

STUDENT FINANCIAL AID: COMPARISON BY SECTOR

by

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(ABSTRACT)

The purpose of the study was threefold: (a) to determine the amount of student financial aid received by undergraduate students in targeted groups to see who benefits, (b) to identify a limited number of variables that account for a significant portion of differences in aid distribution, and (c) to examine alternative models that might clarify suspicions of substantive bias in aid distribution.

The research questions addressed the variability among aid recipients in amount of student financial aid, the variables most closely related to aid differences, and the

extent to which these variables are included in financial aid formulas.

This study employed data from the National Postsecondary Student Aid Study, which collected enrollment and financial aid information for 59,886 postsecondary education students in Fall, 1986. In this study, several samples of aided undergraduate students from public and private, non-profit, institutions were used. Methods included:

1. A large number of variables, selected because of their close association with aid distribution, were reduced through factor analysis to support descriptive analysis.

2. The resulting factors and variables were used to create competing models to predict variability in aid distribution.

3. Regression models were tested using SAS regression procedures.

4. Significant variables were used to aggregate the amounts of aid received by each class of recipient.

The major finding was that the amount of aid appeared to be primarily a function of institutional price/control. Income was related to the amount of aid, as were type of

institution and attendance pattern, but these variables played a lesser role in accounting for aid differences. Student demographic variables, such as race and sex, accounted for little of the differences in the regression models. Yet differences were apparent when descriptive profiles were drawn. It was shown in the profiles that minorities and males generally received higher amounts of aid. Students at four-year institutions and at private institutions appeared to have a smaller percentage of their costs met by aid. Although aid was being distributed to need-based recipients largely in the manner intended by the Higher Education Act, some inequities in distribution were observed.

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## CHAPTER 1

### INTRODUCTION

Student financial aid programs are a major component of Federal and non-Federal investment in postsecondary education in the United States. Students count heavily on student financial aid to pay the costs of their higher education, and institutions rely on student aid funds to support their operating budgets, to meet enrollment targets, and to diversify the student body. "Societal concerns, such as the need for an educated citizenry, the advancement of knowledge and technology, and equal educational opportunity" (Fenske and Huff, 1983, p. xiv) are also addressed through student financial aid. Policy makers and the public they represent are concerned with who receives financial aid; that is, how the aid is distributed both by source and type among those varied demographic and institutional segments that comprise the higher education population today.

The vast majority of aided students are need-based recipients, although there are non-need based aid recipients who receive competitive scholarships. Most of

those students affected by federal legislation are covered when studying need-based recipients. In the last couple decades, the goal of financial aid has been to increase to all students the opportunity to attend one's chosen higher education institution, regardless of financial ability. In A Compilation of Federal Education Laws (1987), it was stated in Title IV of the Higher Education Act (Public Law 89-329) that the purpose of the Act was to provide "basic educational opportunity grants to all eligible students" (eligibility being based on a student aid index fashioned from family/student income and assets) and to provide "supplemental educational opportunity grants to those students who demonstrate financial need" (p. 37). Student borrowers were eligible under the Act for low-interest Perkins loans based on need. By the end of the 1970s, "there was general agreement that, for the most equitable distribution of funds, all financial aid could and should be awarded on the basis of objectively determined financial need, with the student and the parents responsible for paying as much as possible of the costs" (Hall, 1984, p. 36).

It is important to get an understanding of who is benefiting today from financial aid and to determine if those who are benefiting are those that the Act intended to benefit. Needs analysis theory accepts the premise that aid should be a function of two principal factors: income (which enters into the expected family contribution figure) and the price (tuition and related costs) of the institution. Indeed, Lee and Sango-Jordan (1989) and other researchers observed that the kind of institution attended (e.g. high-cost/private v. low-cost/public) was related to the amount of aid received. It follows that price and income should explain a major portion of the variability in the amount of financial aid that need-based aid recipients obtain.

In recent years, however, students of higher education have expressed their concern that other unanticipated, perhaps irrelevant, or even undesirable, factors may have entered into the decision to award financial aid. These include age, sex, race, and attendance patterns. Moran (1986) reported that women confront barriers to their participation in financial aid programs. Stampen (1983) found that in public institutions, there were approximately

twice as many non-minority aid recipients as minority aid recipients and that non-minority students received more total aid dollars than minority students. He also found that 92% of need-based aid recipients in public institutions were full-time students. If these reports are true, then the Higher Education Act may not be operating as equitably as intended by the authors of the Act.

The U.S. Department of Education commissioned the National Postsecondary Student Aid Study (NPSAS) to provide data that would help identify the issues surrounding the distribution of student financial aid. Demographic and financial data, and enrollment characteristics of 59,886 postsecondary students in Fall, 1986 were compiled. Although the NPSAS study did not specifically address the research questions raised in this dissertation, it provided a rich body of data that enabled a number of correlated studies of student financial aid to be developed.

#### Purpose of the Study

The purpose of the study was threefold, namely: (a) to describe differences in the amount of aid received by need-based aided undergraduate students in different targeted groups, (grouped both by institutional choice



characteristics and by student demographic characteristics) to see who is benefiting from student financial aid, (b) to identify a limited number of variables, or underlying factors, that might account for a significant portion of observed differences in aid distribution, and (c) to examine alternative models that might clarify any questions of bias in the distribution of student financial aid.

#### Research Questions

The study itself addressed three principal questions:

1. How much variability among need-based aid recipients can be observed in the amounts of student financial aid awards? The policy concern is that the distribution of student financial aid be equitable.

2. What variables or factors appear to be closely associated with these differences in amounts awarded to student financial aid recipients? The policy concern is that decisions concerning student financial aid to need-based recipients be driven by discernible factors of cost and financial ability and not other largely policy-irrelevant factors.

(a) To what extent, if any, are personal demographic characteristics of aid recipients related to the amount of aid they receive?

(b) To what extent, if any, are the characteristics of chosen institutions related to the amount of aid received by attending students?

3. Are these the same or different variables or factors that are included in the financial aid formulas? The policy concern is that the administration of student financial aid be consistent with the intent of the legislation.

#### Significance of the Study

Using data from the 1986 NPSAS survey, differences in amounts of student financial aid awarded to different classes of students based on institutional choice characteristics and student demographic characteristics could be examined. In addition, it was possible to examine a number of "models" that offered different explanations for the seeming inequity in the distribution of student financial aid. The results of the study should be helpful for policy makers in the federal, state, and

institutional jurisdictions as they seek to correct observed imbalances or inequities in financial aid distribution. Results of the study also should demonstrate whether aid distribution to need-based recipients in Fall, 1986 followed the pattern intended by the Higher Education Act, prior to the 1986 Amendments. Baseline information for future studies of student financial aid, after the 1986 Amendments have been in effect, should be provided by the results of this study.

#### Limitations of the Study

There were a few limitations and delimitations that constrained this study.

It was limited by two types of response problems in the original National Postsecondary Student Aid Study (NPSAS). The first problem was the lack of response to the survey by institutions and by students. Approximately 92% of the institutions responded and 72% of students responded. However, adjustments were made by NCES to correct nonresponse bias for use in weighted national estimates.

The second response problem was the failure of survey respondents to complete all questionnaire items. Missing

data on income and institutional cost were of concern for this study. When the sample for the present study was taken, the number of fully usable observations was reduced by 34% (from 16,928 to 11,141) in order to overcome the missing data and get a complete data set for all variables of interest. Therefore, this study used a sample with a complete, even though perhaps unrepresentative, data set. Despite these reductions, the resulting sample remained very large (11,141), hence of policy interest. Once the sample had been selected by subsetting on certain variables and then had been further reduced to the non-missing data set, it then was functioning as if it were a population of its own.

NPSAS was limited in that it studied aid recipients only at one point in time, the Fall of 1986, rather than the full academic year. "Lobbyists complained that the department's data could not be adjusted to represent a year's time without distortion, so the results of the study would be less helpful than they had hoped" (Wilson, 1988, p. A27).

Since academic ability is important in the consideration of some types of financial aid (e.g.

competitive scholarships), it was hoped that this study could provide some information on the relationship of aid and ability. However, there were two problems in attempting to assess this. The main problem was that this study was limited to the aid received by need-based recipients only. This restricted range of need-based recipients resulted from NCES's derived variable for income (used in this study) being taken from records of applications for need-based financial aid. Since aided students were the sample of interest in this study, all income data is on need-based recipients. However, non-need based aid that is received by need-based recipients is included.

A secondary problem is that GPA is an imperfect measure of student's academic ability. GPAs are not standardized among institutions across the country, and therefore, are less desirable as an ability measure. SATs would have been a preferable ability measure. Accordingly, it was not feasible to examine the effects, if any, of academic ability on aid decisions for need-based recipients in the main line of this study. However, the ability measure was included in a regression equation as an

addendum study. Studying aid recipients within the restricted range would help answer the question of whether aid, that should be need-based, was, in fact, being determined by ability. If ability was shown to rank higher than cost or income in predicting aid distribution, then needs analysis would not be operating as intended.

The general relationship between all aid recipients and ability could not be determined from these data. Important questions cannot be answered about ability's relationship to aid because these data are focusing on financial need.

