutions of higher education; 3. a change of \$100 in the cost of higher education will, on the average, induce a change of 2.5 percent in the enrollment in higher education under 1974 conditions. Tierney (1980) found that tuition is related to the choice between public and private institutions.

Tierney (1980) in his study of public and private college attendance concluded that the cost was the major reason why students chose public institutions over private institutions. He noted, " The difference between tuitions at public and private institutions is significantly associated (in the statistical sense) with the probability of matriculating at a public institution ---- In every case, this coefficient is negative, indicating that as the tuition gap increases, the probability of matriculating at a public institution increases" (p.22).

Students from low or middle income groups are more sensitive to cost than students from high income groups (Chapman, 1979; Kohn et al, 1974; Nolfi, 1978; Manski and Wise, 1983; Davis and Johns, 1982; Zollinger, 1985). All studies have found negative relationship between college going behavior and cost. In view of increasing cost of college education and declining student aid, it is reasonable to include a measure of cost in studies of college attendance and choice. Cost is also related to the perceived quality of the institution. Other things being equal, brighter students tend to go to higher cost colleges (Munday, 1976). Several empirical studies have examined the relationship of cost, family income and college attendance. Kohn (1976) included tuition cost and also a quadratic term to make up for lack of financial aid data. His results confirmed that increase in tuition had the strongest negative effect for low income families. Nolfi (1978) found that negative effects of tuition varied according to the length of the program. Bishop (1977) used Project Talent data and concluded that cost is related to ability and income and the effect of cost differed according to ability and income : students on both ends of ability scale were least responsive to tuition costs and those from low income and moderately high income were most responsive to differences in tuition.

The effect of cost varies among different sectors of higher education (McPherson, 1978; Corwin and Kent, 1978). Public higher education is more sensitive to cost variations than private higher education. The effect also varies at the different stages of decision making. (Jackson, 1977). Jackson pointed out that effect of cost is vital when students consider the various options after high school and choose colleges to apply to. But once they have selected the colleges to apply to, effect of cost on actual choice of college among the ones offering admission is minor and inconsistent (Jackson, 1977).

On the whole, the institutional characteristics together explain modest amounts of variance in attendance as compared to such variables as family background, ability and attitudes etc. At the same time the types of institutions students apply to, and choose to enroll, are dependent on students' background, ability and plans of students (Sandell and Johnson, 1977).

This study examined the effect of two postsecondary institutional characteristics on enrollment decision: size and cost. Size of the institution is measured by the full-time enrollment and cost of attending the institution is measured by the undergraduate tuition cost. These are important characteristics that prospective students consider and evaluate prior to enrollment. These variables are described in greater detail in Chapter 3.

Financial Aid

Federal programs for need-based student aid had modest beginnings in the 1960's. The program goals were twin : equal access to educational opportunities and wider choice of institutions of varying costs. The primary goal of need-based financial aid programs was to ensure that disadvantaged youth can have equal access to educational opportunity. Education was

seen as an avenue for upward social mobility for the disadvantaged Americans. Removing barriers to educational opportunity was a collective moral response to the wrongs of the past. Leslie and Fife (1974) comment, "The financing of higher education through students is a recent though major trend in American higher education." Financial aid is of three types: non-repayable grants and scholarships, repayable loans, and monies earned by work-study programs.

With the passage of Higher Education Amendments of 1972, federal government entered the financial aid scene in a significant way and initiated several student aid programs. Federal student aid is based on need and is tied to the cost of attending a particular institution. Then there are state student aid programs and institutions have their own programs of student aid.

Throughout the 1970's there was tremendous growth both in the number of the programs and the dollars allocated to the programs. The primary programs were Basic Educational Opportunity Grant (known as Pell Grant), Supplementary Educational Opportunity Grant (SEOG), Federal Guaranteed Loan (GSL), and National Direct Student Loan (NDSL). The target populations also expanded to include middle income groups under Middle Income Student Assistance Act (MISAA). By 1980, both the scope and magnitude of the financial aid had enlarged. Federal government was spending over 14 billion dollars on student aid in 1980 compared to 190 million dollars in 1963 (Gillespie and Carlson, 1983).

In recent years, financial aid programs and policies governing them, have come under attack. Due to drastic cuts in federal programs, student aid has declined and its components (grants, loans and work-study monies) have undergone changes. As a consequence of shift in the policy, loans are becoming a larger and more important component of financial aid packages. In 1974-75, only 16.9 percent of all federal aid was loan aid, 80.3 percent was grant aid. In 1980-81, grants were 56.1 % of all federal student aid, while loans were 40.1 % (Gillespie and Carlson, 1983). By 1984-85, loans made up 51.7 % of all federal student aid, while grants were only 44.6 percent of the total aid (Gillespie and Carlson, 1984).

Financial aid variables are policy relevant because they are subject to modification by policies at several levels : federal, state and institutional. The criteria for aid, the nature of aid, and the amount of aid are all matters of policy. Since these variables are manipulable by policy, they are important variables to investigate.

Some empirical studies of college attendance have examined the impact of financial aid variables on college-going behavior (Jackson, 1977; Leslie and Fife, 1974; Fife and Leslie, 1976; Davis and Van Dusen, 1978; Nolfi, 1978; Tierney, 1980; Chapman, 1979; Fuller, manski and Wise,1982). Empirical studies have found a positive impact of student aid on patterns of attendance. The studies that examined the effect of need-based programs separately (Schwartz, 1985; Manski and Wise, 1983) found a strong impact of these programs on decisions of students from low-income families. There are studies which failed to find significant effect of financial aid on patterns of attendance and concluded that financial aid, in general, has not stimulated college attendance and has provided a subsidy to students by shifting the private function of meeting educational costs to the public (Hansen,1982). Hansen reviewed major student aid programs, their rationale and intended results, in order to examine the effects of these programs on the economic and social composition of the student population. He concluded that increases in federal funding intended to promote equal access have not significantly changed the socioeconomic composition of student population at institutions of higher education and have shifted the financial burden from private to public sources. Case (1986) noted that system of financial aid acts as a disincentive for parents' to plan and save for their children's education. Parents who plan and forgo the current consumption in order to invest in education are punished by the system of financial aid.

Unfortunately, given the short history of these programs and the complex nature of college attendance and college choice decisions, not much empirical work has been done to examine the relationship between financial aid and decision process involved in college attendance. The role of financial aid has remained largely unresearched by quantitative methods.

Leslie and Fife (1974) studied the state scholarship and grant programs and reported that about half the recipients of aid felt that the student aid made it possible for them to attend college. Jackson (1978) concluded that financial aid had a definite positive effect on the decision to enroll. In his study it was the offer of financial aid that was important but the amount of aid explained no further variance. Chapman (1979) did a study of college choice process, using conditional logit model. He used two measures of financial aid -- one for grants alone and one for total financial aid offered. Grants were significantly related to the decision to enroll for middle and low-income students. Tierney (1980) used separate measures for grants, loans and work-study aid. He analyzed the influence of financial aid on the individual demand for public and private higher education. All three variables were found to be significant factors in the choice between public and private institutions.

It has been suggested that aid has significantly changed income-access relationship. Hyde (1978) in his review of the literature on the effects of tuition and aid found two general results -- first, a large portion of recipients say they would not attend without aid; secondly, the effect of aid on enrollment is less than the effect of low tuition. Receiving aid is also associated to the college chosen (Leslie and Fife, 1974; Peng, 1977). Leslie and Fife (1974) reported that students who would otherwise have gone to public schools were able to go to private schools with aid. But the actual magnitude of the impact of financial aid has been hard to assess because of the complex nature of college-going behavior and lack of reliable financial aid data.

The impact of financial aid awards on the enrollment decision was examined in the present study. Two financial aid variables were included in the model as putative positive effects on the college enrollment : all educational grants combined in one measure and all educational loans combined together in a measure of educational loan.

Although the methods of research and data differ in these studies, a review of the results indicates that certain factors have been repeatedly identified to impact the process of college attendance. For example, all studies confirm the strong impact of certain student character-

istics on the continuation of education after high school. The inclusion of financial variables is a recent advance in conceptual orientation in models of college attendance and choice. Model-based analyses is a methodological advance compared to the atheoretical studies on various factors. The examination of student costs and student aid is a reasonable decision in view of the fact that over half of all students enrolled in colleges and universities received some kind of financial aid in 1981-1983. The availability of financial aid appears to be a critical factor in enrollment at various institutions of higher education. The examination of various social, psychological and financial factors that determine the final enrollment at different types of institutions is the focus of this study.

CHAPTER 3.

Data , Model and Method

This study was an investigation of the factors that affect students' choice of enrollment between four year colleges and other postsecondary institutions. Due to the interrelated nature of these factors, a structural causal model was proposed that presented ten variables as predictors of the choice between four-year colleges and other postsecondary institutions. In other words, this research pertained to college enrollment decision and its concomitants. One important purpose was to determine the impact of an offer of financial aid on college enrollment choice through recursive modeling.

After the research topic was defined, the decision was made to employ secondary analysis on an extant data base for various reasons. One reason was cost and time involved in data collection efforts. Another more important reason was the availability of several large-scale data bases with nationally representative samples, standard items and standard indices in the area of educational attainment. The decision was made to use High School & Beyond data.

Thus, a model of college enrollment behavior was proposed and tested on data from High School and Beyond (HSB) data base.

The chapter is divided in three sections : (1) Data, (2) Model, (3) Methods. The sources of the data used in the study are given in the first section. The databases, data collection procedures, population and sampling techniques, instrumentation and validity of the measures are described. The process of data verification and file preparation prior to data analysis is also outlined in the first section. This process involved the selection of an extant database to be used and the selection of a sample and variables proper for the study. The research problem and the model are described in the second section. Then the statistical methods or procedures that were used to analyze the data are described. A list of variables and their definitions are contained in the last section.

Data

The use of precollected data has become very common in social science research. The easy availability of a wide range of computer software packages and multivariate statistical techniques for data analysis has increased the utility of large scale survey data sets. Surveys have been used to elicit information on a wide variety of topics from both general and specialized populations. There is now an abundance of surveys on population characteristics, attitudes and behavior patterns, and social-psychological attributes of individuals and groups. Secondary analysis of existing surveys allows researchers access to data from large national samples --- data that would be difficult and expensive for a lone researcher to collect.

Another advantage is that many available data sets provide the benefits of nationally representative samples, containing wide-ranging information regarding many demographic, social, psychological, economic characteristics on individuals or in aggregated units. Such data tapes often provide standard items, standard indices and many composite variables. Many data sets can be merged to update and enhance information if they share a key variable in common. High School and Beyond data that has been used for this study offered all these advantages.

The data used for the present research were drawn from three sources: 1. High School and Beyond data, 2. Cooperative Institutional Research Program, and 3. Higher Education Directory (1983).

High School and Beyond Data

Center for Statistics (CS) instituted the National Educational Longitudinal Studies (NELS) program in response to the need for policy-relevant, time-series data on nationally representative samples of high school students. High School and Beyond data are part of that on-going effort in data collection to "study longitudinally the educational, vocational and personal, familial, social, institutional and cultural factors" that may affect the development of youth as they pass from high school years to the adult world (National Opinion Research Center, 1985). HSB data were collected in two ways : (a) multi-wave, (b) multi-cohort.

Multi-wave data involves the initialization and regular follow-up of a given cohort of students over a span of years while multi-cohort data involves the establishment of several comparable cohorts, permitting studies of trends in educational and career development and other areas

of social and psychological research (Data Users' Manual, HSB 1984 Sophomore Cohort, 1986).

HSB has two cohorts: Sophomore and Senior cohorts. These cohorts of high school sophomore and senior students were surveyed in 1980 for the first time. This has been called the base-year survey. They were surveyed again two years later. The 1982 survey is called the first follow-up survey. The two cohorts again were surveyed in 1984 which is called the second follow-up survey. The sampling method employed for these surveys involved two stage, stratified random probability sampling design. The design provided for a highly stratified national probability sample of over 1,100 secondary schools as units of selection for the first stage. In the second stage, 36 students per school were selected. Certain types of schools were oversampled to make separate analysis possible on special groups. Oversampled groups consisted of Hispanic or Spanish speaking students and black students.

Data for this study were drawn from the second follow-up tape of the sophomore cohort. The purpose of including the sophomore cohort was primarily to understand secondary school experience and its impact on future educational and occupational decisions of students. The sophomore cohort provided data on critical experiences and decisions made between the sophomore and senior years, permitting a better understanding of shifts in values and attitudes during those years. This tape contained data on those 1980 sophomore students who were included in all three surveys. The sophomore cohort in the base-year (1980) consisted of 28,240 students in 1015 high schools. For the second follow-up in 1984, the sample was reduced to 14,625. For the present study, the sophomore cohort data were preferred to the data on senior cohort because the sophomore tape contained more extensive information on high school experiences, high school performance and postsecondary plans and aspirations. Since the topic of the research here is the process by which earlier high school experiences and other background influences shaped postsecondary choices, the sophomore data were considered to be more suitable. The data used here came from all three surveys.

Sophomore Data Collection

The student data were collected by means of questionnaires and tests. The base-year student survey was comprised of two sections: 1. A demographic section of 36 items, 2. a section on plans and experiences containing 114 items. The student questionnaire contained extensive data on respondents' background, high school experiences, post high school plans and aspirations, self-concept, language proficiency and types of courses taken in high school. The student survey focused on student behavior and experiences in the secondary school setting. Information regarding employment outside the school, post-secondary educational and occupational aspirations, school activities and attitudes, selected personal and family characteristics was also available.

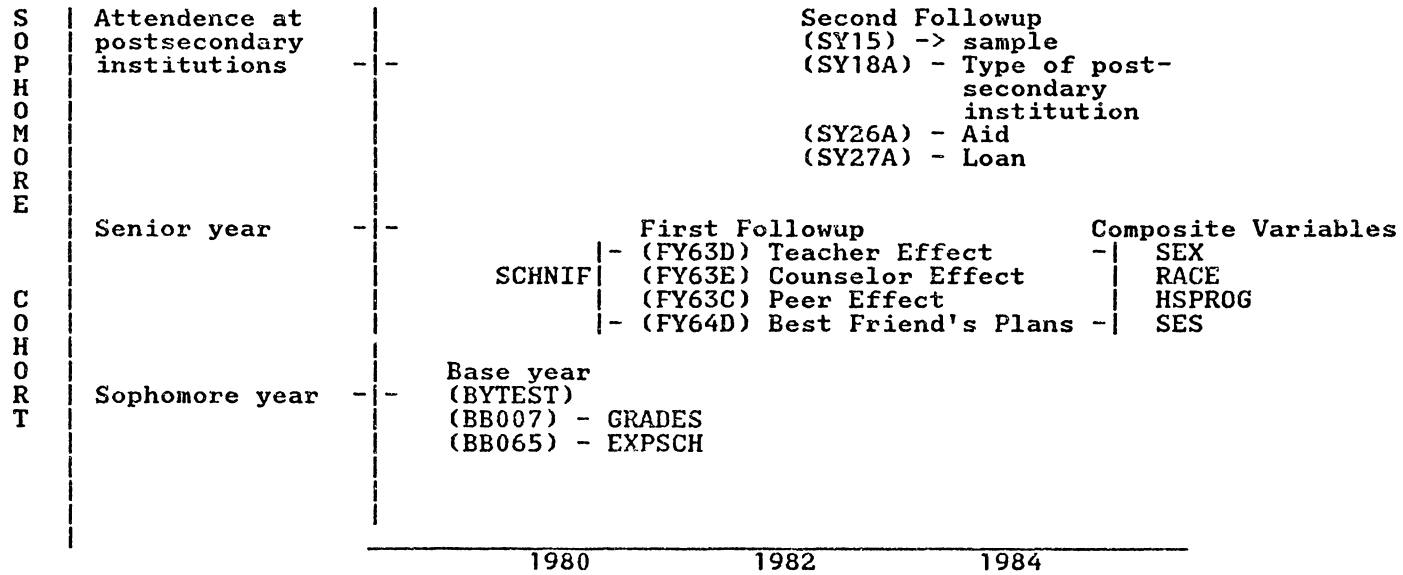
Cognitive tests administered to students measured both verbal and quantitative skills. (The exogenous variable, BYTEST, in the model is based on the cognitive tests given in the base year survey.) The components of the tests are more fully described in the section on variable specification. The reliability and the validity of these tests have been studied by some researchers (Heyns and Hilton, 1982; Schrader and Hilton, 1980). Schrader and Hilton (1980) conducted the test analysis on test battery of High School and Beyond data for final report to National Opinion Research Center. Heyns and Hilton (1982) judged the validity of these tests as adequate and described them as meeting the purpose for which they were intended. Heyns and Hilton noted:

"The reliabilities meet conventional standards and the difficulty levels and timing of each of the tests appeared to be appropriate. Examination of the distribution of scores for each test indicate that the scores are not skewed to either end of their scales. The reliabilities are consistent for students in public, catholic and other private schools." (p. 92)

The first follow-up student questionnaire data further documented the secondary school experiences and shifts in attitudes and values since the base-year. It contained extensive information regarding work experiences and plans for postsecondary education. The second follow-up data provided the information about the actual postsecondary choices and offers of financial aid to the students who had entered postsecondary institutions in the academic year of 1982-83. This group of students formed the sample of the study. In this research study, a model of college enrollment behavior was proposed. Data were needed on family background, social and psychological influences, and high school experiences, and actual offers of financial aid to assess their effects on postsecondary choices made by these students. The sophomore data provided a wealth of information on each of these factors.

Data Verification and File Preparation

The data for this study were obtained from the second follow-up (1984) sophomore data tape a copy of which was maintained on tape by Virginia Tech and were accessed via the mainframe through a SAS program. (SAS is a software system for data analysis.) The data tape contained data only for respondents to the second follow-up sophomore cohort survey and all prior data from the base year and first follow-up surveys for the same respondents. A SAS system file was created on disk of those students who entered a postsecondary institution upon high school graduation. The second follow-up item SY15 identified that portion of the sophomore cohort. It provided a subsample of $n=8332$. These students had entered various postsecondary institutions : two-year colleges, community colleges, vocational and business colleges, four-year colleges, and universities.



Data collection periods for sophomore cohort and variables identified with multi-waves of the 1980 sophomore cohort.

Figure 1. Illustrative Model of Variables

There is no substitute for experience in learning the use of archived data sets and in understanding the process of file preparation prior to analyses. The first step in that process was to access the sophomore tape and run frequencies on selected variables and match these frequencies with the code book in order to verify the accuracy of the data tape and accuracy of variable description in the code book. The second step was to create a SAS system file of those who went to various postsecondary institutions. Only those variables were included in the file that were directly related to the topic of research. Thus the items containing information on socio-economic status, ability, performance, aspirations, curriculum placement and high school effects were included in the file. In addition, data on actual postsecondary choices and financial aid data such as the sources, amounts and the duration of educational grants, scholarships and loans, were also part of the file. More details on the sources of variables are given in the last section.

In order to obtain clean and complete data without missing responses, missing values were assigned to incorrect, irrelevant, non-applicable or missing responses. For example, on the item number BB007 which referred to base-year question number 7 and provided information regarding grades earned so far, the codes 96 (multiple punch), 97 (refused) and 98 (missing data) were assigned (.) which SAS recognizes as missing value. This procedure precluded all inaccurate and nonapplicable responses from the new data file. The exact codes which were assigned to missing values are given in variable definitions for each variable.

Recoding and Constructing New Variables

Some variables were recoded and renamed to make analysis simpler. For example, item number BB007 (grades earned so far in high school) was coded in HSB so a response of

"Mostly A's" was coded 1 and a response of "Mostly below D's" was coded 8. These responses were recoded so a response of "Mostly D's" was 1 and a response of "Mostly A's" was 8. Coding was reversed to match the higher grades with higher values. Such recoding was employed to avoid confusion over positive and negative signs in correlation coefficients. All recodes are described in the variable definitions. A new variable, labeled SCHINF, was created to measure the effect of the normative culture of the high school by combining several responses to questions about teachers, guidance counselors and peers. More detailed description of this composite variable is contained in variable definitions.

Cooperative Institutional Research Program

Data were drawn from Cooperative Institutional Research Program. In order to study the process by which the high school students chose and entered institutions of higher education, data were needed on the institutional characteristics of the colleges that students in the present sample had chosen. The data on institutional characteristics were available on tape from The Cooperative Institutional Research Program. The Cooperative Institutional Research Program (CIRP) is a national longitudinal study of American higher education. It was established by the American Council on Education (ACE) in 1966. The CIRP is now the nation's largest and longest continuing empirical study of American colleges and college students. The annual CIRP survey of entering college freshmen is now administered by UCLA's Higher Education Research Institute, under the sponsorship of the American Council on Education. (1986 Freshmen Survey Results, American Council on Education/University of California, Los Angeles).

A separate SAS system file was created that contained two institutional characteristics (cost and size of the institution) and the fice code of the institution. Fice code was a nine digit code that identified the college name and was the key variable, common to both data files, used in merging the institutional data with student data from HSB. The two files were merged with the use of a SAS program. When the fice codes in CIRP file did not match with fice codes in HSB file, the data for these cases were drawn from Higher Education Directory (1983) and were entered manually. The data on 1369 institutions came from the CIRP file and the data on the other cases were drawn from the Higher Education Directory. The updated file was again merged with student data file from HSB and saved on disk. The new file with complete data had a sample of 6722. These steps, as outlined above, completed the task of file preparation prior to the data analyses.

Model

This research examined the process by which the students make decisions to choose and enroll either at four year colleges or at other postsecondary institutions. Causal modeling allows the study of the dynamics of the process of attendance and choice decisions. Important factors relevant to educational decisions were identified and causal relationship among them were specified in the model. These hypothesized relationships were tested on the data. The model proposed here used some of the major constructs of the earlier studies.

Previous research has established that certain variables exert strong positive effect on college-going behavior. Examples are socioeconomic status, academic ability, school performance and aspirations of the student. There is research evidence that certain secondary school experiences are important factors in the students' decision to continue their education

after high school. For example, curriculum placement in academic track has a strong causal link to attainment of postsecondary education. Beside these personal and high school effects, certain financial factors also affect the enrollment decisions. In the present study, an attempt was made to study the impact of these concomitant factors on the entry into four-year colleges and other postsecondary institutions by recursive modeling. The model was developed on the basis of knowledge of earlier research findings and insights gained from them.

Due to their interrelated nature, the variables discussed above were arranged in a fully-identified block recursive model. Similar models have been developed by sociologists to study educational and occupational attainment processes. There is a logical temporal order underlying the arrangement of the variables in the model. The arrangement indicates that earlier influences impact later factors but later factors can not affect earlier influences. Thus, the decision to enter college is regarded in this model as a function of four sets of variables. These are:

1. Student's personal and family characteristics,
2. High school effects
3. Certain characteristics of postsecondary institutions
4. Availability of financial aid.

Final enrollment at a college was conceptualized as a culmination of a series of decisions. Each endogenous variable in the model was seen as dependent on exogenous variables and other prior endogenous variables. No causal relationship was proposed among variables within a block. The path diagram of the model is given in Figure 2.

In a sense, the development of a causal model is an attempt to model reality as the researcher sees it. Path analysis is a method that tests the hypothesized causal relationships that lead

to a given outcome. Since it is an *ex post facto* study and all variables are measures of events and influences that took place independent of any intervention or treatment in the experimental sense, a logical temporal sequence is assumed to explain how earlier influences interrelate to later influences and thus, to later decisions. Path analysis tests if these postulated causal patterns are supported by data or, simply stated, if this view of reality can be verified by data.

A path diagram is a graphic representation of the hypothesized causal relationships among the variables in a model. The causal model being tested in this study was a fully identified recursive model. It assumed a unidirectional flow of effects. There was also the assumption that there was a causal path from all variables taken as causes (independent variables) to all variables considered to be effects (dependent variables). Thus endogenous variables were both causes and effects in different structural equations. Each of the seven endogenous variables in the model was considered to be caused by all the exogenous variables and those endogenous variables that were to its left in the diagram (Figure 2). But no causal relationship was assumed among variables of the same block -- temporal ordering of variables precluded such causation. Thus the arrangement of variables in a model is dependent on theory. A theoretical rationale underlies the reason for inclusion of a variable in a model as well as its place in the structure of the model.

The model that was tested in this study (depicted diagrammatically in Figure 2) proposed that the choice of the institutional type of the sample was a function of ten predictor variables, arranged in four blocks. These were SES (socioeconomic status), GRADES (high school grades), BYTEST (academic ability), EXPSCH (educational aspiration), HSPRGM (high school program), SCHINF (high school influences), TUITION (undergraduate tuition), ENROLL (total enrollment of the postsecondary institution), AID (financial aid in the form of grant), LOAN (financial aid in the form of loan), and the dependent variable was COLLEGE (final outcome variable of enrollment either at a four year college or some other postsecondary institution).

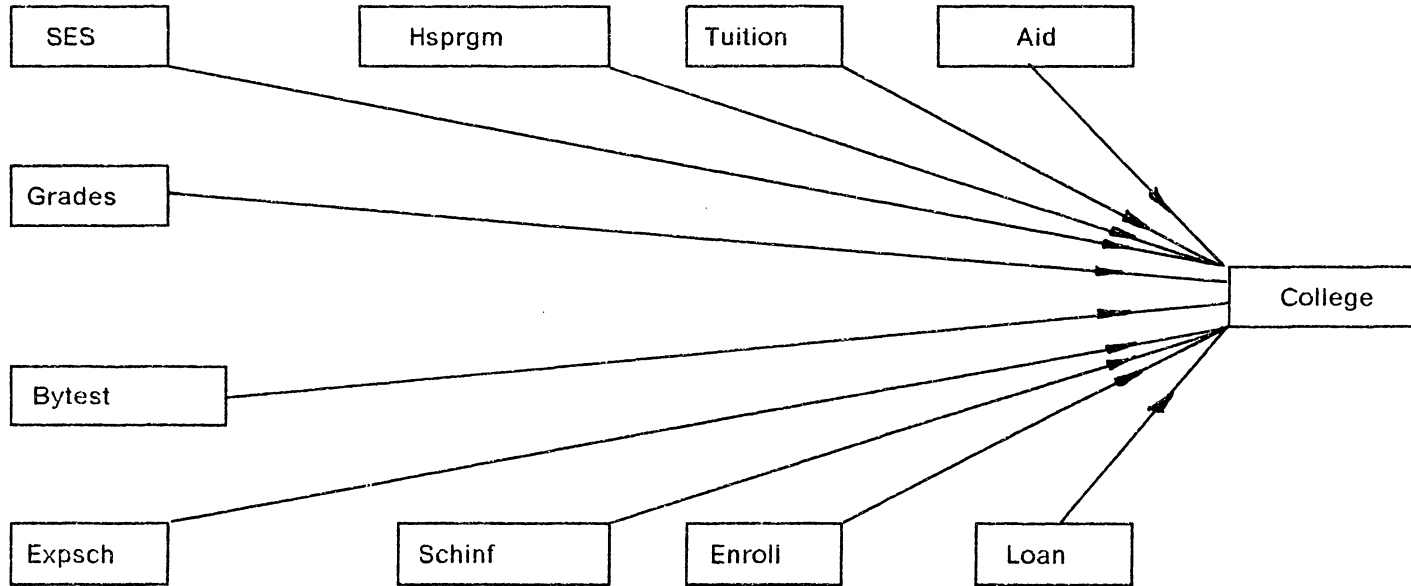


Figure 2. Path Diagram of the Decision to Enroll

The first four were exogenous variables and made up the first block of the model. These are individual characteristics that have been shown in other studies to be strongly related to educational attainment, hence college attendance. These were exogenous variables so the causes of their variation lay outside the model.

There were seven endogenous variables whose causes lay within the model. The second block consisted of the first two endogenous variables. These were the student's curriculum placement in high school and a composite variable of the high school influences.

The high school program (HSPRGM), the first of the endogenous variables in the second block of the model, indicated student's placement in high school program : academic, general and vocational. This variable was seen as dependent on the four exogenous variables : socio-economic status (SES), ability as measured by test scores on reading, math and vocabulary (BYTEST), school performance as measured by grades earned so far in high school (GRADES) and the educational aspirations of the student (EXPSCH). These four variables were hypothesized to have a positive effect on the placement in the academic track in high school. In other words, higher levels of these variables were associated with placement in 'higher' track.

The second endogenous variable, defined as the high school effect (SCHINF), was measured as the sum of encouragement given by teachers, guidance counselors and peers to go to college. Another component of this variable was the effect of the best friend's plans on the respondent's plans to go to college. All these influences were combined in a scale to measure high school effect, called SCHINF. How the variable was scaled is described in the section on variable specification. SCHINF was seen as a function of the exogenous variables of the model. All four exogenous variables were supposed to exert positive impact on SCHINF. Students with higher socio-economic status, higher ability and better grades and higher educational aspirations were supposed to receive higher levels of encouragement from teachers, guidance counselors, peers and were more likely to have a best friend who planned to go to

college. These two variables comprised the second block of variables in the model and were identified as the high school effects.

The third block of the variables consisted of institutional characteristics of the postsecondary institution chosen by a student. These were tuition cost and enrollment of the institution. TUITION was the undergraduate tuition for the academic year and was used as a measure of the cost of college attendance. TUITION was seen as dependent on all preceding variables. It was postulated that how expensive a college students chose, depended on prior variables in the model: background characteristics and high school effects. For example, a student with higher socio-economic status, higher ability and, performance, higher educational aspirations and in academic track had a higher probability of choosing a selective and academically rigorous institution. It is this class of institutions that tend to have high tuition rates. ENROLL was another endogenous variable in this block. It was a measure of the size of an institution, and denoted the number of students enrolled at an institution. It was also seen as a function of the individual characteristics and the high school effects.

Included in the last block were the financial aid variables: AID and LOAN. The actual coding of these variables is described in the last section of the chapter. AID indicated actual offers of financial grant, scholarship, and/or other non-repayable monies given to students in the sample to meet educational expenses. AID was seen as dependent on all preceding variables. LOAN was any money borrowed by the student or the student's family from the federal, state or institutional sources in order to defray the educational expenses. LOAN was seen as a function of other preceding variables in the model. Positive effects were hypothesized from all of the previous variables in the model.

Finally, COLLEGE which was the final outcome variable of the model, was seen as dependent on all ten preceding variables: SES, GRADES, BYTEST, EXPSCH, HSPRGM, SCHINF, TUITION, ENROLL, AID and LOAN.

The model was separately estimated for black students and white students in the sample for purposes of comparison. Many researchers have suggested that processes of educational attainment are different for blacks and whites (Portes and Wilson, 1976; Kerckhoff and Campbell, 1977; Ogbu, 1978 ; Shade, 1982). There are definite differences in the educational outcomes between the two groups. It is possible then that these differences in outcomes are due to the differences in the processes of educational attainment and are indicated by interaction among variables within a model. Therefore, the model of the college enrollment was tested on blacks and whites separately. The model was also estimated separately on data for male and female students. The purpose was to assess if the process of enrolling at different types of colleges was similar in the groups. In other words, these analyses were carried out to determine if the effects of the variables were similar or different among the groups. Central to the study is the effect of the financial aid on the college enrollment. It was of interest, therefore, to determine if the effect of the financial aid was different for blacks and whites, and males and females. The data were further analyzed to examine if there were race or gender effects, per se, on the enrollment decision.

Analysis of Data

The first step in the analysis was to determine the distribution of variables that were being studied. Frequencies and cross tabulations were run to check the distribution of the variables. A number of statistical techniques were used to analyse the data. These included: correlation, multiple regression, and path analysis.

Means, frequencies, percentages and standard deviations were used to examine the descriptive profile of those students who chose to go to a postsecondary institution. Students'

academic, personal, and family background characteristics as well as their high school experiences provided a descriptive profile of those who enrolled in postsecondary institutions. Pearson's product moment correlation coefficients (r) were used to evaluate relationships among the variables of the model. A correlation matrix was generated using the NOMISS SAS option; the matrix was based on 5395 cases. Later analyses were based on correlation coefficients. The matrix was examined for the problem of multicollinearity among the independent variables.

Path analysis was used to examine and analyze the relationships and effects postulated by the model. Path analysis is a method of testing the plausibility of putative causal relationships among a set of variables. Path analysis involves estimation of the path coefficients for the variables given supposed cause and effect relationships as specified by the theory. Pedazur defined path analysis as, "a method for studying direct and indirect effects of variables hypothesized as causes of variables treated as effects" (p.580). The plausibility of these specifications is tested in light of data.

Path analysis was used as the main statistical method to address the primary research question in the study: What are the direct and indirect effects of the independent variables as posited by the causal model on the subsequent entry into postsecondary institutions. The proposed model was estimated using the computer program GEMINI (Wolffe and Ethington, 1985). Ordinary least squares regression was used to estimate the coefficients of the structural equations that define the model. Each endogenous variable is regressed on all exogenous variables and causally antecedent endogenous variables. This procedure yields several sets of regression coefficients. These coefficients represent the direct effects of the causal factors on the dependent variables in the equations. These are partial regression coefficients and are interpreted as such. When one variable affects another variable through intervening variables, such effects are called indirect effects. Indirect effects and their standard errors are also estimated by the program. The sum of direct and indirect effects are called total effects.

Several steps were taken to assess the race and gender effects on the college enrollment decision. The model was estimated separately for the groups using program GEMINI. Coefficients of determination and metric coefficients were compared and examined to see if the process of college entry was explained equally well for the four groups (white and black students, male and female students). The model was again estimated including race or gender as dummy variables to examine if there was a race or gender effect per se. The model was estimated with the inclusion of interaction terms to determine if any paths were significantly different for the groups. SAS procedure Proc Glim was used for assessing the race and gender effects.

Variable Specification

A list of the variables and their definitions is provided in the following section. Some of these are commonly used composite variables, prepared by the HSB staff. These are intended for use in substantive analyses to control for numerous demographic and educational factors. The tape positions are given in parentheses.

SEX (30) -- The composite variable specifying the respondents' sex was created by the HSB staff for use by researchers. The information was available in three survey documents: base year questionnaire, the base year student identification pages , and the first follow-up questionnaire. If one or more of these sources contained a valid sex code (and if the non-missing sources did not conflict), that code was taken for the composite sex variable (SEX). Male was coded 1 and female was coded 2.