Another delimitation was the choice of student-determined expenses as the cost measure. NCES collected estimates of expenses from the institution and from the student, but so much of the institutional cost data was missing, use of student cost estimates was necessitated. The institution expense variable consisted of data from the financial aid office for students who received need-based aid, while the student expense variable consisted of institution record of tuition and fees plus student-reported food, housing, and other expenses for all students. (See Chapter 3 for more complete variable

definitions.) NCES has reported that the institution-determined and student-determined expense variables are consistent. (See Appendix A for NCES' comparison of institution-determined and student-determined expenses.)

It is also important to point out that when costs are discussed in this study, the reference is to cost to the student (expenses) and not the institution's cost of educating the student.

A further delimitation was that a sample of 1000 from the sample of 11,141 was selected by means of a random number program for the factor analysis and regression analyses. It was assumed that this sample was representative of the 11,141 respondents because the study was cross-validated with a second sample of 1,000. The sample of 1,000 was chosen, instead of using the entire 11,141, because this would better identify and rank order significant predictor variables from the regression analyses for later use in the descriptive profiles. It was important to ensure that significant predictors would be identified. With a very large number, such as the sample of 11,141, the likelihood of all predictors being significant would be very high, thereby providing little

help for determining which variables to include in the descriptive profiles.

The generalizability of the results is limited to the 11,141 and not to the entire postsecondary population. Weights applied to the 11,141 in the descriptive profiles are not national estimates, but rather estimates for the portion of the population represented by this study's sample. The weights are not to be taken as interval or ratio estimates. This sample is not to be used to assess differences between intervals. The sectors are ordinal data and the rank orders are valid, although the "point estimates" (numbers presented) may not configure with reality.

The use of factor analysis implies a measure of subjectivity and the reliability of the factor analysis procedure may not be high.

Despite these delimitations and limitations, it was felt that the resulting data sets were representatively adequate and that the methodology was sound.

#### Summary

The purpose of the study was to describe need-based aided undergraduate students who received aid by their



demographic and institutional attendance choice characteristics and the aid that they received. Models were proposed and tested to account for differences in receipt of financial aid, and thus determine which variables should be used to build the descriptive profiles. This document is divided into five chapters.

In Chapter 1, the study is introduced, the important research questions are identified, and attention is given to the significance, purpose, and limitations of the study. In Chapter 2, background information and review of the literature of student financial aid are provided. A brief history of financial aid, types and sources of aid, the National Postsecondary Student Aid Study, determinants of aid, targeted recipients of aid, and the effect of student financial aid on the public and private sectors are the topics discussed. In Chapter 3, the data and method of the present study, including population, sample, variable specification, analyses of the data by preliminary investigations, factor analyses and regression analyses, and descriptive sorting procedures are presented. In Chapter 4, a discussion of the results of the study, including the process of identification of predictor

variables, the procedures used in accounting for aid; that is, testing different theoretical models, based on financial aid formula components, student demographics, and ability as predictor variables, and cross-validation of the regression model are shown. In Chapter 5, a summary of the factor analyses and regression analyses and a descriptive profile of aid recipients from weighted estimates are presented. The average aid amounts of different targeted groups, as sorted by institutional choice variables and student demographic variables are shown in the profiles. Discussion of the results and statement of the implications for future research, including addressing policy concerns, are the concluding portions of the chapter.

## CHAPTER 2

### REVIEW OF LITERATURE

In this chapter, an overview of student financial aid literature as it relates to the present study, will be presented. The literature review is divided into six sections:

1. A history of student financial aid.
2. The sources and types of financial aid programs that flowed aid to students at the time of this study.
3. National Postsecondary Student Aid Study: presents the background for and description of this survey which was used to obtain the data for the present study.
4. Determinants of aid: a discussion of what researchers report are the factors that determine the amount of aid awarded, including a description of the "needs analysis process."
5. Targeted recipients of aid: looks at articles which claim certain targeted groups are being underserved in the receipt of aid.

6. Effect of student financial aid on the public and private sector: looks at the differential effect that aid has on these two sectors.

#### History of Student Financial Aid

From the founding of the colonial college through the end of the 19th century, student financial aid was primarily supported privately and through institutions. Much of the aid given was in the form of scholarships to attract the smartest students. During the 1800s, private colleges came to the realization that they could award scholarships through a process called the "Robin Hood technique" as described by Fenske: "Tuition was set somewhat higher than actually needed for the operating budget. A portion of the tuition income was skimmed from those students who paid full tuition and diverted to needy students in tuition waivers called 'scholarships'" (Fenske, 1983, pp. 7-8).

The Morrill Act (Land Grant Act) of 1862 represented one of the first efforts that allowed states to help the student financially by providing federal money for agricultural and technical colleges. It established low cost programs that enabled less wealthy students to attend.

The first comprehensive state financial aid program began in New York in 1919. There were very few state programs through the next three decades, until the mid 1950s, when state financial aid agencies were created to offer financial aid for maintenance of choice of private institutions. It was at this time, that there was tremendous growth in community colleges, whose low cost was viewed as a potential threat to induce an enrollment drain from private institutions. Subsequently, aid was designed to offset this drain.

In the late 1950s and 1960s, awareness of the need to provide access to all was heightened, as colleges were called upon to provide more services to society and to educate a greater diversity of students.

During the post-Sputnik era, most aid was tied to scholastic promise, as well as need, in a search for talent to upgrade the nation's scientific capacity. However, in the 1960s, the goals of financial aid shifted: monetary awards now were given primarily to allow any interested student to have access to any college that would grant admission. (Fenske, 1983, p. 9)

The Civil Rights Act of 1964 and social response to the plight of minorities greatly affected higher education in the late 1960s.

Up until the 1960s, most of federal involvement in higher education was in response to pressing national concerns, such as the GI Bill (1944), the National Defense Act of 1958, and Emergency Relief Administration of the New Deal (1930s). The Truman Commission's (1946) extensive study of United States' higher education led to the recommendation that higher education should not just be the domain of the "intellectual elite" but should be available to all citizens, regardless of race, ethnicity, or sex. Fenske (1983) contends that "In the Truman Commission's reports, one can find the germinal ideas of all the major federal and many of the state student aid programs eventually enacted" (p. 11).

However, until 1965, the federal government "refused to acknowledge any direct and permanent responsibility for a uniform and coordinated program in the field of higher education" (Brubacher and Rudy, 1976, p. 235). The passage of the Higher Education Act (1965) marked the beginning of a new era of federal support for higher education. It was

the first comprehensive measure to provide financial aid to both public and private institutions and to individual college students as well. "Its major emphasis was on a coordinated program to aid the undergraduate student and to cope with the problems created for undergraduates, not only by rising enrollments, but by the rising aspirations of young people from every social class" (Brubacher and Rudy, 1976, p. 235). The Higher Education Act of 1965 addressed social and community problems by authorizing research and continuing education programs. It provided funds for university improvement of libraries; it provided financial assistance for purchasing of laboratory equipment and audio-visual equipment; and offered financial support for emerging and struggling colleges.

The individual student could benefit from the Higher Education Act through four types of programs: Educational Opportunity Grants, low-interest loans, teacher training, and part-time employment opportunities.

It was the Amendments of 1972 that led to the greatest increase in Federal financial aid as a means for financing higher education and a general shift to a focus on student aid. These amendments promoted participation by states

through the State Student Incentive Grant program and authorized increased funding for financial aid. In these Amendments, it was "established that, as a matter of national policy, any college student who could not afford the cost of his education was entitled to get some financial help from the (Federal) government" (Brubacher and Rudy, 1976, p. 236). The Basic Educational Opportunity Grant program helped promote access to higher education, but the student grants were limited to \$1,400. These grants were to be the base upon which aid from other sources, Federal and non-Federal, were added to complete a student's aid package. The National Student Loan Association was a new agency created to update the student loan program. It was authorized to buy back already existing student loans from lending institutions, thus freeing them to loan more money to additional students. This 1972 measure of buying out the loans was estimated to cost over \$20 billion and represented the most significant commitment of the federal government to higher education up to that point (Brubacher and Rudy, 1976, p. 236-237). The Carnegie Commission in 1972 stated that:



the highest single priority for federal funding in higher education in the 1970s is to help fulfill the two-century old American dream of social justice. Equality of opportunity has long been promised to all of our citizens. Increasingly such equality means equality of opportunity to obtain a college education.

(p. 2)

The 1972 amendments indicated that both access and choice were of utmost concern. Increased expenditures for student financial aid programs were authorized by the Education Amendments of 1976 and 1980 and the Middle Income Assistance Act of 1978. Middle income students could have readier access to Guaranteed Student Loans without passing a means test. The Amendments of 1980 authorized "more liberal provisions of need analysis to govern the need-tested aid programs while shielding the now open-ended Guaranteed Student Loan program from major proposals to curb eligibility, reduce subsidies, or otherwise control the suddenly ballooning cost of this form of aid" (Gladieux, 1983, p. 402). The predominant emphasis in federal policy of the early 1980s and the thrust of federal programs, such as TRIO and Title I Outreach (programs for

minorities and economically disadvantaged), was to assure equal opportunity for higher education and to accomplish this goal through student financial aid. The pattern of distribution of aid to middle income students has been reversed, with GSLs now subjected to more rigorous eligibility rules. During the Reagan Administration, the role of the federal government in many areas, was questioned. This affected higher education and student aid. There has been a decrease in appropriations for student aid. Total federal aid (in constant dollars) decreased from 15,076 millions in 1981-1982 to 13,345 millions in 1984-1985. (College Board, 1987, p. 7)

McPherson (1988) reported that the real value of federal aid, per student, dropped from 529.90 in 1980 to 398.78 in 1984. (p. 6) "In 1986-87, federally sponsored aid declined 1.7 percent (in constant dollars) from the preceding year because of enactment of the Emergency Budget Control and Deficit Reduction Act of 1986 (commonly referred to as Gramm-Rudman-Hollings)" (College Board, 1987, p. 3). The cutbacks have generated questions about the value of student aid today and about what has been accomplished through student aid programs through the

years. With the decline in federal aid, comes the need for prioritizing the groups that receive aid and the amounts of student financial aid available.