RACE (31) -- This variable, again a composite created by the HSB staff following the same procedures as described for SEX above, is based on race and ethnic origin codes which were available from both the base year and first follow up questionnaires. The coding was as follows:

- 1 = Hispanic or Spanish
- 2 = American Indian or Alaskan Native
- 3 = Asian or Pacific Islander
- 4 = Black
- 5 = White
- 6 = other

The next four variables were the exogenous variables comprising the first block of the model.

SES (4363-4367) -- The variable SES, a composite variable created by the HSB staff, measures the socio-economic status of the student's family. It was copied from FUSES, the first follow-up socio-economic status composite variable. If FUSES was missing, BYSES, base year socioeconomic status composite variable, was used. The variable is based on five components : (1) father's occupation, (2) father's education, (3) mother's education, (4) family income, and (5) material possessions in the household. It is the average of the non-missing components after each component score has been standardized. It is a continuous variable with a range of -2.25 to 1.86 and a mean of 0.1802. It was used as an exogenous predictor variable in the model.

GRADES(327-328) -- The source of this variable is the base year item BB007. The item BB007 provides self-reported data on the grades earned approximately in the first two years of high school. At the time of the base year survey in 1980, the students in the sample were high school sophomores. The base year variable BB007 is recoded so higher grades match with higher code values. This made the interpretation of correlations more straightforward. The

variable offered information on high school performance of the students. It is used as a measure of students' academic performance and is an exogenous predictor variable in the model. The missing codes were assigned to codes 96 (multiple punch), 97 (refused), 98 (missing data). The scale is as follows:

8 = Mostly A's (or a numerical average of 90-100)

7 = About half A's & half B's (or 85-89)

6 = Mostly B's (or 80-84)

5 = About half B's and half C's (75-79)

4 = Mostly C's (or 70-74)

3 = About half C's and half D's (or 65-69)

2 = Mostly D's (or 60-64)

1 = Mostly below D's (or below 60)

BYTEST(32-36)-- The base year test composite, prepared by the HSB staff, is based on a battery of cognitive tests administered to all sophomores in the base year. These were timed tests as described below:

1. Vocabulary (21 items, 7 minutes) : uses a synonym format.
2. Reading (20 items, 15 minutes) : Consists of short passages (100-200 words) followed by comprehension questions and a few analysis and interpretation items.
3. Mathematics (38 items, 21 minutes) : students are asked to determine which of the two quantities were greater, whether they were equal, or whether there

is insufficient data to answer the question.

BYTEST is an average of the non-missing reading, vocabulary, and math (part 1) standardized scores (YBREADSD, YBVOCBSD, YBMTH1SD). If scores for all three standardized tests were missing, composite score was missing. The composite test score, BYTEST, was used as a measure of academic ability of the student in the study. It was an exogenous predictor variable. It is a continuous variable with a range of 28.50 to 74.24 and a mean of 53.94.

EXPSCH -- This is a variable renamed from the base year variable BB065 (625-626). BB065 is based on responses to the base year survey question, "As things stand now how far in school do you think you will get?" EXPSCH is taken as a measure of the students' educational aspirations and is included as an exogenous predictor variable in the model. A missing value is assigned to codes 96, 97, 98. The scale is as follows:

Less than high school	= 1
High school only	= 2
Vocational School	
Less than 2 years	= 3
Two years or more	= 4
College Program	
Less than 2 years	= 5
2 or more years	= 6
4 or 5 year degree	= 7
Master's degree	= 8
Ph.d.,M.D. or other professional	= 9

The next two variables formed the second block in the model and were the first endogenous variables of the model whose causes were postulated to be within the model. They were seen as dependent on the exogenous variables.

HSPRGM -- The variable, HSPRGM, was based on the composite variable, HSPROG, created by the HSB staff. It indicated the curriculum placement of the high school students. HSPROG (4350) was created from FY2 (high school program at the time of the first follow-up), FD9 (program at the time student dropped out of the school) and BB002 (high school program indicated during the base year). If a student ever reported an academic program, an academic track was assigned. If general track was reported by a student, code for the general track was assigned. If there was no report of academic program but a vocational program was mentioned, vocational track was assigned. When all three sources were missing, the variable was declared missing. HSPROG was renamed HSPRGM and recoded as follows : 1 = vocational, 2 = general, 3 = academic. Missing value was assigned to code 8 (missing data). It was an endogenous variable which was seen both as cause and effect of other variables in the model.

SCHINF -- SCHINF was a composite variable created for purposes of this study. It was a measure of the effect of high school's normative culture on the students' postsecondary plans. More specifically, it measured the influence of teachers, guidance counselors and peers on the students' decision to go to college. Responses to several first follow-up survey questions were combined to form the variable, SCHINF. The sources from first follow up survey were: FY63D, FY63E, FY63C and FY64D. The survey question FY63D (1514-1515) asked students, "what do the teachers think you ought to do after high school." The first follow-up survey item FY63C (1512-1513) repeated the same question about a guidance counselor. The same question was asked about peers in first follow-up item FY63E. The first follow-up item FY64D (1521) asked the students if their best friend planned to go to college. The first three items were first dummy coded separately : 1 = if teacher or guidance counselor or peers thought the student should go to college. 0 = all other responses. FY64D was also dummy coded as : 1 = if best

friend planned to go to college, 0 = if best friend did not plan to go to college. Then these four dummy coded variables were summed in one variable and labelled SCHINF. The scale is as follows:

- 0 = if no one encouraged the student to go to college and his/her best friend did not plan to go to college.
- 1 = if, out of these four sources of influence, one was positive.
- 2 = if, out of these four sources of influence, two were positive.
- 3 = if, out of these four sources of influence, three were positive.
- 4 = if all four sources of influence were positive.

The next two variables, TUITION and ENROLL, comprised the third block in the model and have been referred to as the characteristics of the postsecondary institutions. These characteristics were factors affecting the students' choice of different types of institutions. These were endogenous variables and were taken both as causes and effects in the model. As mentioned earlier, no causal relationship was proposed in the variables of a block.

TUITION -- The variable, TUITION, indicated the academic year tuition for undergraduate students of the institution. Data were drawn from Cooperative Institutional Research Program and Higher Education Directory of 1982-83. TUITION was used as a measure of cost of education for the students. The categories were as follows :

- 1 = Less than 250
- 2 = \$250 - 499

- 3 = \$500 - 999
- 4 = \$1000 - 1499
- 5 = \$1500 - 1999
- 6 = \$2000 - 2499
- 7 = \$2500 - 2999
- 8 = \$3000 - 3499
- 9 = \$3500 or more

ENROLL -- The variable ENROLL provided information on the total enrollment of the institution and was used as a measure of the size of the institution. Data on enrollment came from two sources: Cooperative Institutional Research Program and Higher Education Directory (1982-83). The scale is as follows :

- 1 = Less than 250
- 2 = 250 - 499
- 3 = 500 - 999
- 4 = 1000 - 1499
- 5 = 1500 - 1999
- 6 = 2000 - 4999
- 7 = 5000 - 9999
- 8 = 10000 - 19000
- 9 = 20000 - 40000
- 10 = Over 40,000

The next two variables formed the fourth block in the model. Data were drawn from High School and Beyond survey and these variables, AID and LOAN, denoted actual offers of aid and actual acceptances of loan to meet educational costs. They were seen as dependent on all previous variables in the model and were supposed to exert a positive effect on the dependent variable, COLLEGE.

AID -- The source for this variable was SY26A (3472) -- a second follow up question which asked students if they received any kind of scholarship grant or benefits (not a loan) to go to school during Fall 1982 through spring 1983. Missing values were assigned to codes 8 (missing data), 9 (legitimate skip). The variable was coded as dummy variable: 1 = if student received any educational grant, 0 = if student did not receive any grant. It was an endogenous variable postulated to affect college enrollment in a positive way.

LOAN -- This variable, like AID, was based on the second follow-up variable SY27A (3513) which indicated whether the student received any educational loan or not. LOAN was dummy coded : 1 = received educational loan , 0 = received no educational loan. Codes 8 (missing data) and 9 (legitimate skip) were assigned missing values. Loan was an endogenous variable in the model and is supposed to influence college attendance positively.

COLLEGE -- COLLEGE was the dependent or outcome variable in the model. It denoted enrollment either at four year colleges or at other postsecondary institutions. It was supposed to be influenced and determined by all other variables of the model. It was based on the second follow-up question SY18A (3296) which asked the students what type of postsecondary institution they attended after high school. It was dummy coded as: 1 = 4-year college or university, 0 = all other post secondary educational institutions. Missing values were assigned to codes 6 (multiple punch), 8 (missing data), 9 (legitimate skip).

Summary

Data used for this study provided a wealth of information on many important psychological, social and financial variables. The study explored the dynamic interplay of these factors in

leading to the college enrollment either at four year colleges or other postsecondary institutions. The data used in the study were comprehensive in nature, national in scope, and reflected the shifts and changes in aspirations and attitudes of high school students as they moved from the high school years to the postsecondary years. In addition, detailed information was available on the financial aid, its sources, scope, amount, nature and duration. The financial aid variables were central to the model because the study examined their impact on college entry as well as the effect of other factors. The sources of the data were well documented so the task of file preparation was accomplished with relative ease. A model of college enrollment behavior was proposed and tested on data. The computer program, GEMINI, was used to estimate the model and to compute direct and indirect effects of independent variables on the dependent variables.

Chapter 4

Results

The purpose of this chapter is to present the results of analyses of data. The chapter is divided into five sections :

1. Description of the sample and its demographic and other characteristics.
2. Correlations among the variables of the model.
3. Estimation of the model.
4. Results on race and gender effects.
5. The effects of the variables.

As described in Chapter 3, the relevant data on those students who had enrolled in postsecondary institutions after graduating from high school had been drawn from the

sophomore cohort of High School and Beyond survey data. This initial sample ($n=8332$) was merged with a data file from Cooperative Institutional Research Program (CIRP). This file contained two institutional characteristics namely: undergraduate tuition and total enrollment of the postsecondary institutions that students in the sample had chosen to attend. Both data files contained fice code, a nine digit code that identified the institution's name. This code was the common key variable that made it possible to merge the two files. Institutional data were unavailable for many cases in the CIRP data tape. A new file of institutional data was created for these cases by entering the data manually. The new file, containing institutional information, was appended to the other file of institutional data. Then the updated file was merged with the data file from the HSB. The merged and updated data file contained 6722 cases. All the descriptive statistics reported in the chapter refer to these 6722 students. The inferential statistics in the chapter are based on the correlation matrix, generated with a NOMISS option, further reducing the sample to 5395 cases. The NOMISS option specifies that an observation with a missing value for any variable be dropped from all calculations. Therefore, the correlation matrix for the variables in the model was based on 5395 cases. All subsequent analyses were based on the correlation matrix.

Demographic and Academic Characteristics of the Sample

The demographic characteristics of the sample of 6722 students are presented in Table 1. Of these students, 46.2% students were males and 53.8% were females. The racial and gender composition of the sample closely paralleled the gender and racial composition of the total HSB sophomore cohort. In the total HSB sample, 44.7% of the students were males and 48.3% were females. As to the racial composition of the sample of the study, 18.6% students

Table 1. Demographic Characteristics of the Sample

Frequencies and Percentages of Race and Gender

Category	Frequency	Percent	Cumulative Frequency
<u>Sex</u>			
Male	3105	46.2	3105
Female	3617	53.8	6722
<u>Race</u>			
Hispanic	1249	18.6	1249
American Indian	82	1.2	1331
Asian	288	4.3	1619
Black	904	13.4	2523
White	4176	62.1	6699
Other	23	0.3	6722

Note: Sample consisted of those students who enrolled in postsecondary institutions from sophomore cohort of High School and Beyond Survey data.

were Hispanic and Spanish speaking. This group was oversampled in the original High School and Beyond survey in order to make various separate analyses on policy-relevant issues possible. In the sample for the study, 62.1% students were white and 13.4% students were black. Others including American Indians and Asian Americans made up 5.8% of the sample.

Academic characteristics of the students are presented in Tables 2, 3 and 4. Since the sample consisted of only those high school students who chose to go to a postsecondary institution, the majority of the students had above average grades and were placed in a college preparatory track. About 25% of the students earned grades that were half A's and half B's. It is important to note that these were self-reported grades. About 87% students reported above average grades. Seven students in ten were in an academic track, one in ten was in a vocational track and two in ten in a general track. As a group, these high school students reported high academic aspirations. In this sample, about 33% of the students aspired to pursue education beyond the baccalaureate degree; 18% students had aspirations to acquire the Ph.D., M.D., or other professional degree, while three in ten planned to finish four or five years of college. As a group, these students also received encouragement from teachers and counselors to attend college. About 69% of the students in the sample were encouraged to go to college by their guidance counselor; 65% were encouraged by their teachers to further their education. About seven students in ten had peers who thought respondents should attend college after high school. Over 80% of the students indicated that their best friend planned to attend college.

The breakdown of the postsecondary institutions chosen by the students in the sample is provided in Table 5. The percents and frequencies of responses to questions that related to the importance of cost and financial aid in the choice of college are given in Table 5. Over 40% of the students felt that cost was very important to them in choosing a college while cost was moderately important to another 46.3% of the students. Financial aid was very important

Table 2. Academic Characteristics of the Sample.

Frequencies and Percentages of High School Program and High School Grades

Category	Frequency	Percent	Cumulative Frequency
<u>High School Program</u>			
Vocational	851	12.7	851
General	1215	18.1	2066
Academic	4645	69.2	6711
<u>Grades</u>			
Mostly below D's (or below 60)	18	.3	18
Mostly D's (60-64)	38	.6	56
Half C's & Half D's (65-69)	219	3.5	275
Mostly C's (70-74)	568	9.0	843
Half B's & Half C's (75-79)	1457	23.1	2300
Mostly B's (80-84)	1371	21.7	3671
Half A's & Half B's (85-90)	1572	24.9	5243
Mostly A's	1076	17.0	6319

Table 3. Academic and High School Characteristics of the Sample

Frequencies and Percentages of High School Variables

Category	Frequency	Percent	Cumulative Frequency
<u>Educational Aspirations</u>			
Less than High School	20	.3	20
High School Graduation	441	7.1	461
Less than 2 years Vocational School	162	2.6	623
Two years or more Vocational School	440	7.1	1063
Less than 2 years College Program	134	2.2	1197
Two or more years in College Program	841	13.6	2038
Finish College 4 or 5 years	2123	34.3	4161
Master's Degree or Equivalent	899	14.5	5060
Ph.D., M.D., or Other Advanced Professional Degree	1138	18.4	6198

Table 4. High School Characteristics of the Sample

Frequencies and Percentages of Several High School Influences

Category	Frequency	Percent	Cumulative Frequency
<u>Teacher Effect</u>			
No Teacher Encouragement for College Attendance	2244	35.4	2244
Teacher Encouragement for College Attendance	4096	64.6	6340
<u>Guidance Counselor Effect</u>			
No Guidance Counselor Encouragement	1982	31.2	1982
Guidance Counselor Encouragement	4365	68.8	6347
<u>Peer Effect</u>			
No Peer Encouragement for College Attendance	1716	27.0	1716
Peer Encouragement for College Attendance	4637	73.0	6353
<u>Best Friend Effect</u>			
Does not plan to attend College	986	15.5	986
Plans to attend College	5366	84.5	6352

to 43% of the students in choosing a college. It was somewhat important to 37.5% of these students in the choice of institution. In the present sample, six in ten students chose a four-year college while four in ten chose other postsecondary options including two-year colleges, technical and business colleges, and community colleges.

Distribution of some sources of financial aid and the percentages of students who received aid from those sources are presented in Table 5. In earlier studies grant and loan were combined in one financial aid variable. In the present study, the two forms of student financial assistance were kept separate in keeping with the theoretical assumption that AID and LOAN had different effects on the students' decision to enter different types of colleges. AID was defined as all non-repayable payments to students, including grants, scholarships, and gifts, etc. LOAN referred to money that was borrowed from a legitimate source in order to meet the educational costs with the full intention and obligation of repaying the money at a later date, together with interest. As is evident in Table 6, about a quarter of those who continued their education beyond high school actually borrowed to meet college expenses, and 40% of the students had offers of aid. These figures are indicative of the fact that, for the majority of first year college students enrolled in 1982-83, the cost of their education was a private burden shared by the students and their families.

The mean and standard deviation of the variables that define the model are presented in Table 6. These statistics were based on a sample of 5395 students who did not have any missing data on the variables of the model. For purposes of comparison, the means and standard deviations for blacks and whites, and for males and females also are given in the same table.

It is evident from Table 6 that the average socio-economic status of black students in the sample was considerably lower than other groups. It is a confirmation of other descriptive studies of college populations. Although blacks came from a lower socio-economic background, they had higher educational aspirations than any other group in the sample. High

Table 5. Description of Choices of Postsecondary Institutions

Frequencies and Percentages of the Choices of Postsecondary Institutions		
Category	Frequency	Percent
<u>Choice of Postsecondary Institution</u>		
Vocational, technical & business college	241	3.6
Community college	2393	35.6
4 year college or university	4029	60.0
Other	35	.5

Frequencies and Percentages of Responses Related to Importance of Cost and Financial Aid in College Choice		
Category	Frequency	Percent
<u>Importance of Cost in Choice of College</u>		
Not important	545	9.8
Somewhat important	2587	46.3
Very important	2454	43.9
<u>Importance of Financial Aid in Choice of College</u>		
Not important	1082	19.4
Somewhat important	2087	37.5
Very important	2400	43.1

Frequency and Percentages of Some Sources of Financial Aid		
Category	Frequency	Percent
<u>Any Educational Grant or Aid</u>	<u>2616</u>	<u>40.0</u>
BEOG or Pell Grant	1385	20.60
SEOG (Supplementary Educational Opportunity Grant)	372	5.53
<u>Any Educational Loan</u>	<u>1512</u>	<u>23.10</u>
NDSL (National Direct Student Loan)	570	8.48
GSL (Federal Guaranteed Student Loan)	727	10.81

Table 6. Means and Standard Deviations* of Variables in Model for the Four Groups and the Full Sample.

Variables	Females (N = 2934)	Males (N = 2461)	Whites (N = 3498)	Blacks (N = 683)	Total Sample (N = 5395)
SES	.1658 (.7233)	.2410 (.7242)	.3462 (.6647)	-.1249 (.7110)	.2001 (.7246)
Grades	6.2352 (1.3511)	5.9358 (1.4199)	6.2129 (1.3640)	5.6984 (1.4079)	6.0986 (1.3908)
Bytest	53.4635 (8.1841)	55.4734 (8.2550)	56.2716 (7.5083)	49.7200 (8.2313)	54.3803 (8.2765)
Expsch	6.7239 (1.9177)	6.6770 (1.9689)	6.6324 (1.8983)	7.0073 (1.9142)	6.7025 (1.9412)
Hsprgm	2.5958 (.6964)	2.6267 (.6619)	2.6358 (.6597)	2.6076 (.7111)	2.6098 (.6810)
Schinf	3.0014 (1.211)	2.8618 (1.3210)	2.9310 (1.2593)	3.0234 (1.2191)	2.9377 (1.2642)
Tuition	3.9468 (2.3754)	3.9009 (2.3631)	4.1003 (2.3594)	3.9370 (2.3141)	3.9259 (2.3697)
Enroll	6.9441 (1.7065)	6.9972 (1.6326)	6.8562 (1.6983)	6.9019 (1.7006)	6.9683 (1.6732)
Aid	.4233 (.4941)	.3933 (.4886)	.3562 (.4789)	.5973 (.4908)	.4096 (.4918)
Loan	.2352 (.4242)	.2471 (.4314)	.2518 (.4341)	.2723 (.4455)	.2406 (.4275)
College	.6145 (.4867)	.6420 (.4795)	.6495 (.4772)	.6794 (.4671)	.6271 (.4836)

* Standard deviations are given in parentheses.

school effect was also higher for blacks, indicating strong encouragement from teachers, guidance counselors, and peers. Female students earned higher average grades than male students, which confirmed the findings of other studies (Moran, 1986; Klitgaard, 1985). Average Test scores were highest for whites and lowest for blacks. Earlier studies have reported similar results. Although female students received better grades than male students, they scored lower than males on standardized tests. This fact has often been cited as a structural difficulty for women in attaining financial aid, whenever aid is based heavily on test scores, as in the case of National Merit Scholarship (Moran, 1986).

As a group, whites paid the highest tuition cost. It is reasonable to assume that, being from families of higher average socioeconomic status, they chose more expensive colleges.

There were some race differences in the distribution of financial aid. In the sample, 36% of the white students had received some educational aid or grant but 60% of the blacks had received student aid in the form of grants. This was not surprising because most of the grants were awarded on the basis of need. A higher percent of blacks qualified for need-based student aid in the sample. Female students received more offers of grants than male students. In these data, 42% of females had offers of aid compared to 39% of male students. Although figures for loan were more similar among groups, blacks took out more loans than other groups. Six in ten students chose four-year colleges over other postsecondary options in the total sample but slightly higher percent of blacks chose four year institutions. A lower percent of female students selected four year colleges.

Correlations Among the Variables of the Model.

The correlations among the variables of the model are presented in Tables 7, 12, 13, 22, 23. Correlations among the variables are based on the sample of 5395 students in Table 7. Other correlation matrices are based on data from the different groups and their different sample sizes are given in the tables. An examination of the correlation matrix of the total sample (n = 5395) shows that all ten independent or predictor variables were positively correlated with the dependent variable COLLEGE. These positive correlations were significant ($P < .0001$). AID was negatively correlated with SES as was expected in view of the need-based nature of most of the student aid. Loan also had a negative correlation with SES but this correlation was small in magnitude (-.0231) and was significant ($P < .10$), indicating a weak relationship. Loan had a strong positive correlation with tuition cost, suggesting that the students paying higher tuition costs were more likely to borrow.

Values of the correlations ranged from -.02319 (between LOAN and SES, being the lowest) to .4759 (between BYTEST and GRADES, being the largest). A SAS procedure called Proc Reg was run to examine the problem of multicollinearity among the independent variables. After examining the tolerance levels of the variables it was concluded that multicollinearity did not pose a threat to the validity of results and analyses that were based on the zero order correlation matrix. In general, correlation coefficients for the four groups were very similar in magnitudes.

Table 7. Correlation Matrix for Variables in Model of College Enrollment (N = 5395)

Pearson Correlation Coefficients/Prob > IRI under HO : RHO = 0

Variables	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan	College
SES	1.00 (.00)										
Grades	.11764 (.0001)	1.00 (.00)									
Bytest	.32107 (.0001)	.47592 (.0001)	1.00 (.00)								
Expsch	.26469 (.0001)	.35456 (.0001)	.30497 (.0001)	1.00 (.00)							
Hsprgm	.20293 (.0001)	.26455 (.0001)	.35499 (.0001)	.36865 (.0001)	1.00 (.00)						
Schinf	.14038 (.0001)	.31306 (.0001)	.23596 (.0001)	.32786 (.0001)	.28098 (.0001)	1.00 (.00)					
Tuition	.14038 (.0001)	.18194 (.0001)	.24042 (.0001)	.19595 (.0001)	.20884 (.0001)	.18411 (.0001)	1.00 (.00)				
Enroll	.08639 (.0001)	.06460 (.0001)	.06853 (.0001)	.11433 (.0001)	.05260 (.0001)	.06979 (.0001)	-.26715 (.0001)	1.00 (.00)			
Aid	-.20862 (.0001)	.23799 (.0001)	.10621 (.0001)	.12457 (.0001)	.09536 (.0001)	.16329 (.0001)	.21234 (.0001)	-.10047 (.0001)	1.00 (.00)		
Loan	-.02319 (.0885)	.12972 (.0001)	.13585 (.0001)	.11822 (.0001)	.11682 (.0001)	.11898 (.0001)	.32617 (.0001)	-.12904 (.0001)	.31594 (.0001)	1.00 (.00)	
College	.19566 (.0001)	.29585 (.0001)	.32481 (.0001)	.32552 (.0001)	.29549 (.0001)	.28159 (.0001)	.44676 (.0001)	.06603 (.0001)	.22696 (.0001)	.25922 (.0001)	1.00 (.00)

Estimation of the Model

The model was estimated using the program GEMINI. The program, GEMINI, needed correlation matrix, means, standard deviations, sample size, and a few control cards defining the equations in the model as input. The program estimated all of the equations in the model with a multiple regression routine. Seven regression equations were solved. These results are given in the Table 8.

The model explained 34% variation in the dependent variable, COLLEGE, which indicated enrollment either at four year colleges or other postsecondary institutions. The squared multiple correlation coefficient is .3444, when COLLEGE is regressed on all ten predictor variables. Coefficients of determination for other equations in the model are presented in Table 8.

The model proposed both direct and indirect effects. As discussed earlier, direct effects are partial regression coefficients and indirect effects are sum of products of direct causal effects through intervening variables. The decomposition of effects, as they are presented in the following paragraphs, made it possible to give a substantive interpretation to the effects that some variables had on others. The coefficients for direct effects are presented both in the standardized and unstandardized (metric) forms in Table 8. The coefficients for indirect effects (unstandardized) and their standard errors are presented in Table 9. Direct, indirect, and total effects in metric and standardized form are given in Tables 10 and 11 to make comparisons among the magnitudes of these effects easy. Unstandardized coefficients are more meaningful and provide more substantive interpretation, especially when effects in two groups or samples are being compared. But when the relative importance of variables within a equation is being assessed, standardized coefficients are to be examined. The GEMINI program

Table 8. Structural Parameter Estimates for Model of College Enrollment (N = 5395)

Dependent Variables	Independent Variables										Coefficient of determination (R ²)
	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan	
Hsprgm	.0520* (.0488)	.0543* (.0266)	.2316* (.0191)	.2650* (.0930)							.20486
Schinf	.0372* (.0649)	.1992* (.1810)	.0593* (.0091)	.2293* (.1493)							.15678
Tuition	.0439* (.1436)	.0371* (.0631)	.1346* (.0386)	.0675* (.0825)	.0931* (.3242)	.0862* (.1617)					.09384
Enroll	.0555* (.1280)	.0147 (.0177)	.0138 (.0028)	.0831* (.0716)	-.0061 (-.0150)	.0286** (.0379)					.01786
Aid	-.2919* (-.1981)	.1734* (.0613)	.0345** (.0021)	.0706* (.0177)	.0146 (.0105)	.0887* (.0345)	.1643* (.0341)	-.0599* (-.0176)			.17134
Loan	-.1028* (-.0606)	.0313** (.0096)	.0578* (.0030)	.0457* (.0101)	.0247 (.0155)	.0400* (.0135)	.2836* (.0511)	-.0596* (-.0152)			.12756
College	.0715* (.0477)	.0616* (.0214)	.0811* (.0047)	.0988* (.0246)	.0783* (.0556)	.0788* (.0302)	.3447* (.0704)	.1426* (.0413)	.1000* (.0983)	.0860* (.0975)	.34444

Metric coefficients are given in the parentheses.

* P < .01

** P < .05

produced the path coefficients presented in Table 8. These coefficients represent the direct effects of the independent variables on each of the seven dependent variables.

Direct Effects

All direct effects, represented by the direct paths going to COLLEGE in the path diagram (Figure 3), were significant ($p < .01$). The variable TUITION had a path coefficient (standardized) of .3447 which was of the largest magnitude among the variables in the model. This effect was more than two times larger than the effect of ENROLL and about three times larger than the effect of AID. The metric coefficient for TUITION was .0704. ENROLL exerted the next largest direct effect on COLLEGE. It had a path coefficient (standardized) of .1426 and a metric coefficient of .0413. AID and LOAN both have significant direct paths to COLLEGE. AID had the third highest path coefficient in the model. It had a path coefficient (standardized) of .1000 and a metric coefficient of .0983. LOAN had a path coefficient (standardized) of .0860 and a metric coefficient of .0975 (Table 8).

Among the four background variables EXPSCH exerted the strongest direct effect on COLLEGE. Its direct effect was slightly larger in magnitude than that of LOAN. The metric coefficient for EXPSCH was .0246 and the standardized coefficient was .0988. It had a strong direct as well as indirect effect on COLLEGE. SES and GRADES had comparatively smaller but significant direct effects on COLLEGE. Both variables denoting high school effects also exerted significant direct effects (Table 8).

Table 9. Unstandardized Indirect Effects in Model* of College Enrollment (N = 5395)

Dependent Variables	Independent Variables									
	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan
Hsprgm										
Schinf										
Tuition	.0263** (.0062)	.0379** (.0058)	.0076** (.0011)	.0543** (.0061)						
Enroll	.0017 (.0023)	.0065 (.0036)	.0001 (.0007)	.0043 (.0042)						
Aid	.0063** (.0021)	.0096** (.0015)	.0020** (.0003)	.0095** (.0014)	.0113** (.0021)	.0048** (.0011)				
Loan	.0083** (.0026)	.0077** (.0017)	.0027** (.0003)	.0093** (.0014)	.0168** (.0028)	.0077** (.0015)				
College	-.0020 (.0050)	.0237** (.0027)	.0057** (.0005)	.0270** (.0020)	.0275** (.0045)	.0189** (.0024)	.0083** (.0008)	-.0032** (.0006)		

* Standard errors are given in parentheses. ** Indirect effect is at least twice its standard error.

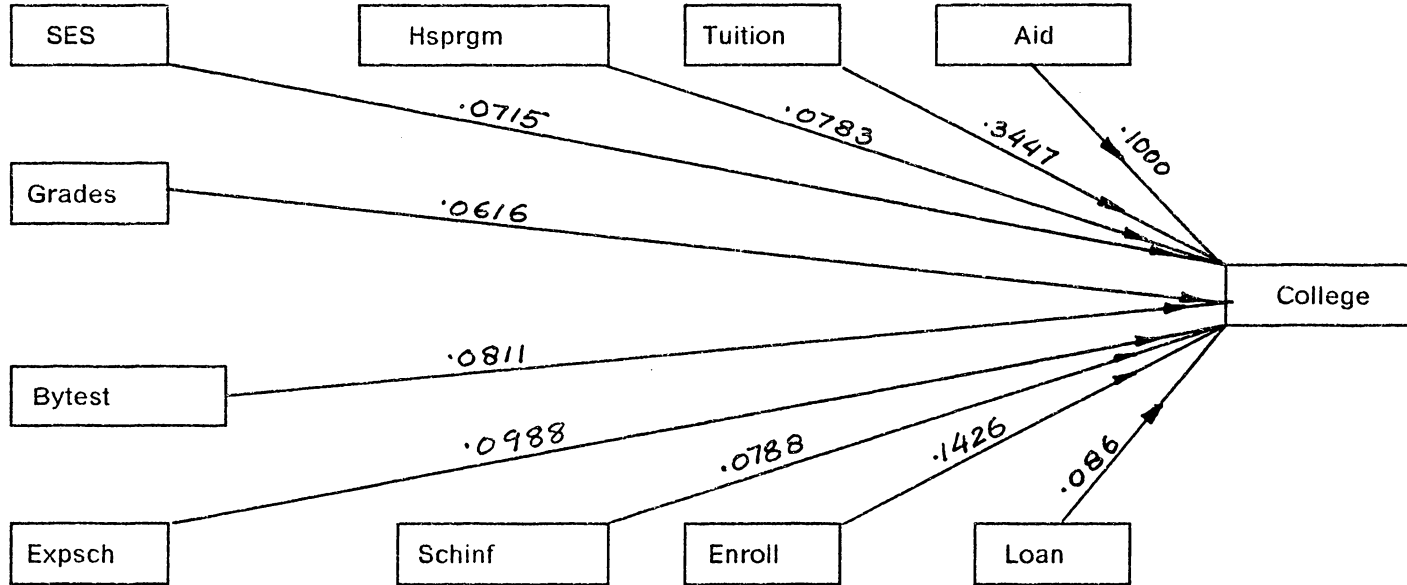


Figure 3. Causal Model of College Enrollment (Path Coefficients)

Thus when only direct effects are examined, institutional characteristics (TUITION and ENROLL) and financial aid variables stand out in importance. The only notable exception being EXPSCH which had a strong direct effect.

Indirect Effects

The indirect effects considerably changed the above picture. It was the exogenous variables of EXPSCH, BYTEST, GRADES that exercised the strongest indirect effects on the outcome variable COLLEGE. All unstandardized indirect effects in the model are given in Table 9. The standard errors of these effects are also presented in parentheses. It is important to note that all predictor variables except SES had significant indirect effects on COLLEGE. The magnitude of these indirect effects (metric) of all variables with the exception of SES was at least twice its standard error, indicating statistical significance.

EXPSCH had the largest indirect effect (unstandardized coefficient was .0270 and the standardized coefficient was .1083). BYTEST and GRADES were the next highest indirect effects. The unstandardized coefficient for indirect effect of BYTEST was .0057 and the standardized coefficient was .0968. GRADES had the unstandardized coefficient for the indirect effect of .0237 and the standardized coefficient of .0681. Comparatively college characteristics had smaller but significant indirect effects. SES was the only variable that did not exert significant indirect effect on COLLEGE (Table 9).

Total Effects

Total effects are the sum of direct and indirect effects. Total effects (standardized and metric) are given in Tables 10 and 11. The total effects describe the important influences on the college enrollment process. The strongest total effects on COLLEGE were TUITION, EXPSCH, BYTEST. The largest total effect (standardized) is .3855, the total effect of TUITION on COLLEGE. The second largest total effect is .2071, the effect of EXPSCH on COLLEGE. The third largest effect is .1779 which is the effect of BYTEST on COLLEGE. These are standardized effects. More details on the magnitudes of total effects are presented in Table 34.