#### Sources and Types of Student Financial Aid

The federal government remains a major supplier of student financial aid. The College Board (1987) states that the federal government supplies about 75% of all student financial aid. Through the National Center for Education Statistics' National Postsecondary Student Aid Study (1986) results, it was shown that:

The largest source of financial aid was the federal government. Thirty-five percent of the undergraduates enrolled in the Fall of 1986 received federal aid in 1986-1987. Less than half that proportion received state, institutional, or other aid (15, 14, and 7 percent, respectively) . The average amount of aid received by full-time, full-year undergraduates in 1986-1987 was \$3,813. The average amount of Federal aid received by full-time, full-year undergraduates was higher (\$2,973) than the average amount of state (\$1,280), institutional (\$2,098), or other aid (\$1,416). (Korb et al, 1988, pp. vii-viii)

There are three general types of financial aid given by all sources: grants, loans, and work-study programs. Grants may include merit-based scholarships. NPSAS results showed that for all sources of aid:

Forty-one percent of the aided undergraduate students enrolled in the fall (1986) received only grants.

Another 30 percent relied on grants and loans. Fifteen percent received only loans, and eight per cent received a combination of aid consisting of grants, loans, and work-study. ( Korb et al, 1988, p. xi)

There are four main sources of financial aid for students: the federal government, the state government, the institution, and private organizations. The major source of financial aid at the time of this study is the federal government, which offers over 75% of the aid being given. Although some aid to students from the federal government is received through the Departments of Health and Human Services, Agriculture, and Defense, it is through Title IV of the Higher Education Act of 1965 and its Amendments that most of the aid to undergraduate students is disbursed. In A Compilation of Federal Education Laws (1987), it was stated that the purpose of Title IV was: to help make

basic opportunity grants and supplemental grants available to eligible students in financial need, to make payments to states to help provide aid to needy students, to provide for special projects and programs to identify and support needy students, and to assist institutions. (p. 37)

Federal financial student aid is distributed as grants, loans, and work-study.

Title IV programs are categorized as campus-based programs or non-campus based programs. Campus-based programs are administered by the institution's financial aid officer, with funds being sent directly to the institution. Campus-based programs are Supplemental Educational Opportunity Grants (SEOGs), College Work-Study (CWS), and Perkins Loans (formerly National Direct Student Loans). The non-campus based programs are Pell Grants, Guaranteed Student Loans (GSL), Parents Loans for Undergraduate Students (PLUS), Auxiliary Loans for Students (ALAS), and State Student Incentive Grants (SSIG).

The following discussion describes the Title IV programs and details eligibility requirements, monetary limits of the awards, interest rates for the loans, and repayment requirements at the time the NPSAS survey was

taken in the of Fall, 1986. This overview is summarized from information in the Financial Aid Administrators Training Handbook, published in 1986 by the Department of Education's Office of Student Financial Assistance.

Pell grants provided aid to needy undergraduate students who were enrolled at least half-time in a degree or certificate program. Eligibility for a Pell grant was determined by the Department of Education and was calculated based on a family's expected contribution, yielding a Student Aid Index (SAI). The amount of aid awarded was determined by examining the expected family contribution, the cost associated with attendance at a given school, the student's attendance status (full-time , three-quarter time, half-time), length of enrollment, and award limits (\$2100 at that time) as designated in the Act.

The Guaranteed Student Loan (GSL) program offered federally-subsidized low interest (8%) loans to both graduate and undergraduate students. The loan was made by states, banks, credit unions, or savings and loan associations and was insured by a guarantee agency in the individual state. The process involved submitting a loan application to the lending institution after the student's

enrollment status had been certified by the institution. If the lender agreed to make the loan, and got the approval of the guarantee agency, the lender would send the loan amount to the institution in one or more payments.

In 1986, the maximum undergraduate award for the GSL was \$2500 with an accumulated debt maximum of \$12,500. For a student whose adjusted family income was less than \$30,000, the full GSL could be received as long as it was not higher than the educational costs of attendance minus other financial aid. Students whose adjusted gross income exceeded \$30,000 needed to demonstrate financial need. Repayment of GSL loans began 6 months after graduation, upon dropping out of school, or whenever the student's enrollment fell below half-time.

Parents Loans for Undergraduate Students (PLUS) provided additional funds for the education of dependent undergraduate students. The loans were made by state agencies, banks, credit unions, or savings and loan associations. In 1986, the interest rate on the loans was 12% and allowed borrowing of \$3,000 per year with a total limit of \$15,000. PLUS required repayment of the loan to begin 60 days after the loan was disbursed.

Auxiliary Loans to Assist Students (ALAS), now known as Supplemental Loans for Students (SLS), provided loans to independent undergraduate students and graduate students. The rate in 1986 was 12% and repayment was to begin 60 days after the loan was disbursed. Full-time enrollment permitted loan payments to be deferred.

The State Student Incentive Grants (SSIG) program was a coordinated effort of state and federal government. Through the SSIG program, grants were given to states to help them offer grants to eligible students attending higher education institutions in that state. The awards to the states were based on the ratio of students of that state to the number enrolled in all higher education institutions nationwide. The maximum award in 1986 was \$2,000, and the decision of how much and to what type of students the awards would be given was left to the state.

Campus-based programs included Supplementary Educational Opportunity Grants (SEOG), Perkins Loans, and Campus Work Study (CWS). With campus-based programs the institution was required to establish criteria for awarding aid and for ensuring uniform application of the aid. Awards were to be made based on need and availability of



funds. There was flexibility in the guidelines for the institution about how to distribute the aid, as long as the procedures and eligibility criteria were made known.

Supplementary Educational Opportunity Grants (SEOG) were grants to undergraduate students. In 1986, the amount of the grant was from \$200-\$2,000 depending on need, availability of funds, and other aid received. A school could choose to give up to 10% of its SEOG funds to part-time students. Each institution got a certain amount of money to distribute, and when that money had been distributed, there were no more SEOGs for that fiscal year.

Perkins Loans (formerly the National Direct Student Loans) were low interest (5%) loans which were available to undergraduate students through the institution's financial aid office. They were based on financial need, availability of Perkins loans funds at the institution, and the amount of other aid received by a student.

College Work Study (CWS) provided jobs for undergraduate and graduates to help pay educational expenses. The jobs could be on campus working for the school or off-campus working for private or public non-profit organization or local, State, or Federal agencies.

The amount of the CWS was based on financial need, availability of funds for the program in the institution, and the amount of other aid received. An institution could use part of its CWS funds for part-time students, as well as full-time.

A major form of state student aid was the SSIGs, which were state funds matched with federal funds to assist students in attending postsecondary institutions. There has been great variability among states in student aid, both in amounts of aid awarded and the structure of the administering agencies. States also have established Guaranteed Student Loan agencies and have been the major guarantee source. States also offer grants and scholarships. Most employ some form of needs analysis for determining aid.

Institutional aid awards are of three basic types: scholarships or grants, both long-term and short-term loans, and work-study arrangements. The funds may be restricted or unrestricted. Restricted funds are gifts and endowments with only the annual interest earned on the principal being used to award student financial aid. Unrestricted funds are general funds which come from

"unrestricted endowment income, unrestricted gifts, and appropriations from state legislatures, as well as indirect cost recovery from government research contacts and tuition and fee income. These funds can be used to respond to a variety of important institutional needs--among them student aid" ( Huff, 1983, p. 87).

Private-source aid consists of scholarships, grants or loans from churches, foundations, corporations, civic organizations, or service organizations.

#### National Postsecondary Student Aid Study

Student financial aid is a key factor in who participates in higher education. It is one major variable that drives enrollment. Because financial aid plays such a large role in higher education today, it is imperative that policy makers have current information about who is receiving aid: what the pattern of aid distribution is and what aid recipients look like. Because aid patterns change periodically to reflect changes in government, the economy, and society, higher education decision-makers must have up-to-date data in order to make decisions about student financial aid. In preparing for the renewal of funding programs dealing with student financial aid, the

National Center for Education Statistics (NCES), assisted by the Department of Education, the Office of Management and Budget, and the Congressional Budget Office commissioned the National Postsecondary Student Aid Study, which was first implemented in 1986-1987 school year. Its goal was to provide state-of-the-art information with a different perspective. "This new perspective derives from the consistent and comprehensive data that were collected for students enrolled at a single point in time--the fall of the school year " (Korb et al, 1988, p. ii). NPSAS was the most comprehensive survey about student aid ever done and was eagerly awaited by institution and government leaders and educational researchers, who lacked the data necessary to design or redesign aid programs. The main areas that needed addressing in NPSAS were: "who receives financial aid and who does not, how financial aid from various sources and types is distributed among students, how much financial aid students receive, and what proportion of the total student cost of postsecondary education does financial aid cover" (Korb et al, 1988, p. v).