Results related to race and gender effects

As mentioned earlier, the model was estimated separately on data for blacks and whites to determine if the model explained the process of college enrollment equally well for both groups. The GEMINI program was used to estimate the model and the effects postulated by it separately for the two groups. The results are presented in Tables 12 to 21. About 36% variation in the enrollment choice of white students was explained by the model while lower variance was explained for the blacks. The model explained 31% of variation in college choice for the blacks (Tables 14 and 15). Examination of the two coefficients of determination and the metric coefficients in the two groups leads one to conclude that model explained the process leading to college entry equally well for both groups. Except for ENROLL, the metric coefficients in the two groups were very similar. The conclusion that the process leading to

Table 10. Total, Direct and Indirect Effects (Standardized) for Model of College Enrollment (N = 5395)

From	Dependent Variables																							
	Hsprgm			Schinf			Tuition			Enroll			Aid			Loan			College					
	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I			
SES	.0520	.0520	-	.0372	.0372	-	.052	.0439	.0081	.0562	.0555	.0007	-.2827	-.2919	.0092	-.0886	-.1028	.0142	.0685	.0715	-.0029			
Grades	.0543	.0543	-	.1992	.1992	-	.0593	.0371	.0222	.0201	.0147	.0054	.2004	.1734	.0270	.0562	.0313	.0249	.1297	.0616	.0681			
Bytest	.2316	.2316	-	.0593	.0593	-	.1613	.1346	.0267	.0140	.0138	.0003	.0688	.0345	.0343	.1108	.0578	.0530	.1779	.0811	.0968			
Expsch	.2650	.2650	-	.2293	.2293	-	.1120	.0675	.0445	.0880	.0831	.0049	.1074	.0700	.0373	.0879	.0457	.0422	.2071	.0988	.1083			
Hsprgm							.0931	.0931	-	-.0061	-.0061	-	.0303	.0146	.0157	.0515	.0247	.0268	.1170	.0783	.0387			
Schinf							.0862	.0862	-	.0286	.0286	-	.1012	.0887	.0125	.0628	.0400	.0228	.1281	.0788	.0493			
Tuition													.1643	.1643	-	.2836	.2836	-	.3855	.3447	.0408			
Enroll													-.0599	-.0599	-	-.0596	-.0596	-	.1315	.1426	-.0111			
Aid																			.1000	.1000	-			
Loan																			.0860	.0860	-			

Table 11. Total, Direct and Indirect Effects (Metric) for Model of College Enrollment (N = 5395)

From	Dependent Variables																							
	Hsprgm			Schinf			Tuition			Enroll			Aid			Loan			College					
	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I			
SES	.0488	.0488	-	.0649	.0649	-	.1700	.1436	.0263	.1298	.1280	.0017	-.1918	-.1981	.0063	-.0522	-.0606	.0083	.0457	.0477	-.0020			
Grades	.0266	.0266	-	.1810	.1810	-	.1010	.0631	.0379	.0242	.0177	.0065	.0709	.0613	.0096	.0173	.0096	.0077	.0451	.0214	.0237			
Bytest	.0191	.0191	-	.0091	.0091	-	.0462	.0386	.0076	.0028	.0028	.0001	.0041	.0021	.0020	.0057	.0030	.0027	.0104	.0047	.0057			
Expsch	.0930	.0930	-	.1493	.1493	-	.1368	.0825	.0543	.0759	.0716	.0043	.0272	.0177	.0095	.0193	.0101	.0093	.0516	.0246	.0270			
Hsprgm							.3242	.3242	-	-.0150	-.0150	-	.0219	.0105	.0113	.0323	.0155	.0168	.0831	.0556	.0275			
Schinf							.1617	.1617	-	.0379	.0379	-	.0394	.0345	.0048	.0212	.0135	.0077	.0490	.0302	.0189			
Tuition													.0341	.0341	-	.0511	.0511	-	.0787	.0704	.0083			
Enroll													-.0176	-.0176	-	-.0152	-.0152	-	.0380	.0413	-.0032			
Aid																			.0983	.0983	-			
Loan																			.0975	.0975	-			

the final enrollment at four year colleges and other postsecondary institutions was similar for blacks and whites was strengthened by further analyses.

The model was estimated on the combined sample of blacks and whites with the interaction terms for race. The purpose was to determine if path coefficients (metric) for the individual paths differed significantly for the two racial groups. In other words, if the effects of the variables were different on COLLEGE in the two groups. To examine the individual paths for equivalency in the two groups, Proc Glim procedure was run with the interaction terms. The only path that was found to be significantly different for the two groups was that of ENROLL. Comparison of metric coefficients illustrated the point. The path coefficient (metric) of ENROLL for blacks is .0095 that is statistically not significant. The same path coefficient (metric) for whites is .0553 which is significant ($p < .01$). In other words, the effect of ENROLL is different in the two groups.

The model was tested on the combined sample of blacks and whites with race included as a dummy variable to determine if there was a race effect per se on the dependent variable, COLLEGE. The estimation of the model was carried out by the SAS procedure Proc Reg. The results showed that there was a significant race effect that favored blacks. Other things being equal, blacks were more likely to enroll in a four year college.

Table 12. Correlation Matrix for Variables in Model of College Enrollment (sample of black students)

Pearson Correlation Coefficients/Prob > |R| under HO : RHO = 0/N = 683

	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan	College
SES	1.00 (.00)										
Grades	.05333 (.1639)	1.00 (.00)									
Bytest	.27102 (.0001)	.37226 (.0001)	1.00 (.00)								
Expsch	.27785 (.0001)	.29190 (.0001)	.27893 (.0001)	1.00 (.00)							
Hsprgm	.17683 (.0001)	.18625 (.0001)	.35690 (.0001)	.31020 (.0001)	1.00 (.00)						
Schinf	.10475 (.0061)	.26980 (.0001)	.23232 (.0001)	.30969 (.0001)	.25588 (.0001)	1.00 (.00)					
Tuition	.13382 (.0005)	.16068 (.0005)	.22881 (.0001)	.20235 (.0001)	.20417 (.0001)	.12110 (.0015)	1.00 (.00)				
Enroll	.02209 (.5645)	.10092 (.0083)	.09542 (.0126)	.07454 (.0515)	.01299 (.7348)	.12134 (.0015)	-.21506 (.0001)	1.00 (.00)			
Aid	-.12511 (.0011)	.28023 (.0001)	.10995 (.0040)	.11864 (.0019)	.06762 (.0774)	.13097 (.0006)	.14935 (.0001)	-.00699 (.8554)	1.00 (.00)		
Loan	-.00475 (.9014)	.16154 (.0001)	.13103 (.0006)	.13522 (.0004)	.08324 (.0296)	.11513 (.0026)	.28832 (.0001)	-.04017 (.2945)	.24069 (.0001)	1.00 (.00)	
College	.18678 (.0001)	.26077 (.0001)	.32537 (.0001)	.29291 (.0001)	.24312 (.0001)	.31450 (.0001)	.39912 (.0001)	.01572 (.6817)	.22914 (.0001)	.23706 (.0001)	1.00 (.00)

Table 13. Correlation Matrix for Variables in Model of College Enrollment (sample of white students)

Pearson Correlation Coefficients /Prob > IRI under HO : RHO = 0/N = 3498

	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan	College
SES	1.00 (.00)										
Grades	.08122 (.0001)	1.00 (.00)									
Bytest	.19660 (.0001)	.49114 (.0001)	1.00 (.00)								
Expsch	.29446 (.0001)	.35052 (.0001)	.36211 (.0001)	1.00 (.00)							
Hsprgm	.20294 (.0001)	.27499 (.0001)	.35799 (.0001)	.37851 (.0001)	1.00 (.00)						
Schinf	.16165 (.0001)	.33408 (.0001)	.26480 (.0001)	.34223 (.0001)	.28725 (.0001)	1.00 (.00)					
Tuition	.11390 (.0001)	.17026 (.0005)	.22995 (.0001)	.19218 (.0001)	.19746 (.0001)	.20982 (.0001)	1.00 (.00)				
Enroll	.13134 (.0001)	.06322 (.0002)	.08881 (.0001)	.10263 (.0001)	.06656 (.0001)	.05118 (.0025)	-.28299 (.0001)	1.00 (.00)			
Aid	-.17763 (.0001)	.26247 (.0001)	.21217 (.0001)	.10696 (.0001)	.10028 (.0001)	.16159 (.0001)	.22445 (.0001)	-.12228 (.8554)	1.00 (.00)		
Loan	-.05031 (.9029)	.12621 (.0001)	.13877 (.0001)	.10614 (.0001)	.10870 (.0001)	.12548 (.0001)	.31255 (.0001)	-.13237 (.0001)	.34132 (.0001)	1.00 (.00)	
College	.20308 (.0001)	.29660 (.0001)	.32854 (.0001)	.34134 (.0001)	.30110 (.0001)	.29952 (.0001)	.43762 (.0001)	.11316 (.6817)	.21859 (.0001)	.25367 (.0001)	1.00 (.00)

Table 14. Structural Parameter Estimates for Model of College Enrollment (sample of black students, n = 683)

Dependent Variables	Independent Variables										Coefficient of determination (R ²)
	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan	
Hsprgm	.0401 (.0401)	.0170 (.0086)	.2794* (.0241)	.2162* (.0803)							.17703
Schinf	.0029 (.0049)	.1624* (.1406)	.1064* (.0158)	.2318* (.1476)							.14062
Tuition	.0490 (.1595)	.0593 (.0974)	.1249* (.0351)	.0999* (.1207)	.1056* (.3437)	.0130 (.0247)					.08801
Enroll	-.0076 (-.0182)	.0517 (.0624)	.0664 (.0137)	.0293 (.0261)	-.0529 (-.1267)	.0972* (.1356)					.02466
Aid	-.1782* (-.1231)	.2358* (.0822)	.0204 (.0012)	.0577 (.0148)	-.0060 (-.0042)	.0535 (.0216)	.1104* (.0234)	-.0158 (-.0046)			.12065
Loan	-.0729 (-.0456)	.0827** (.0261)	.0396 (.0021)	.0587 (.0136)	-.0167 (-.0104)	.0463 (.0169)	.2607* (.0501)	-.0044 (-.0012)			.10610
College	.0832* (.0547)	.0412 (.0137)	.1234* (.0070)	.0755** (.0184)	.0381 (.0250)	.1706* (.0654)	.2774* (.0560)	.0346 (.0095)	.1215* (.1156)	.0738** (.0775)	.30809

Metric coefficients are given in the parentheses.

* P < .01

** P < .05

Table 15. Structural Parameter Estimates for Model of College Enrollment (sample of white students, n = 3498)

Dependent Variables	Independent Variables										Coefficient of determination (R ²)
	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan	
Hsprgm	.0808* (.802)	.0753* (.0364)	.2144* (.0188)	.2507* (.0872)							.20873
Schinf	.0658* (.1245)	.2195* (.2026)	.0633* (.0106)	.2230* (.1479)							.17704
Tuition	.0340** (.1206)	.0207 (.0359)	.1320* (.0415)	.0549* (.0682)	.0824* (.2945)	.1200* (.2248)					.08975
Enroll	.1064* (.2716)	.0161 (.0200)	.0397** (.0090)	.0484* (.0433)	.0083 (.0213)	-.0008 (-.0011)					.02399
Aid	-.2433* (-.1752)	.1669* (.0586)	.1179* (.0075)	.0286 (.0072)	.0040 (.0029)	.0747* (.0284)	.1535* (.0312)	-.0749* (-.0211)			.17118
Loan	-.1102* (-.0719)	.0314 (.0100)	.0531* (.0031)	.0366* (.0084)	.0271 (.0178)	.0447* (.0154)	.2699* (.0497)	-.0561* (-.0143)			.12113
College	.0776* (.0556)	.0677* (.0237)	.0617* (.0039)	.1079 (.0271)	.0790* (.0571)	.0781* (.0296)	.3575* (.0723)	.1968* (.0553)	.0799* (.0795)	.0977* (.1074)	.36111

Metric coefficients are given in the parentheses.

* P < .01

** P < .05

Table 16. Unstandardized Indirect Effects in Model of College Enrollment* (sample of white students, n = 3498)
Independent Variables

Dependent Variables	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan
Hsprgm										
Schinf										
Tuition	.0516** (.0104)	.0563** (.0083)	.0079** (.0015)	.0589** (.0077)						
Enroll	.0016 (.0047)	.0005 (.0052)	.0004 (.0009)	.0017 (.0053)						
Aid	.0034 (.0030)	.0083** (.0019)	.0017** (.0004)	.0075** (.0017)	.0087** (.0025)	.0070** (.0014)				
Loan	.0080** (.0037)	.0081** (.0022)	.0028** (.0004)	.0095** (.0018)	.0143** (.0035)	.0112** (.0019)				
College	.0153** (.0067)	.0231** (.0036)	.0068** (.0007)	.0241** (.0026)	.0268** (.0061)	.0219 (.0032)	.0078** (.0009)	-.0032** (.0007)		

* Standard errors are given in parentheses.

** Indirect effect is at least twice its standard error.

Table 17. Unstandardized Indirect Effects in Model* of College Enrollment (sample of black students, n = 683)

Dependent Variables	Independent Variables									
	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan
Hsprgm										
Schinf										
Tuition	.0139 (.0140)	.0064 (.0126)	.0087** (.0035)	.0312** (.0152)						
Enroll	-.0044 (.0108)	.0180 (.0096)	-.0009 (.0026)	.0099 (.0116)						
Aid	.0041 (.0038)	.0051 (.0031)	.0012 (.0008)	.0062 (.0034)	.0086** (.0042)	.0000 (.0024)				
Loan	.0084 (.0067)	.0074 (.0041)	.0022** (.0009)	.0092** (.0038)	.0174** (.0072)	.0011 (.0041)				
College	-.0058 (.0110)	.0287** (.0063)	.0048** (.0011)	.0247** (.0048)	.0191** (.0095)	.0066 (.0055)	.0066** (.0022)	-.0006 (.0015)		

* Standard errors are given in parentheses.

** Indirect effect is at least twice its standard error.

Table 18. Total, Direct and Indirect Effects (Metric) for Model of College Enrollment (sample of black students, n = 683)

From	Dependent Variables																				
	Hsprgm			Schinf			Tuition			Enroll			Aid			Loan			College		
	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I
SES	.0401	.0401	-	.0049	.0049	-	.1734	.1595	.0139	-.0226	-.0182	-.0044	-.1190	-.1231	.0041	-.0373	-.0456	.0084	.0488	.0547	-.0058
Grades	.0086	.0086	-	.1406	.1406	-	.1038	.0974	.0064	.0804	.0624	.0180	.0873	.0822	.0051	.0335	.0261	.0074	.0423	.0137	.0287
Bytest	.0241	.0241	-	.0158	.0158	-	.0438	.0351	.0087	.0128	.0137	-.0009	.0024	.0012	.0012	.0043	.0021	.0022	.0118	.0070	.0048
Expsch	.0803	.0803	-	.1476	.1476	-	.1520	.1207	.0312	.0359	.0261	.0099	.0211	.0148	.0062	.0229	.0136	.0092	.0432	.0184	.0247
Hsprgm							.3437	.3437	-	-.1267	-.1267	-	.0045	-.0042	.0086	.0069	-.0104	.0174	.0441	.0250	.0191
Schinf							.0247	.0247	-	.1356	.1356	-	.0215	.0216	.00	.0180	.0169	.0011	.0719	.0654	.0066
Tuition													.0234	.0234	-	.0501	.0501	-	.0626	.0560	.0066
Enroll													-.0046	-.0046	-	-.0012	-.0012	-	.0089	.0095	-.0006
Aid																			.1156	.1156	-
Loan																			.0775	.0775	-

Table 19. Total, Direct and Indirect Effects (Metric) for Model of College Enrollment (sample of white students, n = 3498)

From	Dependent Variables																							
	Hsprgm			Schinf			Tuition			Enroll			Aid			Loan			College					
	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I			
SES	.0802	.0802	-	.1245	.1245	-	.1722	.1206	.0516	.2732	.2716	.0016	-.1719	-.1752	.0034	-.0639	-.0719	.0080	.0709	.0556	.0153			
Grades	.0364	.0364	-	.2026	.2026	-	.0921	.0359	.0563	.0206	.0200	.0005	.0669	.0586	.0083	.0180	.0100	.0081	.0468	.0237	.0231			
Bytest	.0188	.0188	-	.0106	.0106	-	.0494	.0415	.0079	.0094	.0090	.0004	.0092	.0075	.0017	.0059	.0031	.0028	.0108	.0039	.0068			
Expsch	.0872	.0872	-	.1479	.1479	-	.1271	.0682	.0589	.0450	.0433	.0017	.0147	.0072	.0075	.0179	.0084	.0095	.0512	.0271	.0241			
Hsprgm							.2945	.2945	-	.0213	.0213	-	.0116	.0029	.0087	.0322	.0178	.0143	.0839	.0571	.0268			
Schinf							.2248	.2248	-	-.0011	-.0011	-	.0354	.0284	.0070	.0266	.0154	.0112	.0515	.0296	.0219			
Tuition													.0312	.0312	-	.0497	.0497	-	.0801	.0723	.0078			
Enroll													-.0211	-.0211	-	-.0143	-.0143	-	.0521	.0553	-.0032			
Aid																			.0795	.0795	-			
Loan																			.1074	.1074	-			

Table 20. Total, Direct and Indirect Effects (Standardized) for Model of College Enrollment (sample of white students, n = 3498)

From	Dependent Variables																				
	Hsprgm			Schinf			Tuition			Enroll			Aid			Loan			College		
	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I
SES	.0808	.0808	-	.0648	.0658	-	.0485	.0340	.0145	.1070	.1064	.0006	-.2386	-.2433	.0047	-.0980	-.1102	.0122	.0989	.0776	.0213
Grades	.0753	.0753	-	.2195	.2195	-	.0533	.0207	.0325	.0165	.0161	.0004	.1905	.1669	.0236	.0567	.0314	.0253	.1339	.0677	.0662
Bytest	.2144	.2144	-	.0633	.0633	-	.1573	.1320	.0253	.0414	.0397	.0017	.1445	.1179	.0266	.1019	.0531	.0488	.1695	.0617	.1078
Expsch	.2507	.2507	-	.2230	.2230	-	.1023	.0549	.0474	.0503	.0484	.0019	.0582	.0286	.0296	.0782	.0366	.0416	.2039	.1079	.0960
Hsprgm							.0824	.0824	-	.0083	.0083	-	.0160	.0040	.0120	.0489	.0271	.0218	.1162	.0790	.0372
Schinf							.1200	.1200	-	-.0008	-.0008	-	.0931	.0747	.0185	.0771	.0447	.0324	.1358	.0781	.0577
Tuition													.1535	.1535	-	.2699	.2699	-	.3962	.3575	.0386
Enroll													-.0749	-.0749	-	-.0561	-.0561	-	.1853	.1968	-.0115
Aid																			.0799	.0799	-
Loan																			.0977	.0977	-

Table 21. Total, Direct and Indirect Effects (Standardized) for Model of College Enrollment (sample of black students, n = 683)

From	Dependent Variables																				
	Hsprgm			Schinf			Tuition			Enroll			Aid			Loan			College		
	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I
SES	.0401	.0401	-	.0029	.0029	-	.0533	.0490	.0043	-.0095	-.0076	-.0018	-.1723	-.1782	.0059	-.0595	-.0729	.0134	.0744	.0832	-.0089
Grades	.0170	.0170	-	.1624	.1624	-	.0632	.0593	.0039	.0666	.0517	.0149	.2503	.2358	.0145	.1061	.0827	.0234	.1276	.0412	.0864
Bytest	.2794	.2794	-	.1064	.1064	-	.1558	.1249	.0309	.0619	.0664	-.0044	.0406	.0204	.0202	.0802	.0396	.0406	.2084	.1234	.085
Expsch	.2162	.2162	-	.2318	.2318	-	.1257	.0999	.0258	.0404	.0293	.0111	.0821	.0577	.0243	.0984	.0587	.0397	.1769	.0755	.1013
Hsprgm							.1056	.1056	-	-.0529	-.0529	-	.0065	-.0060	.0125	.0111	-.0167	.0278	.0672	.0381	.0291
Schinf							.0130	.0130	-	.0972	.0972	-	.0534	.0535	-.0001	.0493	.0413	.0030	.1877	.1706	.0171
Tuition													.1104	.1104	-	.2607	.2607	-	.3100	.2774	.0327
Enroll													-.0158	-.0158	-	-.0044	-.0044	-	.0323	.0346	-.0022
Aid																			.1215	.1215	-
Loan																			.0738	.0738	-

The above steps were repeated for the groups of males and females. Those results are presented in Tables 22 to 31. The model was estimated separately for males and females. The model's fit was found to be equally adequate for both groups. The coefficient of determination was .35025 for the female sample and .34148 for the male sample. Although there was a gender effect per se, the paths were very similar for the two groups, indicating similar effects of the variables on COLLEGE for the two groups. There was a statistically significant difference in the intercept for the two groups which favored males, indicating a gender effect. Other things being equal, male students were more likely to attend four year institutions.

The Effects of the Variables

Ten predictor variables were examined for their influence on the college enrollment decision. The four exogenous variables whose causes lay outside the model were: socioeconomic status of the student (SES), student's academic ability (BYTEST), academic performance (GRADES), and educational aspiration (EXPSCH). The endogenous variables which were seen as both causes and effects of other variables in the model were: high school program (HSPRGM), perceived encouragement at high school (SCHINF), cost of the postsecondary institution (TUITION), size of the postsecondary institution (ENROLL), student aid in the form of grant (AID) and student aid in the form of loan (LOAN).

Table 22. Correlation Matrix for Variables in Model of College Enrollment (sample of male students, n = 2461)

Pearson Correlation Coefficients /Prob > IRI under HO : RHO = 0/N = 2461

	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan	College
SES	1.00 (.00)										
Grades	.11201 (.0001)	1.00 (.00)									
Bytest	.30873 (.0001)	.48216 (.0001)	1.00 (.00)								
Expsch	.27480 (.0001)	.39957 (.0001)	.32541 (.0001)	1.00 (.00)							
Hsprgm	.17162 (.0001)	.27161 (.0001)	.36493 (.0001)	.35157 (.0001)	1.00 (.00)						
Schinf	.14943 (.0001)	.34938 (.0001)	.29429 (.0001)	.35340 (.0001)	.32590 (.0001)	1.00 (.00)					
Tuition	.12831 (.0001)	.20151 (.0005)	.25744 (.0001)	.18812 (.0001)	.21229 (.0001)	.20500 (.0001)	1.00 (.00)				
Enroll	.07829 (.0001)	.06936 (.0006)	.07305 (.0003)	.14375 (.0001)	.06184 (.0001)	.07370 (.0001)	-.22102 (.0001)	1.00 (.00)			
Aid	-.20229 (.0001)	.23622 (.0001)	.10263 (.0001)	.11143 (.0001)	.10995 (.0001)	.18626 (.0001)	.21968 (.0001)	-.10052 (.0001)	1.00 (.00)		
Loan	-.04249 (.0351)	.15664 (.0001)	.12729 (.0001)	.12463 (.0001)	.12961 (.0001)	.11698 (.0001)	.30795 (.0001)	-.08789 (.0001)	.31408 (.0001)	1.00 (.00)	
College	.17767 (.0001)	.28565 (.0001)	.32174 (.0001)	.31105 (.0001)	.29843 (.0001)	.30308 (.0001)	.45583 (.0001)	.09061 (.0001)	.21607 (.0001)	.25480 (.0001)	1.00 (.00)

Table 23. Correlation Matrix for Variables in Model of College Enrollment (sample of female students, n = 2934)
 Pearson Correlation Coefficients /Prob > IRI under HO : RHO = 0/N = 2934

	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan	College
SES	1.00 (.00)										
Grades	.13475 (.0001)	1.00 (.00)									
Bytest	.32507 (.0001)	.50729 (.0001)	1.00 (.00)								
Expsch	.25787 (.0001)	.31536 (.0001)	.29424 (.0001)	1.00 (.00)							
Hsprgm	.22652 (.0001)	.26661 (.0001)	.34723 (.0001)	.38384 (.0001)	1.00 (.00)						
Schinf	.13857 (.0001)	.27110 (.0001)	.19945 (.0001)	.30389 (.0001)	.24642 (.0001)	1.00 (.00)					
Tuition	.15173 (.0001)	.16495 (.0001)	.23157 (.0001)	.20253 (.0001)	.20670 (.0001)	.16500 (.0001)	1.00 (.00)				
Enroll	.09170 (.0001)	.06456 (.0005)	.06235 (.0007)	.09061 (.0001)	.04496 (.0001)	.06850 (.0002)	-.30387 (.0001)	1.00 (.00)			
Aid	-.21169 (.0001)	.23640 (.0001)	.11755 (.0001)	.13523 (.0001)	.08525 (.0001)	.14032 (.0001)	.20594 (.0001)	-.09969 (.0001)	1.00 (.00)		
Loan	-.00810 (.6608)	.10990 (.0001)	.14197 (.0001)	.11295 (.0001)	.10608 (.0001)	.12282 (.0001)	.34199 (.0001)	-.16318 (.0001)	.31866 (.0001)	1.00 (.00)	
College	.20849 (.0001)	.31415 (.0001)	.32572 (.0001)	.33884 (.0001)	.29247 (.0001)	.26692 (.0001)	.44018 (.0001)	.04588 (.0129)	.23778 (.0001)	.26251 (.0001)	1.00 (.00)

Table 24. Structural Parameter Estimates for Model of College Enrollment (sample of female students, n = 2934)

Dependent Variables	Independent Variables										Coefficient of determination (R ²)
	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan	
Hsprgm	.0777* (.0748)	.0617* (.0318)	.2073* (.0176)	.2833* (.1028)							.21476
Schinf	.0473* (.0792)	.1798* (.1612)	.0260 (.0039)	.2273* (.1435)							.12958
Tuition	.0525 (.1724)	.0180 (.0317)	.1329* (.0386)	.0853* (.1056)	.0920* (.3139)	.0778* (.1525)					.09081
Enroll	.0691* (.1630)	.0278 (.0351)	.0059 (.0012)	.0553* (.0491)	-.0102 (-.0250)	.0359 (.0506)					.01551
Aid	-.3067* (-.2095)	.1798* (.0658)	.0479** (.0029)	.0904* (.0233)	.0058 (.0041)	.0717* (.0292)	.1653* (.0344)	-.0493* (-.0143)			.17480
Loan	-.0921* (-.0540)	.0086 (.0027)	.0779* (.0040)	.0360 (.0079)	.0119 (.0072)	.0610* (.0214)	.2927* (.0522)	-.0792* (-.0197)			.13857
College	.0782* (.0527)	.0948* (.0342)	.0680* (.0040)	.1144* (.0291)	.0695* (.0486)	.0742* (.0298)	.3370* (.0691)	.1371* (.0391)	.1090* (.1075)	.0860* (.0988)	.35025

Metric coefficients are given in the parentheses.

* P < .01

** P < .05

Table 25. Structural Parameter Estimates for Model of College Enrollment (sample of male students, n = 2461)

Dependent Variables	Independent Variables										Coefficient of determination (R ²)
	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan	
Hsprgm	.0203 (.1858)	.0487** (.0227)	.2560* (.0205)	.2433* (.0818)							.19565
Schinf	.0288 (.0526)	.1995* (.1856)	.1149* (.0184)	.2284* (.1532)							.18853
Tuition	.0354 (.1155)	.0517** (.0861)	.1457* (.0417)	.0448** (.0538)	.0931* (.3322)	.0926* (.1656)					.09965
Enroll	.0372 (.0839)	.0028 (.0032)	.0151 (.0030)	.1204* (.0998)	.0003 (.0007)	.0201 (.0249)					.02301
Aid	-.2741* (-.1851)	.1686* (.0581)	.0119 (.0007)	.0469** (.0116)	.0232 (.0171)	.1121* (.0415)	.1653* (.0342)	-.0715* (-.0214)			.16865
Loan	-.1146* (-.0682)	.0654* (.0199)	.0255 (.0013)	.0549* (.0120)	.0416** (.0271)	.0177 (.0058)	.2720* (.0496)	-.0370 (-.0098)			.11970
College	.0625* (.0412)	.0376*** (.0126)	.0773* (.0045)	.0832* (.0202)	.0852* (.0615)	.0980* (.0329)	.3552* (.0719)	.1483* (.0434)	.0861* (.0842)	.0863* (.0957)	.34148

Metric coefficients are given in the parentheses.

* P < .01

** P < .05

*** P < .10

Table 26. Unstandardized Indirect Effects in Model* of College Enrollment (sample of female students, n = 2934)

Dependent Variables	Independent Variables									
	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan
Hsprgm										
Schinf										
Tuition	.0356** (.0091)	.0346** (.0075)	.0061** (.0014)	.0542** (.0088)						
Enroll	.0021 (.0045)	.0074 (.0047)	-.0002 (.0009)	.0047 (.0063)						
Aid	.0074** (.0030)	.0065** (.0019)	.0017** (.0004)	.0093** (.0020)	.0112** (.0027)	.0045** (.0015)				
Loan	.0098** (.0038)	.0063** (.0023)	.0025** (.0004)	.0111** (.0020)	.0169** (.0039)	.0070** (.0021)				
College	.0007 (.0068)	.0212** (.0037)	.0052** (.0006)	.0278** (.0027)	.0247** (.0060)	.0189** (.0033)	.0089** (.0012)	-.0035** (.0008)		

* Standard errors are given in parentheses.

** Indirect effect is at least twice its standard error.

Table 27. Unstandardized Indirect Effects in Model* of College Enrollment (sample of male students, n = 2461)

Dependent Variables	Independent Variables									
	SES	Grades	Bytest	Expsch	Hsprgm	Schinf	Tuition	Enroll	Aid	Loan
Hsprgm										
Schinf										
Tuition	.0149 (.0087)	.0383** (.0085)	.0099** (.0018)	.0525** (.0085)						
Enroll	.0013 (.0019)	.0046 (.0051)	.0005 (.0012)	.0039 (.0057)						
Aid	.0051 (.0032)	.0122** (.0023)	.0028** (.0005)	.0092** (.0021)	.0113** (.0032)	.0051** (.0016)				
Loan	.0064 (.0036)	.0078** (.0024)	.0032** (.0005)	.0074** (.0021)	.0165** (.0041)	.0080** (.0021)				
College	-.0051 (.0073)	.0253** (.0040)	.0065** (.0007)	.0258** (.0029)	.0305** (.0070)	.0182 (.0035)	.0076** (.0012)	-.0027** (.0008)		

* Standard errors are given in parentheses.

** Indirect effect is at least twice its standard error.

Table 28. Total, Direct and Indirect Effects (Metric) for Model of College Enrollment (sample of female students, n = 2934)

From	Dependent Variables																							
	Hsprgm			Schinf			Tuition			Enroll			Aid			Loan			College					
	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I			
SES	.0748	.0748	-	.0792	.0792	-	.2079	.1724	.0356	.1652	.1630	.0021	-.2021	-.2095	.0074	-.0442	-.0540	.0098	.0534	.0527	.0007			
Grades	.0318	.0318	-	.1612	.1612	-	.0662	.0317	.0346	.0425	.0351	.0074	.0723	.0658	.0065	.0090	.0027	.0063	.0554	.0342	.0212			
Bytest	.0176	.0176	-	.0039	.0039	-	.0447	.0386	.0061	.0010	.0012	-.0002	.0046	.0029	.0017	.0066	.0040	.0025	.0093	.0040	.0052			
Expsch	.1028	.1028	-	.1435	.1435	-	.1597	.1056	.0542	.0538	.0491	.0047	.0326	.0233	.0093	.0190	.0079	.0111	.0569	.0291	.0278			
Hsprgm							.3139	.3139	-	.0250	.0250	-	.0153	.0041	.0112	.0241	.0072	.0169	.0734	.0486	.0247			
Schinf							.1525	.1525	-	.0506	.0506	-	.0338	.0292	.0045	.0283	.0214	.0070	.0488	.0298	.0189			
Tuition													.0344	.0344	-	.0522	.0522	-	.0780	.0691	.0089			
Enroll																-.0143	-.0143	-	.0357	.0391	-.0035			
Aid																			.1075	.1075	-			
Loan																			.0988	.0988	-			

Table 29. Total, Direct and Indirect Effects (Metric) for Model of College Enrollment (sample of male students, n = 2461)

From	Dependent Variables																				
	Hsprgm			Schinf			Tuition			Enroll			Aid			Loan			College		
	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I
SES	.0185	.0185	-	.0526	.0526	-	.1304	.1155	.0149	.0852	.0839	.0013	-.1800	-.1851	.0051	-.0618	-.0682	.0064	.0361	.0412	-.0051
Grades	.0227	.0277	-	.1856	.1856	-	.1243	.0861	.0383	.0078	.0032	.0046	.0702	.0581	.0122	.0276	.0199	.0078	.0380	.0126	.0253
Bytest	.0205	.0205	-	.0184	.0184	-	.0516	.0417	.0099	.0035	.0030	.0005	.0035	.0007	.0028	.0045	.0013	.0032	.0109	.0045	.0065
Expsch	.0818	.0818	-	.1532	.1532	-	.1064	.0538	.0525	.1037	.0998	.0039	.0208	.0116	.0092	.0194	.0120	.0074	.0460	.0202	.0258
Hsprgm							.3322	.3322	-	.0007	.0007	-	.0285	.0171	.0113	.0436	.0271	.0165	.0920	.0615	.0305
Schinf							.1656	.1656	-	.0249	.0249	-	.0466	.0415	.0051	.0138	.0058	.0080	.0511	.0329	.0182
Tuition													.0342	.0342	-	.0496	.0496	-	.0795	.0719	.0076
Enroll													-.0214	-.0214	-	-.0098	-.0098	-	.0407	.0434	-.0027
Aid																			.0802	.0802	-
Loan																			.0957	.0957	-

Table 30. Total, Direct and Indirect Effects (Standardized) for Model of College Enrollment (sample of female students, n = 2934)

From	Dependent Variables																				
	Hsprgm			Schinf			Tuition			Enroll			Aid			Loan			College		
	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I
SES	.0777	.0777	-	.0473	.0473	-	.0633	.0525	.0108	.0700	.0691	.0009	-.2958	-.3067	.0109	-.0753	-.0921	.0168	.0793	.0782	.0011
Grades	.0617	.0617	-	.1798	.1798	-	.0377	.0180	.0197	.0337	.0278	.0058	.1976	.1798	.0178	.0287	.0086	.0201	.1537	.0948	.0589
Bytest	.2073	.2073	-	.0260	.0260	-	.1540	.1329	.0211	.0048	.0059	-.0012	.0762	.0479	.0283	.1266	.0779	.0487	.1561	.0680	.0881
Expsch	.2833	.2833	-	.2273	.2273	-	.1290	.0853	.0437	.0605	.0553	.0053	.1267	.0904	.0363	.0861	.0360	.0502	.2240	.1144	.1095
Hsprgm							.0920	.0920	-	-.0102	-.0102	-	.0215	.0058	.0157	.0396	.0119	.0277	.1048	.0695	.0354
Schinf							.0778	.0778	-	.0359	.0359	-	.0828	.0717	.0111	.0809	.0610	.0199	.1213	.0742	.0471
Tuition													.1653	.1653	-	.2927	.2927	-	.3802	.3370	.0432
Enroll													-.0493	-.0493	-	-.0792	-.0792	-	.1249	.1371	-.0122
Aid																			.1090	.1090	-
Loan																			.0860	.0860	-

Table 31. Total, Direct and Indirect Effects (Standardized) for Model of College Enrollment (sample of male students, n = 2461)

From	Dependent Variables																				
	Hsprgm			Schinf			Tuition			Enroll			Aid			Loan			College		
	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I	T	D	I
SES	.0203	.0203	-	.0288	.0288	-	.0399	.0354	.0046	.0378	.0372	.0006	-.2665	-.2741	.0076	-.1038	-.1146	.0108	.0547	.0625	-.0078
Grades	.0487	.0487	-	.1995	.1995	-	.0747	.0517	.0230	.0068	.0028	.0040	.2040	.1686	.0354	.0911	.0654	.0256	.1128	.0376	.0752
Bytest	.2560	.2560	-	.1149	.1149	-	.1820	.1457	.0345	.0175	.0151	.0024	.0592	.0119	.0474	.0866	.0255	.0611	.1887	.0773	.1114
Expsch	.2433	.2433	-	.2284	.2284	-	.0886	.0448	.0438	.1250	.1204	.0047	.0838	.0469	.0370	.0885	.0549	.0337	.1896	.0832	.1063
Hsprgm							.0931	.0931	-	.0003	.0003	-	.0386	.0232	.0154	.0669	.0416	.0253	.1274	.0852	.0422
Schinf							.0926	.0926	-	.0201	.0201	-	.1259	.1121	.0139	.0422	.0177	.0244	.1412	.0908	.0504
Tuition													.1653	.1653	-	.2720	.2720	-	.3929	.3552	.0377
Enroll																-.0715	-.0715	-	.1389	.1483	-.0094
Aid																			.0861	.0861	-
Loan																			.0863	.0863	-

Financial Aid (Grants)

Availability of financial aid lowers the net price of an educational option. Hence it makes it theoretically possible for many more than just financially able students to attend college. It does not follow, however, that financially unable students and their families necessarily will avail themselves of such aid or will let the promise of financial aid figure in their decisions to attend college or to choose between a four year or two year college. It is reasonable, therefore, to include financial aid as one factor in a study of determinants of college enrollment. Indeed, one half of the college going population in 1980-82 received some kind of student aid. In this sample, 41% accepted offers of financial grants and 24% had accepted financial aid in the form of loans (Table 6).