The present study was developed through using NPSAS data. An overview of NPSAS is presented below to justify its use in the present study, to familiarize the reader with the details of the study, and to provide future reference for interpreting information in Chapters 3 and 4. The information in this overview is abstracted from Korb et al's Undergraduate Financing of Postsecondary Education: A Report of the National Postsecondary Aid Study (May 1988). NPSAS is described as a "consistent, comprehensive, and efficient student-based data system...(which) obtained information on the students' enrollment characteristics, financial aid status, cost of attendance, and demographic and socioeconomic characteristics" (Korb et al, 1988, p. v). It was especially valuable that the information on these variables was obtained for the same population at the same point in time. It was comprehensive in that it covered all postsecondary students, regardless of type of institution, attendance patterns, or source of financing. "This comprehensiveness permits comparisons of costs and finances among students with vastly different operating characteristics" (Korb et al, 1988, p. 2).

### Survey Instruments

National Postsecondary Student Aid Study (NPSAS) employed multiple survey sources to obtain data on each student. (See Westat, Inc.'s Data File User's Manual (1988) for a copy of the survey instruments.) Information was obtained from the institutions, from students, and from parents. Multiple sources were employed to help achieve accuracy and to permit estimates of validity to be made. The survey sources included an institutional checklist, institutional abstract form (which obtained information from institutional registration records and financial aid office records), student survey, and parent survey. The students' and families' financial condition was obtained from different sources. If a student received aid, this information was obtained from the financial aid office. If a student were independent and did not receive aid, information was obtained from the student. If a student did not receive aid and was dependent, the information was obtained from the students' parents.

#### Institutional Checklist

Once an institution had been selected to provide a student sample, an institutional checklist was employed to

ask for the source and location of registration and financial aid information.

#### The NPSAS Record Abstract Form

This form contained questions about student characteristics, enrollment information, student and family financial information, and type, sources, and amount of student financial aid. In order to answer the questions on this form, the data collector needed to tap two institutional sources. Institutional registration records provided enrollment data. The institutional financial aid office provided information on financial aid awards. The Record Form contained sections in which to provide information about the student's aid status, type, source of aid, amount of aid, length of award, and student and family financial status. In order to ensure accuracy of reporting of financial aid information, a Student Financial Records Update Form was produced in late summer 1987 to convey changes in aid status for each student.

#### Student Survey

This was a mail questionnaire containing questions about the student's personal characteristics, financing sources, and costs of attending an institution. Financial

aid information also was obtained from the student in the student survey; the student provided information about any aid that might not be processed by the financial aid office.

### Parent Survey

A parent questionnaire, also a mail survey, was administered to a sub-sample of NPSAS students. The present study will not incorporate parent information because the final tape with this information was not available. Also this information was not relevant for independent students who form a large part of the sample of this study.

### Population

The target population of NPSAS consisted of students enrolled in all sectors of postsecondary education in the 50 states and District of Columbia in the Fall, 1986. To be included in NPSAS, schools had to meet the following criteria in the fall of 1986: (a) offer an education program for those having finished their secondary education, (b) offer an academically, occupationally, or vocationally-oriented course of study, (c) offer access to



persons other than those employed by the institution, (d) offer at least one program lasting three months or longer, (e) offer more than correspondence courses, and (f) be in the 50 states or the District of Columbia.

Students in NPSAS had to meet the following criteria:

- (a) had to be enrolled in a course for credit or in an occupational or vocational program or course of studies,
- (b) had to be enrolled in a degree or formal award program,
- (c) were not be enrolled in a high school program.

#### Sampling Design

It was necessary for NCES to create its own sample because no validated file existed for the universe of all students attending postsecondary education.

Sampling of NPSAS was done in three stages. The first stage was a sampling of geographic areas, followed by sampling of institutions, then sampling of students. The aim was to provide representation of students from all sectors of postsecondary education, as well as trying to limit the variability of the estimates of characteristics of the students. It represented students at one point of time (i.e., October 15, 1986).

Stage 1--Geographic Sampling (Establishment of Primary Sampling Units (PSUs))

This first stage established primary sampling units (PSUs) and involved the clustering of institutions within geographic areas based on three-digit zip code areas. Prior to this geographic clustering, 162 institutions were selected from a list of HEGIS and Pell institutions for inclusion with certainty in the sample. These were institutions that were so large that they were deemed necessary for inclusion.

A geographic cluster was established if there were at least seven institutions with an aggregate enrollment across the institutions of at least 1000 students. Combinations of zip code areas were created when one area was too small, but crossing of state boundaries in order to create such combinations was not permitted. A universe of 361 PSUs was created. From these, 50 PSUs were selected because their size was so large as to be included in the sample with certainty.

Each PSU was assigned a measure of size that depended upon the total number of students in the PSU and the number of students in four different types of

institutions. A function of these numbers was used as the measure of size for each PSU to insure adequate representation of smaller specialized institutions. A PSU was selected with certainty if the total enrollment in the PSU exceeded one-half the sampling interval. (Korb et al, 1988, p. 101)

The next step in the geographic sampling was the stratification of the PSUs according to the state in which the PSU was located. Thirty-five equal-sized strata were established. Probabilities of being chosen based on size were established and the PSUs were sorted by state and within state by their size. A sample of 2 PSUs was selected from each stratum, which resulted in 70 PSUs. These 70 PSUs combined with the 50 PSUs selected with certainty in the beginning comprised the entire geographic sample of 120 PSUs.

#### Stage 2--Institutional Sampling

A list of eligible institutions in the 120 PSUs was established from 9 different sources of information on postsecondary institutions, such as HEGIS and files of institutions in the Pell programs and institutions with GSL

recipients. A total of 7,814 schools were identified for this list.

In creating the sample of institutions, 162 colleges had previously been selected (in the first stage prior to the geographic clustering) because of their size of enrollment, and thus were already in the sample. The next step was to stratify the 7,814 institutions that were identified in the 120 PSUs into 11 strata in order to select the sample. The strata were created based on type and control of institution and eligibility for Pell Grants. Ten strata were established based on control of institutions, such as public, private, etc. and type (highest degree awarded). The 11th stratum consisted of those institutions that were ineligible for Pell Grants, regardless of type or control.

Large institutions in the 11 strata, that exceeded the sampling interval for their respective stratum, were selected with certainty at this stage. This included an additional 346 institutions in the sample.

Probabilities were calculated to sample according to enrollment size within a stratum and the remaining 7,450 institutions were sorted by PSU and sampled. This

procedure added 802 institutions to the preselected 162 and the 346 institutions already in the institutional sample. The total institutional sample included 1,310 institutions. Reclassification or invalidation of some institutions and supplemental samples from the State of New York led to a final total of 1,074 institutions in the sample.

### Stage 3 -- Student Sample

The eligible institutions submitted lists of their students as of October 15, 1986. "Students were stratified by level (undergraduate, graduate, and first-professional) and systematically sampled, using a random start and a prespecified sampling rate that was varied by student level" (Korb et al, 1988, p. 105). Total sample size was 59,886.

### Loss of Sample and Response Rate

Approximately 70,000 students were expected to be surveyed. However, the sample was smaller due to three reasons: (a) refusal of institutions to participate, (b) inclusion of ineligible students, (c) use of a lower undergraduate rate for sampling if stratification by level was not permitted.

Of the 1,353 institutions in the original sample, 1,074 participated; 190 were ineligible; and 89 refused to participate. Institutions were ineligible if they "only served secondary students, or provided only avocational, recreational, or remedial courses, offered only in-house business courses or seminars of less than three months duration...or offered only correspondence courses " (Westat, Inc., 1988, p. 2-1).

Loss of sample size also resulted from ineligible students. Ineligible students were those taking remedial or vocational courses not for credit, those auditing courses, and those taking courses "for leisure rather than as part of an academic, occupational, or vocational program or course of study" (Westat, Inc., 1988, p. 2-2). There were 59,886 eligible students included in the national sample. Of these, about 57,500 were selected by the initial sample. Due to the insufficient number of first-professional students in this initial sample, an additional 2,280, first-professional students were sampled in March, 1987, which gave the total of 59,886.

### Fall Institutional Survey Response

There were 59,886 students with Record Abstract Forms completed by the institution. There was a financial aid record from the financial aid office for 33,076 of them (55%).

### Update Response

To assist in getting updated information, both for student/family information and for financial information, a Student Financial Records Update Form was created and sent out to institutions in summer, 1987. A total of 59,569 of these update forms were returned with 37% of them having at least one change, either a correction or an update.

### Student and Parent Survey Response

There were 43,176 students who responded to the student questionnaire; 23,524 by mail and 19,642 by phone. 13,423 parents responded; 7,170 by mail and 6,253 by phone.

### Estimation Procedures

In order to produce student level estimates of national population of postsecondary students, a system of weighting was devised. The procedure for developing the weights consisted of two main steps. First, a basic student weight was determined by using the inverse of the

probability of being selected in the NPSAS sample. Second, this base weight was adjusted by a ratio adjustment factor derived from the 1986-1987 Integrated Postsecondary Education Data System (IPEDS) and the 1985-1986 Higher Education General Information Survey (HEGIS). The ratio adjustment was used to adjust for institutional level nonresponse and to decrease the variance of estimates. The final weight for the student was the product of the base weight and the ratio adjustment factor.

#### Estimates of Variance

The "jackknife replication" method was chosen to compute estimates of the variances of the statistics produced from NPSAS. As explained in data file user's manual, two primary units were chosen from each of H strata ( $H=1,2\dots H$ ). "The first replicate was formed by deleting one unit at random from the first stratum, doubling the weight of the remaining unit in the stratum, and using all the other strata. This procedure was followed for each stratum resulting in H replicates each of which produces an estimate of the population total" (Westat, Inc., 1988, p. 2-11).



To calculate variances, 34 strata were formed and 34 replicates were designed.

To estimate sampling errors from this stratified "jackknife approach", a special procedure created for this type of application was designed by Westat. It can be done in SAS using a procedure called PROC WESVAR.

#### Reliability of NPSAS Estimates

In order to establish reliability of the estimates obtained from NPSAS, NCES made comparisons with other published data sources-- IPEDS/HEGIS and Pell Program and GSL program records.

Comparisons of NPSAS with IPEDS/HEGIS indicated that NPSAS estimates of enrollments were about 11% lower for all institutional sectors. NCES concluded that this resulted from: (a) sampling error of the individual surveys, (b) the different methods used to produce the institutional universes of the two surveys, and (c) the different time frames measured by the two surveys. Even though both IPEDS/HEGIS and NPSAS were collected in the fall, IPEDS/HEGIS collected estimates of full-year enrollments while NPSAS collected information on students enrolled at that one point of time.

Comparisons with Pell and GSL program records revealed no significant differences ( $p < .05$ ) in the estimated enrollments from the two samples.

#### Data Collection Procedures

Specifically-trained data collectors went to the sample institutions between December, 1986 and March, 1987 to collect the data on the students in the Fall Records Survey. This information was derived from several sources. First, the Institutional Checklist was completed by the data collector to ascertain where to obtain the enrollment and financial aid information. Then the data collectors began to collect the information from the various sources.

The data collector used the NPSAS Record Abstract Form to record the information on enrollment. Student characteristics were obtained from registration records. Next, the data collector gathered financial aid information, such as type, source, and amount of aid, and student and family financial status, on aided students from the institution's financial aid office.

The Records Update Task consisted of producing a separate Student Financial Records Update Form for each student in which changes in aid awarded since the 1986

record collection date could be recorded. The participating institutions were sent an advance request to assist with the update form. Then the Student Financial Records Update Forms and a Control List of students were sent to the institutions for them to complete in the summer and fall, 1987.

A student questionnaire was mailed to 59,886 students beginning in March, 1987. Students who did not respond to the mail questionnaire were attempted to be reached by telephone for interviews.

Questionnaires were mailed to a sub-sample of students' parents in the summer of 1987 and non-respondents were telephoned in the fall of 1987.

#### NPSAS Conclusion

It was hoped that NPSAS would help clarify policy and research issues that were salient in postsecondary education and student financial aid today and that the 1986 survey would be a stepping stone to more detailed analyses.

#### Determinants of Aid

It is key to the present study to examine what determines the receipt of aid: how aid has traditionally been calculated and any factors that might affect the

amount of aid received. In reviewing the literature, it was determined that the variables most often mentioned as highly related to the amount of aid received were: income and student cost (components of the needs analysis formula), sex, ability, race, institutional type and control, and attendance status. Many researchers focused on "nontraditional" students being denied adequate aid. "Nontraditional" encompassed the variables of age, dependency status, attendance status, sex, race, and income in a particular pattern.

Student Costs, Income, and Type and Control of Institution  
as Determinants of Aid

If need-based aid is working as intended by the federal government, then needs analysis components, that is, the cost of the institution and the student and family income, will be the major factors in how much financial aid is received by the student.

Wagner and Willie (1987) stressed that there has been "since the 1970s, an almost singular emphasis on allocating aid according to financial need " (p. 1) and that this "emphasis on need-based criteria dates to the 1950s when college administrators, fearful of growing competition for

students with financial aid and tuition discounts, agreed to provide aid to a student only if he/she required more than the centrally-calculated expected contribution to meet their costs of attendance" (p. 4). The theoretical basis for needs analysis is simply that "financial aid is the practical manifestation of a commitment to equal educational opportunity" (Case, 1983, p. 124). Inherent in this aid commitment is the idea that both access to higher education and choice among institutions should be promoted. There is a great difference in the cost of student financial aid programs when choice of institution, regardless of its price, is offered to a student, rather than simply access to any institution.

Because education is held to be a public good, egalitarian principles require that it should be equitably available to all who can benefit from it.

Therefore, if the cost of education presents a barrier to a student's academic pursuits, financial assistance should be available to ensure, if not to create equal educational opportunity. (Case, 1983, p. 125)

Case proposed that need is the only fair way to achieve the greatest equity in aid distribution. Wagner and Willie

(1987) claimed that the need-based system remains the "only basis" for evaluating the distribution of institutional aid money and 85% of institutional grants are awarded on the basis of need. (pp. 5-7) When needs analysis is working effectively, both horizontal and vertical equity are achieved. Horizontal equity means that those in the same circumstances are treated alike. Vertical equity means that those of higher income should pay more than those of lower income and those with less resources should receive greater aid amounts. (Case, 1983, p. 126)

To see how this philosophy is implemented requires an understanding of the needs analysis process. Needs analysis is the process by which the amount that a student/family may be expected to contribute toward postsecondary expenses is determined. It is a very important process in that it influences decisions concerning the distribution of aid, how well aid contributes to educational opportunity, how different kinds of institutions are affected, and how the financial status of different targeted groups is specified (Carnegie Council, 1979, pp. 78-79).

The needs analysis process depends heavily on price of the institution and on student income. It operates in the following way: the student's financial need is calculated by subtracting the expected student and/or family contribution from the cost of attending a particular institution. What is left is the student's eligibility for aid. The expected family contribution is derived from a formula which determines how much of a family's resources should be available for contribution to college expenses. Factors considered in determining the expected family contribution include: taxable and non-taxable income, assets, as well as certain allowances to be subtracted from income and assets. There are some differences in the criteria used for needs analysis for eligibility in the Pell Grant program and in the Uniform Methodology (the needs analysis model used by the College Scholarship Service and the American College Testing Program).

"At best, it is hoped that a need analysis method will place families in a fair rank order of need, with an indication of the magnitude of that need, so that the intended just distribution of financial aid is achieved " (Case, 1983, p. 127). However, in reality, eligibility for

aid may be restricted if aid funds are limited and the institution may make adjustments to needs analysis formulas. For example, allowances may be tighter or certain criteria of the formulas may be eliminated or added. Institutions address need in different ways. They may only give a certain percentage of the student expense budget (divide the aid among eligible students) or may help only the neediest students. (Case, 1983, pp. 127-128)

Wagner and Willie (1987) reported that these needs analysis adjustments benefit some students and some institutions. They found that the neediest students received larger grants and that "four-year colleges and universities were more likely to have implemented policies which favored the neediest students more than two year or proprietary institutions" (p. 7).

Augenblick and Hyde (1979) looked at the differences in the costs of attending postsecondary institutions and the distribution of student financial aid among states, sectors, and income groups. They found that the costs of attendance varied across sectors and states due to differences in "tuition policies, quality of education provided, and the costs of services" (p. 3). There were



greater differences across states in public institutions than in private institutions. Private 4-year institutions were the most costly, followed by 2-year privates, then 4-year and 2-year publics. They found also that cost of attendance increased as income level of the family increased and that the percentage of the college budget supported by the family's income, increased as family income increased. There was much greater variation in the percentage of the budget to be given in the public sector; whereas, there was a reduced range in the private sector. (Augenblick and Hyde, 1979, p. 12) When Augenblick and Hyde (1979) looked at financial aid and its effect on state, sectoral, and income cost disparities, they found that:

Student financial aid reduces the price of education for many students, and the reductions are the greatest for low income students. (It)...also reduces the range in price to the student, from one sector to another as well as from state to state, although the sector-to-sector net price disparities of a particular state are greater than state-to-state disparities for particular institutional sectors. (p. 19)

In summary, differences in the amount of aid, found by Augenblick and Hyde, are related more to the control of the institution (public/private) and to income than to geographical location, although there are variations between states.

In the Carnegie Council (1979) report, it was shown that the kind of institution helped explain the amount of certain kinds of aid received. Most of the aid received was received by students whose costs were high, as well as by students whose incomes were low. Public 2-year colleges had been favored by the Basic Grant Program and private institutions benefited from state and institutional grants. State grants often were offered to assist students in going to private institutions and local or private grants were given through private institutions' funding. The Council concluded that private institutions "relatively high tuition charges mean that some students who would not need aid at lower-cost colleges do need aid if they attend these institutions instead. Therefore, whatever system is used for estimating expected parental contributions will be exhausted by more students before they have met costs at high-tuition colleges" (p. 103). A more recent statistical

account (McPherson, 1986) found that "57% of Pell has gone to publics, 21% to proprietary and 23% to private-non-profit. Campus-based funds are targeted more heavily at private institutions, which gather about 43% of them" (p. 12).