The results of this study clearly indicate that financial aid was a direct and positive influence on the enrollment decision of the students in the sample. To be specific, offer of grant (AID) improved the probability of enrollment significantly at four year colleges when other factors were controlled. This result confirms several previous research studies (Jackson, 1977; Fuller, Manski and Wise, 1983; Schwatz, 1985). Having an educational loan also increased the probability of enrollment at four year colleges. These were direct effects. There were no intervening variables between financial aid variables and final outcome variable COLLEGE.

In this study, the strongest determinant of offers of financial grant was the socio-economic status of the student (Table 10). The lower the socio-economic status of the student, the more likely is the student to receive an award of financial grant. This was a predictable result since most major student aid programs are need-based, and most of the student aid in 1982-83 was generated by need-based federal programs (Carlson and Gillespie, 1984).

Not surprisingly, the second major factor associated with the award of grant is student's grades. This finding also confirms that some discretionary student aid is awarded on the ba-

sis of academic performance (Manski and Wise, 1983). There is a growing trend among institutions to base some financial aid awards on academic merit. This reflects an increasing competition for better students among colleges. Manski and Wise (1983) reported in their study of college choice, using NLS-72 data, that a significant amount of aid goes to middle-class and upper-middle class students on the basis of merit who would have enrolled anyway. The results of the present study indicate that aid awards are based on some combination of need and merit.

A third determining factor in the award of grants was found to be the tuition cost of the particular institution. This seemed to follow from the fact that the financial aid programs are based not solely on the ability of a student to attend any college but also on the ability to attend a college of his/her choice. The amount of financial aid is tied to the cost of attending a particular college as well. Thus "need" is defined as the difference between what a student can pay and what it costs to attend a college of his/her choice. According to these data, financial aid may be seen to promote choice among institutions. Being determined in part by tuition cost, financial aid provides a larger choice of institutions of varying cost to the student. If a student is admitted to a more expensive college, he is more likely to receive an award of aid, because his "unmet need" is larger, other things being equal.

Financial Aid (Grants) and Race

A primary goal of financial aid is to remove barriers to educational opportunity for disadvantaged youth. This is especially important when considering differences between races, because a higher proportion of blacks than whites falls into the lower socioeconomic class in the population, and in the sample of the study. It was expected, therefore, that a higher percent of blacks would be aid recipients (Table 6).

Analyses were done separately on data for blacks and whites to determine if the effect of having a grant was similar for the two racial groups. As is shown in Table 6, about 60% of black students in the sample had offers of aid compared to 36% of white students. When the metric coefficients for AID in the model are compared for the two groups, one can see that AID is a stronger factor for blacks than for whites in the enrollment at four year colleges. The metric coefficient for blacks is .1156 as compared to .0795 for whites (Tables 18 and 19). These metric coefficients constitute the total effect of AID on enrollment choice since there are no indirect effects. When magnitudes of total effects are rank ordered, AID is sixth in order of magnitude for blacks, while it is the tenth variable in order of magnitude for whites (Table 32). This particular finding that student aid is of greater importance to the students from lower socio-economic status is corroborated by prior research studies (Fuller, Manski, and Wise, 1983; Zollinger, 1984; Zollinger, 1985; Shaut & Rizzo, 1980; Schwartz, 1985).

Financial Aid (Grant) and Gender

The model was tested separately for males and females. The comparison of metric coefficients indicates that an offer of grant increased the probability of enrollment at four year colleges both for women and men. The effect, however, was marginally larger for women. That is, AID may be interpreted to be a stronger influence on women's decision to enroll at a four year rather than a two year college. In this sample, 42% of the women and 39% men had an offer of some aid. Results from this sample indicate that AID figures more importantly in women's college choice than men's (Tables 28 and 29). The metric coefficient of AID on COLLEGE for women is .1075 compared to .0802. Not many empirical studies have been done on women's access to financial aid. There is some evidence that women do not have the same access to financial aid and there are serious inequities in the distribution and amount of aid awarded to women (Moran, 1986). Since the amount of aid is not considered in the

present study, this issue cannot be examined here but the charge that fewer women receive aid does not find support in these data.

Financial Aid (Loan)

The other financial aid variable examined in the study was student loans. Specifically, the variable LOAN in the model indicated whether a student had sought and accepted a loan. The results of the effect of loan on enrollment indicate that the availability of loan increases the probability of enrollment at a four-year college. So a student who has an educational loan is more likely to enroll at a four-year institution.

When loan is examined in relation to prior factors that influence the decision to accept loan, certain factors emerge as important determinants of loan. Tuition cost was the strongest determinant of loan. Those students who chose more expensive colleges were more likely than other students to take out loans. Federal loan programs that provide interest subsidy were designed both to improve access and choice among institutions of varying costs. If the prime factor influencing the reliance on loan is the cost of college attended, then the availability of subsidized loans promotes student choice among institutions.

A second factor influencing loan was the socioeconomic status of the student. It was found to have a negative relationship with loan. These data do not support the claim that the cost of borrowing is higher for students of lower socio-economic status, making them reluctant to rely on loans. Since the sources and amounts of loan are not considered here, serious examination of this issue is precluded. But it is probable that interest subsidy makes it possible for students from poor as well as middle class families to take out loans to attend four-year colleges.

The third important factor associated with loan is BYTEST, indicating that the high ability students are more likely to borrow. Since debt reliance is determined by high cost, low SES, and high ability, students seeking high cost, high quality schools are more willing to borrow because they expect a higher pay off from their college education. In any case, these results support the claim that financial aid programs are following policy directives by improving choice and access for students from low income families.

Financial Aid (Loan), Race and Gender

The effect of loan was analyzed separately for the two racial groups. In these data, 25% of black students had borrowed in order to afford college while 27% of white students had taken out loans to meet the cost of college. When metric coefficients indicating the effect of loan on enrollment were compared LOAN had a larger positive effect on enrollment for whites than for blacks. The probability of attending a four-year college is improved more for whites if they have a loan than for blacks who have loans. Comparison of metric coefficients indicated that the effect of loan was remarkably similar for male and female groups. In these data, 24% of women borrowed to meet college costs compared to 25% of men who relied on loans to meet college costs. The results indicate that men and women relied on debt in similar numbers and debt affected their choice of college in similar ways.

College Cost

The effect of tuition cost on the choice between four year college and other postsecondary institutions was examined in the study. The results indicate that the enrollment at a four-year

college is related significantly to the higher tuition cost. The tuition cost differences among the different institutional types in higher education are quite substantial. Although there is considerable variability in cost among institutions of one type, there are tremendous cost differences among different institutional types. For example, the price of two-year colleges and community colleges is substantially lower than four-year colleges and universities. When other variables were held constant, the tuition cost was a powerful factor in college enrollment decision. When the standardized total effects are rank ordered, tuition cost had the largest total effect on COLLEGE. The large total effect of TUITION is an artifact of cost differences between four year and two year colleges. It is not clear whether it drives the choice between the four year institutions and two year institutions. This point is further discussed in Chapter 5.

Many studies have reported cost to be the major reason why low-income students enroll at two-year colleges and community colleges. Davis and Johns (1982), using CIRP and Census data, analyzed enrollment trends by family income. They concluded that, after an increase in enrollment of low-income freshmen between 1966 and 1976, the enrollment of such students declined in all institutional types except two year colleges. The two year institutions have steadily increased their enrollments of lowest income freshmen since 1966. In 1980, slightly more lowest-income freshmen enrolled at community colleges and four year public colleges than in 1976. These studies support the assertion that financially handicapped students have been underenrolled in four year colleges. Almost all studies examining the impact of cost have confirmed the negative impact of cost both on attendance and enrollment (Peng, 1977; Schwartz, 1985).

Due to the nature of the present study, high school students who decided not to continue their education after high school are not in the sample, one can only speculate what role the perception of cost had played in non-attendance decisions. It is not unlikely that perceptions of high cost of higher education is a factor in such non-educational choices. It is reasonable to

assume that the high cost of higher education may depress the educational aspirations of students from low-income families at an early age.

It is noteworthy that the potential of cost to affect patterns of attendance and choice would grow stronger as college costs rise and financial aid programs decline. Financial aid programs were designed to mitigate the negative effect of cost on attendance and choice behavior. The impact of cost on college enrollment decisions in this study is especially notable because by 1982-83 the effect of budget cuts in financial aid programs had not as yet been dramatic. Since tuition and fees at all public and private four year colleges has risen continuously during the last few years, it is not unreasonable to infer that the role of cost in attendance and choice behavior will remain critical.

Some patterns of relationships emerged when TUITION was examined in relation to other factors in the model. Tuition cost was most strongly associated with BYTEST, indicating that high ability students choose more expensive colleges. This finding is not surprising. Several other studies reported the same relationship. Brighter and abler students choose more selective hence more expensive colleges. Another notable factor in determining who pays high tuition cost is the high school program. If a student is in an academic track, he is more likely to choose a four year college which is more expensive than two year colleges. High school influences also play a part in the choice of high cost college option. These results confirm that high ability students who are in college preparatory courses and are encouraged to go to college are more likely to select more expensive colleges.

It is obvious from the pattern of relationships described above that high tuition cost is related to perceived academic quality of the college. The information regarding college quality is imbedded in the tuition cost to some extent. Thus, the choice of a more selective college is related to student ability, course taking patterns, and perceived encouragement at high school.

The effect of cost is found to be invariant among groups, suggesting that the effect of tuition cost is similar on the choice between four-year colleges and other postsecondary institutions for the groups in the sample.

High School Program and Perceived Encouragement at High School

Coming to the secondary school experiences, sixty-nine percent of these high school students were in an academic track. The results show that being in an academic track had a positive effect on the decision to enroll in four-year colleges. It significantly increased the probability of enrollment at four year colleges (Table 8). This result confirms many earlier studies (Alexander and Cook, 1982; Alexander and McDill, 1976; Heyns, 1974; Rosenbaum, 1980; Wolfle, 1985).

According to these data, the two equally important factors that determine placement in an academic track are the student's educational aspiration and ability. Curriculum placement is more dependent on a student's educational aspiration and ability than on social class origins. High school program's strongest effects are on tuition cost and final dependent variable, COLLEGE. Being in an academic track reinforces the college aspirations of students. Thus, the students who are in an academic track are more likely to consider more selective and more expensive colleges. The effect of curriculum placement is the same among groups.

High school influence variable labeled, SCHINF, is also positively associated with the enrollment at four-year colleges. If a high school student perceives that he/she is being encouraged by teachers, guidance counselors, and peers to go to college, his/her chances of enrolling at a four-year college are improved. According to these data, prior factors that determine such encouragement are educational aspirations of students and their performance as reflected in their grades. When metric coefficients for blacks and whites are compared, it is clear that

such perceived encouragement in high school was more important for black students and had a stronger impact on black enrollment at four year colleges. For males and females, high school influences impacted in a similar way.

Background and Personal Characteristics

The following discussion centers on the effects of the exogenous variables of the model. It is noteworthy that the indirect effects of exogenous variables were larger than their direct effects. Results indicated that the educational aspiration of a student was a powerful influence on the enrollment choice between four year colleges and other postsecondary institutions. Educational aspiration not only affected the enrollment decision directly, but it also exerted a strong indirect effect through other variables. According to these results, a student with higher educational aspiration is also encouraged by others to attend college and is more likely to choose a high cost college. These patterns of effects are remarkably similar for blacks and whites.

The second exogenous variable examined here was BYTEST. BYTEST is a measure of the student's academic ability as reflected in test scores. The effect of ability is strongly positive on enrollment in four-year colleges (Tables 8 and 10). The higher the student's academic ability, the higher the probability of enrollment at four year colleges. Ability's indirect effect is larger than its direct effect. It strongly affects curriculum placement and tuition cost. These results are not surprising. They confirm earlier findings. The effect of ability is invariant among the groups.

The third exogenous variable, GRADES, was a measure of high school performance as reflected in grades earned in high school. GRADES was strongly associated with the enrollment choice of four-year colleges. The students who have higher grades are more likely to attend

a four-year college. Academic performance in high school had a larger indirect effect than direct effect. This impact was through other intervening variables. GRADES also strongly affected perceived encouragement in high school. It is not surprising that the student who earned good grades was encouraged by teachers, guidance counselor, and peers to attend college. GRADES was related to the tuition cost, which means that students with better grades apply to more selective and hence, more expensive colleges. Among the four groups, women earned the highest grades and GRADES exerted a higher total effect on their enrollment choice.

The last exogenous variable examined is the socio-economic status of the student. Although the effect of socio-economic status was positive on the enrollment choice in this study, it was of the lowest magnitude among the variables. When variables such as ability, performance and aspirations are considered in models of educational attainment, the effect of SES per se declines. The socio-economic status of the student is correlated with his/her ability, performance, and aspiration. After these factors are taken into consideration, the effect of SES on enrollment is moderate. According to these data, SES is a strong determinant of financial aid. Both the awards of grants and loans are strongly associated with low socioeconomic status. Comparison of metric coefficients (.0488 for blacks and .0709 for whites) indicates that the effect of SES is stronger for whites. Other studies have pointed out the stronger positive effects of SES for whites. There is no doubt that the availability of need-based public grants and interest subsidies on loans have weakened the relationship between SES and enrollment. There is considerable support for this conclusion from other studies (Schwartz, 1985; Manski and Wise, 1983).

These are enormously complex results and there is no simple way of presenting them. Major results are discussed above and many minor results are omitted. An examination of the tables would make many major and minor relationships among the variables clear.

These are the major findings that are supported by this study. A number of these conclusions corroborate conventional wisdom about college attendance. Some run counter to common perceptions. The claim that the process of educational attainment as reflected in college enrollment process is different for blacks and whites does not find support here. Contrary to popular perception, the study showed a weak relationship between social class origins and enrollment.

Summary

The model, when tested on data, explained 34.44% variation in the enrollment behavior of the students in the sample. Coefficient of determination (r^2) for the final equation was .3444, when COLLEGE was regressed on all ten independent variables of the model. Direct and indirect effects presented the patterns of influences in the college-going behavior. All path coefficients (metric) were significant. These direct effects are estimated as partial regression coefficients and are interpreted in the same way. All indirect effects, except for SES, were also significant. The variables that exerted the strongest influence on college choice behavior were tuition cost, educational aspirations and ability. The rank ordering of total effects in magnitude made it possible to compare the relative importance of the predictor variables. These results are presented in Tables 32, 33 and 34.