Fenske and Huff (1983) stressed cost of the institution as an important variable in the needs analysis process in determining aid:

Assuming an equal parental contribution, the student who chooses to go to a high-cost private institution would probably demonstrate financial need. A second student with the same level of parental contribution might elect to attend a local public two-year college with negligible or even no tuition. Needs analysis for the second student would likely show little or no eligibility for financial assistance. (p. 382)

Other researchers focused on income as the main explanatory factor. The Carnegie Council (1979) emphasized that "aid resources are concentrated on students whose family incomes are low--just the result we would expect of programs in which the amounts of aid that students receive are based on their measured financial need" (p. 100). They

found that as family income increases, the amount of aid that a student receives declines, except for federal student loan programs, which were non-need based at that time.

Wagner and Willie (1987) found that student characteristics do not explain much of the variance in the amount of institutional aid awarded, and the student characteristics are not equally important across different kinds of institutions. They concluded that there are widely different practices for awarding institutional aid which do not necessarily support need formulas.

Linda Caplan (1980) explored the questions of differences in types and amounts of aid received by men and women attending different institutions, as well as the characteristics of aided men and women. Among 7,618 respondents to a Higher Education Research Institute survey on student financial aid, she found that 40% of the students were in 2-year schools, 5% in privates, and 80% of the students were white. This study was done during the period of the Middle Income Student Assistance Act. It was found that the highest percentage of students that got aid were in the middle income range (\$8,000 to 20,000). She

also found that men received higher aid amounts at 4-year public and private institutions, and black institutions, with females receiving more aid at 2-year institutions. Caplan used regression analysis to identify significant predictors of type and amount of aid. She included as variables: income, type of institution, high-school grades, sex, age, ethnic background, and college major. She found that there were no significant differences by sex among students from low income families or those attending white private institutions. Caplan found race to be an important variable in explaining the amount of aid; for males, being Caucasian had a negative value and for women, being Black had a positive value. Black and Oriental males had the greatest chance of receiving high amounts of total aid.

As expected, parental income was another important variable. Caplan stated that "students from low income families generally attend public two year and four year colleges, but low income students who do attend schools in the private sector receive large amounts of financial assistance" (p. 14). Caplan also found a student's above average high school record to be significant in the amount of aid received, with high grades associated positively

with attending private institutions. She also found that the type of major had an impact on aid received, with engineering, health, and agriculture students receiving significant amounts of aid.

When Caplan tested her models for both males and females, she found that type and amount of aid are not significantly different for males and females. However, there were more aided males in private institutions, with more aided females in public institutions in her sample. Aided males had higher incomes, as well.

Lee (1987) used data from the High School and Beyond Study and HEGIS to examine the total amount of money available to postsecondary students. He found that students with lowest income received twice as much student subsidy as those of highest income. He also found that:

The most important factor in determining the amount of subsidy appears to be the institutional choice of the student...Once the student decides to go to a specific college, that choice, along with the student's financial situation, determines the amount of aid for which that student is eligible. (p. 1)

McNees (1988) also concluded that: "Most aid is based on demonstrated need-- the difference between what it costs to attend a college and what a family can contribute to that cost...the amount of 'need'-- and the amount of financial aid available-- will vary with institution" (p. C5).

#### Ability as a Determinant of Aid

Ability or merit also has been found to be a determinant of student financial aid. Although federal and state governments have moved primarily to award aid on a need basis, Huff (1983) found that the number of non-need based scholarships appeared to be stable or growing. Competition for bright and talented students leads college to award scholarships based on merit. This helps improve their prestige. "One of the greatest dilemmas for institutional aid administrators today is the reemergence of merit no-need scholarships at the very time that federal financial assistance funds for needy students are being reduced" (Binder, 1983, p. 153). While rewarding bright, high achieving students is understandable, Binder states that, "It is difficult to condone the use of institutional and private funds for merit scholarships to students

without documented financial need if needy students are thereby denied access to postsecondary education" (p. 153).

Merit plays the major part in National Merit Scholarships and National Achievement Scholarships for Outstanding Negro Students. Merit also improves the chances of getting financial aid and the quality of the financial aid package among needy applicants. McNeese (1988) quoted Robert and Anna Leider by saying, "When awarding money from programs they administer but do not fund (i.e. Federal), colleges tend to give priority to the neediest of the able; when awarding money from their own funds, colleges tend to follow the principle: the ablest of the needy" (p. C5).

Lee (1987) found that the highest ability quartile students received the highest subsidy amounts, leading to the conclusion that "there is a close relationship between ability and student subsidy. The higher the ability measure, the greater the subsidy" (p. 18). He speculated that high ability students more often go to higher priced institutions, and therefore, are eligible for greater amounts of student aid.



The Carnegie Commission (1972) suggested other variables that may impact the amount of aid received by a student: state allotment formulas, varying policies of institutions for distributing aid, and the capabilities of institutional staff for soliciting maximum funds. The particular institution within a particular state influences the receipt of aid. Gladieux (1975) also mentioned factors that significantly affect the aid received by institutions for campus-based programs, including the number of institutions applying, nature of the requests, and state allocation formulas. (p. 8) State allocation formulas which determine how much campus-based financial aid a particular state is to receive have a differential effect on students depending on the state.

#### Targeted Recipients of Aid

While family income and the price of an institution play a major part in aid distribution, other policy analysts and researchers believe that other factors are important too. A big concern is that there are particular categories of students, based on demographic characteristics, that are not receiving adequate aid amounts. It is important to first identify the categories

of the students that figure prominently in higher education today and then look at their particular needs. Marketing segmentation of the higher education market allows breaking down the whole higher education population into sub-groups. Segmentation allows identifying classes of buyers who can be separated according to the product desired or the way they respond. There is no one particular way that a market must be segmented, but it is often done based on geographic location, demographic variables, psychographic variables, product usage rates, and consumer preferences. In higher education, market segmentation is an important process because it allows the policy-maker or institution to determine whose needs may be served.

Once segments have been identified, then the institution or federal policy maker determines which of the segments it wants to target for its particular purposes. Goals may be to increase the number of students in a particular segment, to provide access and choice through financial aid, and to provide the types of programs that the particular segment of students wants.

Enrollment patterns in postsecondary education in the United States help identify potential market segments. It

can be seen that the patterns of undergraduate college attendance are changing dramatically, with many more nontraditional students attending college in nontraditional ways. Brazziel (1978) examined "the patterns and outcomes of 76 colleges and universities actively engaged in efforts to plan and mount policy initiatives dealing with impending shifts in traditional pools of applicants" (p. 1). One of the major policies was expanding marketing to new segments, such as women, older, and minority students.

With a shift in enrollment comes the concern that the increasing groups are not getting a fair share of aid. There are allegations that, despite the premise that aid should equalize opportunity, certain targeted subgroups are being underserved in the aid process, irrespective of their eligibility by reason of low income. While the record shows that overall there has been progress in removing barriers for the poor, for women, and for minorities, there are some analysts that question whether student aid has worked satisfactorily.

Hall (1984) issued concern for those who are being left out of financial aid. The two groups he stated that

were most affected were nontraditional older students and low-income poverty level students who are often minorities.

### Nontraditional Students

The term nontraditional has been prominent in the literature and has been given various definitions, usually including the characteristics of female, part-time, and over the age of 24, but also including minorities and financially independent students. The nontraditional student, while becoming a larger percentage of our college population, has lagged behind the traditional student in the amount of financial aid received.

Part-time students are jeopardized by the inadequacies of existing financial aid policies to meet their needs e.g. Pell recipients had to be at least half-time students. While strides have been made (especially in light of the 1986 Higher Education Amendments) to address the needs of part-time students, much more needs to be done. "Almost half of the states offer part-time students no assistance whatever, and many of the programs that do exist restrict eligibility to the point that allocated funds go unused" (Murphy, 1988, p. B2). Pitchell (1974) also writes of the "massive discrimination" experienced by part-time students.

Murphy (1988) claims: "It is time to redress the imbalance and give part-time students a fair shake--not just with added funds, as the Administration proposes, but with new regulations that reflect the realities of part timers' lives" (p. B2-3).

"Forty-six percent of the increase in total enrollment between 1980 and 1985 can be attributed solely to the increased attendance of women 25 and older" (Stern and Chandler, 1987, p. 124). "The proportion of college students who were women, part time and 25 years old or over increased considerably during the decade. These trends have continued since 1980, but the rate of increase has generally been slower" (Stern and Chandler, 1987, p. 97).

In a survey of 636 women undergraduate students over the age of 25, Wilson and Christian (1986) found that financial aid was a very important concern. The women felt that they lacked information about financial aid services and that they were deprived of adequate financial aid because of their part-time status. They voiced concern that their special needs be recognized. (p. 428-429)

Hooper and March (1980) discussed the problems faced by the female single parent in her private life and in her

life as a college student. The female single-parent student believed that colleges are designed for traditional students. Her sole responsibility for taking care of her children makes it difficult for her to attend college, both emotionally and financially. These women have difficulty getting loans because they are considered poor risks, and because they often are enrolled only part-time.

Many researchers have looked at the increased participation of women in higher education, but not too many have examined the differences in availability of financial aid for women as opposed to men. Mary Moran (1984) studied enrollment patterns, financial circumstances of men and women, and participation of women in financial aid programs. She found that enrollment of women has increased greatly in the last decade; half of the women are enrolled part-time, and almost forty percent of women are enrolled in two-year institutions. In participation in financial aid, she found that women were more than half of the aid recipients, which matches their enrollment numbers. They received lower average loan amounts and the grants covered a smaller proportion of their total costs. Among undergraduates, women were more likely than men to have

Pell Grants, a reflection in part of their lower-income profile.

Swift, Mills, Colvin and Smith (1986) studied the need for financial aid of displaced homemakers. They found that, unlike older, nontraditional students who have adequate resources for college, the displaced homemaker is often a single parent living at a poverty level. For the displaced homemaker, attending college is a way to gain necessary skills to get a job. The authors indicated that much of the problem in displaced homemakers' receiving aid is due to the fact that these students can only attend part-time due to their living circumstances. Most aid goes to full-time students. Aid to part-time students is limited or non existent. They suggested that "new legislation is needed in order to provide financial aid to displaced homemakers thereby giving them the opportunity to achieve economic independence through further education" (p. 38).

Fenske, Hearn, and Curry (1985) determined the unmet student financial needs in the state of Washington. They studied 20,768 students whose average unmet need was approximately \$2,500. They defined "unmet need" as the

difference between "need" (cost of education minus total expected family contribution) and the total amount of assistance received by the student through federal, state, and institutional financial aid programs, private scholarships, and non-subsidized student employment both on and off campus. Their findings included: unmet need is an ever larger gap between costs and financial resources for increasing numbers of Washington students; and certain segments of the student population are much more adversely impacted by unmet need gap; such as, female, older than 24, enrolled in a community college, independent student, low family income, with little or no parental support and at least one dependent child. (p. ix) They also reported that "the notable variance in background characteristics of students according to differing levels of unmet need suggests that targeting of ameliorative strategies could effectively offset the worst effects of unmet need" (p. 42).

Melecki (1984) also reported on adult learners' enrollment patterns and characteristics. He found that the adult learner presents a "unique challenge" for those in the aid office. An administrator needs to understand the



differences of adult students from the younger students and adapt the aid packaging, office operations, and information communication system to meet the different needs. He stated that:

It is time for the financial aid community to begin to research specific issues related to adult learners.

What costs do they incur? What are their resources?

What types of financial aid do they receive and what types are they denied? What are their perceptions of aid offices as services? What are their information needs? (p. 15)

During the Hearings before the subcommittee on postsecondary education on July 9 and 10, 1985, many concerns about nontraditional students were voiced. The speakers emphasized that today's nontraditional student will be tomorrow's traditional student, since the numbers have grown so rapidly. "By 1992, half of all college students will be 25 years of age or older and one in five will be 35 years old or older" (Subcommittee on Postsecondary Education, 1985, p. 132). Koloski, Director of American Association for Adult and Continuing Education, proposed in the Hearings before the Subcommittee on

Postsecondary Education (pp. 130-133), that inequities in financial aid for adults be addressed and eliminated. She encouraged changes in Pell grants awards and other measures to assist older, independent students.

### Minority Students

Affirmative action in both public and private institutions was expanded in the 1970s, with schools doing active recruiting and opening their doors to more and more minorities. "It is significant that need-based federal student aid reduced the cost to states and institutions of enrolling disadvantaged minority students, since part of the aid cost would be borne by the federal government" (McPherson, 1988, p. 15). McPherson believed that federal student financial aid policy helped low income minorities enter higher education. Minority students account for a larger percentage of student aid than their percentage of enrollment, due to the fact that they have lower income.

Lassiter (1983), in a report to the Governor's Commission on Higher Education in New Mexico, stated that minority students get less economic support from parents, job earnings, and financial aid in attending college than white students. She found that "most financial aid in all

categories is awarded to white students" (p. 3) and she urged that "since about 80% of minority students' total educational expenses must come from financial aids, and since federal funds are drying up or being diverted, New Mexico must increase its investment in higher education for minorities via increased financial aids" (p. 4).

Kirschner, Payne and Schiavi (1987) issued a statistical report on the United Negro College Fund institutions. These institutions are private, accredited, and primarily black institutions. The authors stressed that with decreasing availability and purchasing power of federal grant and work-study programs, students have shifted to loans in increasing numbers. This shift has hurt lower income students who are reluctant to take on this loan burden and the authors surmised that many of these students are choosing not to go to college, as well as dropping out in greater numbers.

During Hearings before the Subcommittee on Postsecondary Education (July 9 and 10, 1985), concern was voiced about the decline in minority enrollment in higher education. Hayes said that part of the reason for this is "lack of funds, lack of money, lack of support for their

children while they attend school, and inability to get student loans and this kind of thing" ( Subcommittee on Postsecondary Education, 1985, p. 53).

Olivas (1985) found that while aid is mostly flowing to Hispanic students according to need, need is not the only criterion that is being used. He said, "student choice among institutions, public support to the private sector, and aid to middle-income families are just as surely premises of the existing financial aid system" (p. 468). Most Hispanics are clustered in two-year institutions and primarily receive Pell grants. He felt that Hispanics are not being awarded aid at private four-year institutions where wealthier students receive institutional aid. Hispanics are thus "dissuaded" from attending private institutions.

Lee (1987), in a study of the equity of higher education subsidies, found that Blacks and Asians received the largest amount of student subsidy, but Hispanics and Indians received a low student subsidy .

In Student Aid and Public Higher Education, Stampen (1983) analyzed the impact of student financial aid in the public sector. He found that 31% of 12,000 students at

public colleges received aid; 55% of them were women, 34% were minorities, and 40% were self-supporting, often older and married. Males averaged more total aid than females, both for independent and dependent students. Black, Hispanic and Indian recipients were concentrated in 2-year colleges and lower tuition universities. Unmarried students made up 90% of aid recipients, but single and married students received similar amounts of total aid. He found that 92% of the need-based aid recipients attended full-time. Independent students received slightly larger total aid amounts and attended lower cost institutions. Aid recipients at 2-year colleges received smallest amounts of aid.

Green (1982) summarized the status of minority participation in student financial aid by saying that "empirical evidence suggests that the major federal categorical programs designed to assist minority students and minority institutions do have generally positive impacts and benefits. The evidence also suggests, however, that many of these programs have fallen short of their espoused goals and objectives" (p. 43). Although Blacks, Indians, and Hispanics have been the target of student

financial programs and these programs have improved access to higher education, choice and persistence for these groups is still lacking.

These arguments that certain groups are being underserved in student financial aid, led to the selection of some of the variables for this study. The NPSAS data will help to answer important questions concerning distribution of average student financial aid amounts to these particular subgroups: older, female, part-time, and minorities.

#### Effect of Student Financial Aid on Public and Private Sectors

It is important to look at the differential effect of aid on public and private institutions since the cost of institutions is a main component of aid formulas and costs of public and private institutions differ greatly. Financial aid is also a fundamental factor in establishing a balance between public and private institutions. For the viability of private institutions, financial aid is crucial. In both public and private institutions, student aid generates institutional aid.

Student aid has "widened choices for many students of modest economic and social background, enabling them to attend more expensive institutions, live on campus rather than commute, and attend full-time rather than part-time" (Gladieux, 1986, p. 12). In this way, it has broadened the mix of students within an institution and has boosted enrollment. Federal aid to students is really giving federal aid to institutions. It is a primary source of financing the institution's budget. "Student aid helps an institution when it enables more qualified students to go or when it relieves the institutional-based aid budget for students who would receive aid from the school if federal aid were not available" (McPherson, 1988, p. 17).

Johnstone and Huff (1983) reiterate that "from the perspective of the institution, enrollment targets, budgeting, and even the fortunes of individual departments and program may depend considerably on what kinds of students are offered what forms of financial aid" (p. 255). Operating budgets of both public and private institutions would find it impossible to make up for the loss of funds that would occur if aid were to disappear. Money from student financial aid is used for operating funds and

auxiliary services. "For the large number of private colleges that depend almost entirely on tuition income for the operating budget, the results of sudden withdrawal of student aid might be serious if not fatal. Public institutions would find that they must go to hard-pressed legislatures for large increases to their budget" (Fenske and Huff, 1983, p. 373).

In public institutions, student financial aid, together with low tuition helps limit costs for low income students. Most public institutions have low tuition and give little student assistance from their own resources. Thus most student financial aid in public institutions comes from the federal government. "The federal aid introduces an element of income sensitivity into what is otherwise a fairly regressive pattern of subsidy in public higher education" (McPherson, 1988, p. 11). Private institutions must spend a lot of their own resources on need-based grants and price discounts in order to be more competitive with public institutions. Private institution aid is sensitive to differences in income. McPherson emphasizes that federal aid to private institutions "federalizes some of the costs of aid policies that the



colleges would, within the limits of their resources, undertake anyway and probably increases the total resources going into need-based aid at private colleges and focuses more of them on higher need, lower income students than the colleges would themselves" (McPherson, 1988, p. 11).