The institutional characteristics (TUITION and ENROLL) and the financial aid variables (AID and LOAN) had the largest direct effects. The only exception was EXPSCH which exerted both a strong direct as well as indirect effect. By contrast, it was the student characteristics that exercised the strongest indirect effects. Educational aspirations (EXPSCH) and ability

Table 32. Rank Ordering of Total Effects on College Enrollment for Blacks and Whites

Blacks (n = 683)				Whites (n = 3498)			
Rank	Variable	Standard	Metric	Rank	Variable	Standard	Metric
1	Tuition	.3100	.0626	1	Tuition	.3962	.0801
2	Bytest	.2084	.0118	2	Expsch	.2039	.0512
3	Schinf	.1877	.0719	3	Enroll	.1853	.0521
4	Expsch	.1769	.0432	4	Bytest	.1695	.0108
5	Grades	.1276	.0423	5	Schinf	.1358	.0515
6	Aid	.1215	.1156	6	Grades	.1339	.0468
7	SES	.0744	.0488	7	Hsprgm	.1162	.0839
8	Loan	.0738	.0775	8	SES	.0989	.0709
9	Hsprgm	.0672	.0441	9	Loan	.0977	.1074
10	Enroll	.0323	.0089	10	Aid	.0799	.0795

Table 33. Rank Ordering of Total Effects on College Enrollment for Male and Female Students

Males (n = 2461)				Females (n = 2934)			
Rank	Variable	Standard	Metric	Rank	Variable	Standard	Metric
1	Tuition	.3929	.0795	1	Tuition	.3802	.0780
2	Expsch	.1896	.0460	2	Expsch	.2240	.0569
3	Bytest	.1887	.0109	3	Bytest	.1561	.0093
4	Schinf	.1412	.0511	4	Grades	.1537	.0554
5	Enroll	.1389	.0407	5	Enroll	.1249	.0357
6	Hsprgm	.1274	.0920	6	Schinf	.1213	.0488
7	Grades	.1128	.0380	7	Aid	.1090	.1075
8	Loan	.0863	.0957	8	Hsprgm	.1048	.0734
9	Aid	.0861	.0842	9	Loan	.0860	.0988
10	SES	.0547	.0361	10	SES	.0793	.0534

Table 34. Rank Ordering of Total, Direct and Indirect Effects on College Enrollment (N = 5395)

Rank	Variable	Total Effect	Rank	Variable	Direct Effect	Rank	Variable	Indirect Effect
1	Tuition	.3855	1	Tuition	.3447*	1	Expsch	.1083**
2	Expsch	.2071	2	Enroll	.1426*	2	Bytest	.0968**
3	Bytest	.1779	3	Aid	.1000*	3	Grades	.0681**
4	Enroll	.1315	4	Expsch	.0988*	4	Schinf	.0493**
5	Grades	.1297	5	Loan	.0860*	5	Tuition	.0408**
6	Schinf	.1281	6	Bytest	.0811*	6	Hsprgm	.0387**
7	Hsprgm	.1170	7	Schinf	.0788*	7	Enroll	-.0111**
8	Aid	.1000	8	Hsprgm	.0783*	8	SES	-.0029
9	Loan	.8600	9	SES	.0715*			
10	SES	.0685	10	Grades	.0616*			

NOTE: These effects are reported in standardized form.

* $P < .01$

** Indirect effect is at least twice its standard error.

(BYTEST) had the largest indirect effects on the outcome variable COLLEGE. So when the total effects were summed up, TUITION, EXPSCH, and BYTEST had the largest total effects.

There were both race and gender effects on college-going behavior. All things being equal, blacks had a higher probability of attending a four year college. There was a statistically significant gender effect that favored males. Other things being equal, male students had a better chance of enrolling at four year colleges. The only path that was different for blacks and whites was ENROLL, denoting different effects of the size of the institution in two groups. The path coefficients for the predictor variables were quite similar in male and female groups. On the whole, the process of enrolling at four year colleges and other postsecondary institutions was found to be invariant in the groups. Financial aid variables had significant positive effects for all groups but this effect was more pronounced for blacks.

Chapter 5

Summary, Conclusions and Recommendations

This chapter begins with a brief summary of the study's methods and results and is followed by a discussion of the relative role of each of the ten predictor variables considered in the model in explaining the enrollment status and process at various colleges. Implications and recommendations for future research are presented in the last section.

Summary

The primary purpose of this study was to test a model of the influences on high school graduates' choice for first-time enrollment between four year institutions and other postsecondary institutions such as two year junior colleges, vocational technical colleges, and community colleges. The 5395 high school graduates in the sample had enrolled in various post-

secondary institutions during the academic year of 1982-1983. The data on these students were drawn from the High School and Beyond data set and made up the sample for the study.

Path analysis was used to determine the extent to which the choice of a four-year institution as opposed to the choice of other postsecondary options could be explained by four sets of factors which were arranged in a fully recursive block model. The factors were : 1. student background and personal characteristics, 2. high school program and perceived encouragement, 3. institutional characteristics of postsecondary institutions, and 4. financial aid awards in the form of grants and loans.

A model of college enrollment was developed from an extensive search of the literature for well identified predictor variables. The two major bodies of literature were sociological research on educational attainment, and econometric models of demand function and choice behavior in higher education. The model consisted of ten predictor variables: SES (socio-economic status), BYTEST (academic ability), GRADES (high school grades), EXPSCH (educational aspiration), HSPRGM (high school program), SCHINF (high school influences), TUITION (cost of the institution), ENROLL (size of the institution), AID (financial aid awards in the form of grants) and LOAN (financial aid in the form of loans).

Discussion

The results presented in the preceding chapter shed light on the college enrollment behavior of the sample of high school graduates who entered institutions of higher education after high school graduation. These students had above average SES and above average academic

resources compared to the total high school sample in the HSB. These students are comparable to other groups of college populations in that regard.

In the following section major results are reviewed and conclusions are presented. First, results related to the research questions are discussed and then implications and ideas for new research are discussed.

1. The underlying hypothesis in the study was that the model would explain a statistically significant amount of variance in college enrollment for the sample of 5395. In fact, the model explained 34% of the variance in the decision to enroll in a four year college as opposed to a two year college or other postsecondary institution, suggesting that these variables together describe the process and choice of enrollment to a reasonable degree. The variance explained in the choice of enrollment at four year colleges and other postsecondary institutions by the variables of the model is statistically significant. In substantive terms, it is a matter of judgment whether the explained variance is adequate or not. It depends on the research topic and the purpose of the research. In studies in the social sciences, the explained variance generally falls between the range of 20 to 40 percent. Kenny (1979) comments,

“ Even highly developed causal models do not explain behavior very well. A good rule of thumb is that one is fooling oneself if more than 50 percent of the variance is predicted. It might then be argued that the remaining unexplained variance is fundamentally unknowable and unexplainable. Human freedom may then rest in the error term. The hard core determinist would counterargue the error is potentially explainable, but at the present moment science lacks an adequate specification of all the relevant causes. ” (p. 9)

It is possible that some explanatory variable has been excluded from consideration and thus the model is misspecified. There is always a large idiosyncratic component in any human decision that defies explanation. But these analyses point to some important factors that lead similar students to behave in similar ways.

2. According to the model, the three most powerful influences on the enrollment decision are the tuition cost, educational aspiration, and academic ability of the students. Students who have high educational aspirations, high academic ability are most likely to enroll at four year colleges and universities. Conversely, students who have lower academic ability and lower educational aspiration, and lack capacity to pay college costs are more likely to enroll at two year colleges and vocational- technical colleges. Each of these factors had a strong determining effect on the final outcome variable of COLLEGE. Collectively they significantly increase the probability of enrollment at four year colleges. These results corroborate other empirical studies on the determinants of college-going behavior (Jackson, 1977; Manski and Wise, 1983).

3. The offers of financial aid are strong positive factors that enhance the probability of enrollment at four year colleges and universities. Both forms of financial aid, grants and loans, exerted a positive impact on four year college enrollment. The effects of grants and loans were similar in this sample. When the model was developed it was assumed that the effects of grants and loans would be different, and that grants would have a greater impact than loans in stimulating attendance at four year colleges. The similarity in effects of the two forms of student aid might possibly be due to the strong subsidy component that is widely acknowledged to underwrite federal loans and the easy availability in 1982-83 of inexpensive loans to middleclass parents. Stampen (1984) noted in this regard that the Higher Education Amendments of 1978 changed federal student aid in two important ways: 1. families earning up to the national median income became eligible for Pell grants, and 2. the pre-existing income ceiling for Guaranteed Student Loan eligibility was removed. Broadening the eligibility requirements for a Pell grant had a modest impact but the increased availability of Guaranteed Student Loan had a dramatic impact. Between 1977-78 and 1980-81 aid awarded through GSL program grew from \$1.7 billion to \$6.2 billion (Stampen, 1984).

4. Each of the ten factors that was examined in the study had a positive influence on the choice of four year college versus other postsecondary institution. The strongest direct effects were

exerted by the characteristics of the admitting institutions (tuition cost and size of the college) and offers of financial aid. By contrast, the strongest indirect effects were exerted by students' personal characteristics of educational aspiration, academic ability, and high school performance. Although students' socioeconomic status had a significant direct effect on the enrollment, its indirect effect was not significant.

As first mentioned in Chapter 4, the large effects of TUITION and ENROLL seem to be the artifacts of two distinguishing characteristics of four and two year institutions. They reflect the fact that in general four year institutions are more expensive and larger in size than two year institutions. Although it is reasonable to say that the higher tuition cost is related to the attendance of four year institutions and conversely, lower cost of college attendance generally denotes attendance at two year institutions, the interpretation of tuition cost in causal terms is problematic. One cannot say that the high cost causes four year college enrollment! The large regression coefficient of TUITION is reflecting a bimodal distribution of costs among four and two year institutions. Four year colleges in general have higher tuition and two year institutions generally have lower tuition.

The large direct effect of tuition cost is an artifact of correlation between higher tuition cost and four year colleges. In other words, if a student chooses a four year college, he is more likely to pay higher tuition but it cannot be argued that the higher cost drove the choice. The cost may have driven the choice between four and two year institutions for some students, but in general it is reasonable to conclude that it is the educational aspiration and the academic ability that determine the institutional choice.

The placement of TUITION in a model of choice between four and two year colleges presents a conceptual difficulty because the argument can be made that cost is not always considered prior to the choice between four and two year institutions. For some students, cost may be a determining and prior factor. But for many students, it can be argued, the choice between the different institutional types is made either prior to the evaluation of cost or in conjunction with

the consideration of cost. It is important to clarify this issue so not too much is read into the large regression coefficient of TUITION in the study. Similarly, the effect of size simply means that four year colleges in general are bigger than two year colleges.

5. No differences were found between blacks and whites in the influences of these variables on the decision to enter four year or two year college. The influences of the prior factors on enrollment behavior were similar in the two groups, suggesting that the pattern of influences leading to enrollment is similar. The one variable whose effect was found to be different for the groups was the size of the postsecondary institution. Size of the college was a positive factor in the enrollment choice of whites but not of blacks. The effect of financial aid was stronger for blacks. Most financial aid programs are need-based and larger percent of black students qualify for those awards.

Although black and white students were affected similarly by these personal, social-psychological, and economic factors in their decisions to enroll, it was found that, other things being equal, blacks in the sample had a higher probability of enrolling at four year colleges. That is, a black student with the same average attributes is somewhat more likely than a white student with the same average attributes to enroll at a four-year college or university. It is important to remember that these comparisons are based on similar black and white youth. They control for individual and background characteristics. Not controlling for these attributes, blacks are less likely than whites to attend four-year colleges and are more likely to attend two year college or other postsecondary institution. In the data here, blacks have lower average socioeconomic status, lower average test scores, and lower average grades. These factors are major determinants of enrollment at four-year colleges.

6. Male and female students were affected similarly by prior factors in their enrollment choice. The variables in the model explained about the same percent of variance for the two groups. Although there were some differences in metric coefficients, the patterns of influences leading to an enrollment decision were invariant for the two groups. Despite equiv-

ality of effects, a gender effect was found which favored males. Other things being equal, males had a higher probability of enrolling at four year colleges.

Implications

The findings of the study shed light on the importance and role of both cognitive and affective secondary school experiences in shaping decisions about college attendance. It was concluded that strong cognitive outcomes and supportive normative culture of high school influenced college attendance positively. In order to promote college attendance rates among traditionally underenrolled groups, generally minorities and low-income families, it would be helpful to understand more fully the role that the secondary schools play in decisions of college attendance and college choice. The traditionally underenrolled segments of population are ill-prepared to enroll at college, they do not perceive that college would benefit them, and they do not think that they can afford college expenses. These have been called educational and attitudinal barriers to college enrollment as opposed to financial barriers (Ferrin, 1970; Davis and Johns, 1982). Three points are noteworthy in this regard:

1. Since the course taking patterns in high school have a strong correlation with college attendance, high school curricula can be strengthened to prepare the students better for college. Stronger academic preparation and certain course taking patterns could be specified to raise participation rates in higher education among minorities and low-income families. Larger percents of students from private and certain public secondary schools attend four year colleges because of strong college preparatory orientation of these schools.

2. There is some evidence to indicate that high school students do not know enough about financial aid programs and thus do not seek financial aid. Secondary schools can play a significant role in filling the information gap. A number of federal, state and independent studies have concluded that lack of information about financial aid was one of the major barriers to college attendance especially for minorities and low-income families (Higgins, 1984; Olson and Rosenfeld, 1982; Baldrige, 1982; Beck, 1983). There are two related but separate issues here: one is the information gap about postsecondary options and financial aid programs and the other is the complexity of seeking the financial aid once one has acquired the knowledge about the programs. High schools can help ameliorate both problems. The need for more information is especially crucial for low and middle income families and for those from racial and ethnic minorities. The dual functions of seeking information and seeking financial aid traditionally have been performed by affluent and middle class parents for their children.

3. The third point is a logical extension of the first two and has to do with role of educational aspiration in college attendance. The process of the formation of educational aspirations is indeed complex and there is no doubt that it is related to the social class origins of the student, but academic preparation in secondary school and knowledge of various educational options would ensure that educational aspirations are not lowered as a result of information gap and misconceptions about college costs and financial aid programs. There is some evidence to show that many students have lower educational aspirations because they perceive that college has no relevance for their lives. Often the same students feel that college is beyond their means. Such perceptions and misconceptions lead to a downward adjustment in aspiration. If the counseling staff at secondary schools is sensitized to these issues and students can have access to information about various postsecondary options and financial aid programs, some students may aspire to go to college who otherwise would not have considered it. Adequate information early in a student's high school years regarding sources of aid and college costs can have an impact on educational decisions made. Colleges also have

an obligation to provide adequate information about programs of student aid as well as net costs to prospective students well in advance so students can make informed decisions.

In general, the strengthening of secondary school curriculum and providing a full-range of counseling services would have a positive effect on the college attendance decisions of students from low-income families. These efforts would work to remove the educational and attitudinal barriers to postsecondary education. These insights are not new but have a renewed significance in light of the importance of secondary school experiences both cognitive and affective, and the importance of aspirations in college attendance and choice behavior.

Recommendations for New Research

Evaluation of the impact of declining student aid and rising college costs on college attendance and college choice behavior of students from minority and low-income families is an area where empirical research could throw new light on current policy issues. It has been reported that participation rates have fallen for blacks. New empirical studies can help determine the causes for such decline. When studying the process of college attendance for blacks, it is important to disaggregate data for black men and black women. There is some evidence to show that the decline in black enrollment is due to black men not participating in post-secondary education, while rates for black women are comparable to other cohorts (Trent, 1984).

Another area of research is the empirical study of college choice among four year colleges. There is a vast range of selectivity and cost among four year colleges and universities. The examination of relative effects of social class and ability on the choice of four year colleges

would contribute to understanding the process of stratification in higher education. Are there differential economic and status benefits associated with the attendance of differentially selective colleges and universities? What is the effect of merit-based scholarships on these choices? New empirical studies can lead to answers of these and other related questions.

The impact of current financial aid policy on non traditional patterns of attendance is an area that can lead to fruitful research. The current policy in financial aid favors first time full-time college attenders. Although the traditional path of entering college after high school is still the dominant one, non-traditional ways of attending college are becoming common. For example, delayed entry, stopping out, and part-time attendance are all common now. Effect of financial aid policy on nontraditional ways of college attendance is a valuable area of research. Since women make up the largest segment of part-time college attenders, current financial aid policies should be evaluated in terms of their impact on access and choice for women. With the availability of large scale time-series data, models can be developed to explain non-traditional patterns of attendance.

Causal models can be developed and tested on data about other decision processes. Decisions, made by students at various stages, are determined by prior influences. Choice of graduate studies, choice of majors and occupations, choice of staying in college or transferring to other college are all decisions that can be examined in relation to other factors.

New research examining the linkages between education and occupation, especially for women and minorities, would greatly contribute to the understanding of processes of educational and occupational attainment and structural barriers in these processes. It would be valuable to study the relationship between occupational choices and post secondary educational decisions. A high school students' occupational aspirations clearly inform his postsecondary decisions. Conversely, availability of various postsecondary options of varying costs and quality would influence occupational choices. Empirical research can shed new

light on this relationship and increase our knowledge of this link between education and occupation.

These are some recommendations for further research. Empirical research in these areas, not only would make substantive contributions to educational research, but would demonstrate the advantages of large panel data sets which can be analyzed with relative ease due to advances in quantitative methods. Empirical research will lead to developments in model specification, estimation theory, and computing software. Large-scale time series data are a rich resource for educational research which permit analysis and examination of many important social, psychological and financial factors in college-going behavior.

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