Financial aid can be viewed as a marketing tool. Higher education institutions must compete for students, especially higher cost and less prestigious private institutions, that must compete against public institutions as well as each other. Dennis (1986) talked about colleges involved in "bidding wars" increasingly using institutional no-need scholarships to attract the best students. Institutions strive to have the marketing of student financial aid be consistent with the overall mission and objectives of the institution. The institutional decision about which students to market to, is difficult, yet necessary, since it cannot be financially competitive for all students. Thus, how aid is distributed institutionally and how it is used to attract students depends on the philosophy of the institution and its goals. "Independent higher education is at a considerable disadvantage unless it can convince prospective students that its product is

intrinsically better and worth the higher price, or that it can reduce the difference in price (the tuition gap) by discounting its product. It is in implementing this latter competitive strategy that financial aid becomes crucial because it is essential to survival" (Kelly, 1980, p. 16).

This issue is important; both from the philosophical and social standpoint, that financial aid is a means to help equalize educational opportunities for disadvantaged groups and from the practical standpoint, that the traditional pool of students is diminishing and institutions will have to reach out to nontraditional students to meet enrollment goals.

Hyde (1979) discussed equality of access and choice as translating into the goal of increasing enrollment for targeted groups, since other conceptual definitions of access and choice are too difficult to assess. "Neither adequate data nor acceptable criteria exist for determining the degree to which equal access and choice are achieved" (p. 7). The only way to equalize participation rates is to provide aid that will help low income and low ability groups rise to the level of other groups. He said that

large numbers of aid recipients say that aid affects their choice of institution or their decision to attend (p. 40).

### Summary

The review of the literature pertinent to understanding financial aid and the variables related to aid distribution was presented. It began with a historical overview, including a discussion of the rationale and creation of NPSAS. Next, a description of the types and sources of aid was given. The next section described other research that looked at the determinants of aid. A review of studies that address the issue of groups that receive inadequate aid was done. This included discussion of the aid received by females, part-time students, older students, and minorities. Finally, a discussion of the effect of aid on the public and private sectors was presented.

This literature review led to the selection for this study of variables that most likely affect the distribution of student financial aid funds. The variables selected are grouped in two ways: those that are institutional choice characteristics and/or entered in needs analysis formulas (control of institution, student costs, type of

institution, attendance status, and income) and those that are student demographic characteristics (sex, age, marital status, race, dependency status).

## CHAPTER 3

### METHOD

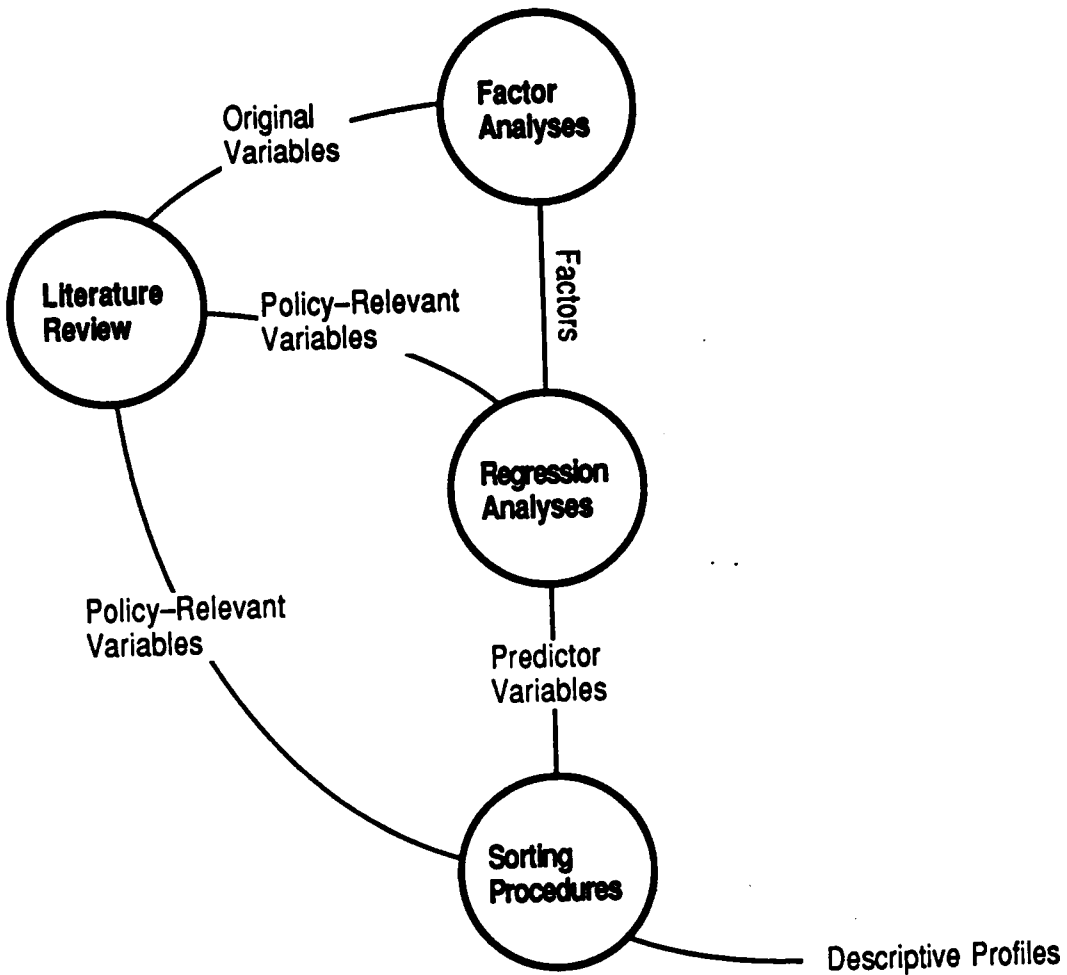
The purpose of this chapter was to describe the data and method of the present study. Data from the National Postsecondary Student Aid Study (NPSAS), which had been described in Chapter 2, were used in this study. A discussion of the population of interest, sampling design, variable specification, and methods used to analyze the data is presented in this chapter. A summary chart of the method is shown in Table 1. This can be used to follow the process from factor analysis to regression analysis to the descriptive profiles, which are the ultimate technical goal of the study.

#### Data

The data for this study were taken from the National Center of Education Statistics (NCES)'s NPSAS tape of May, 1987, which was placed on file at Virginia Tech's Computer Center. The data were accessed via the mainframe through SAS (Statistical Analysis System), a software package for data management and statistical computing (SAS Institute Inc., 1986).

Table 1

Overview of Method



### Population of Interest

The target population for this study was all aided undergraduate students who were in public and private, not-for-profit institutions in the 50 states and D.C. on October 15, 1986.

### Sampling Design

To obtain samples of this target population for data analysis for this study, the following steps were taken.

1. From the original NPSAS tapes, which contained 43,176 observations on 763 variables, a tape was created of undergraduate students. The number of student observations on this tape was 34,882 undergraduates.

2. From this tape of undergraduate students, a disk file was created that included only aided students in public and private, not-for profit institutions. This was done by using SAS's subsetting "if" command, which selected observations if the student was aided and was in either public or private, not-for-profit institutions. This resulted in a sample of 16,928 students.

3. From this sample of 16,928, a subset was created by including only students with non-missing data on the variables of interest. CONTROL, TYPE, ATTENDANCE STATUS,

DEPENDENCY STATUS, AGE, SEX, RACE, MARITAL STATUS, STUDENT COST, INCOME, AID AMOUNT were the primary variables of interest. Any student with data missing on any of the variables was deleted. This resulted in a data set that contained 11,141 student observations. Use of NCES's derived variables for income resulted in a sample of need-based aided students, because income was derived from financial aid records of applications for need-based recipients.

4. From this 11,141 student data set, three random samples of 1,000 were selected. The SAS procedure RANUNI (SAS Institute Inc., 1986) for generating random numbers was used for the selection of the samples. A sample of 1,000 was used because the ultimate purpose of the study was to do descriptive profiles based on rank order of predictor variables. In order to get meaningful rank order of variables, an extremely large sample, like the 11,141, could not be used because the large sample could potentially cause all variables to appear significant, even when the beta weights were close to zero. This is because the standard error decreases as  $N$  increases. Because the interest in this study was in finding theoretically-



significant variables for further use in the descriptive profiles, the intent was to rank order the variables from the regression, and not to estimate differences in interval data. A second sample of 1,000 was used to cross-validate the study.

### Variable Specification

The variables used in this study are described in this section. Even though the literature indicated many variables of policy interest in student financial aid, only ten independent variables were retained for use in this study. These appeared to be the most policy-relevant and were a manageable number. These included: STUDENT COST, CONTROL of institution, INCOME, SEX, RACE, AGE, DEPENDENCY STATUS, TYPE of institution, ATTENDANCE STATUS, and MARITAL STATUS. ABILITY was also considered important and was to be included in an addendum study, but not as part of the main study (as discussed in Chapter 1). The dependent variable for the study was AID AMOUNT. The variables in the study came from NCES's derived variables or from responses to questions from the institutional abstract form. Questions from the institutional abstract form were designated with a "Q" followed by the number of the

question. NCES's derived variables were taken from either institution or student questions and were combined to create a derived variable. A detailed description of NCES's derivation of their variables can be obtained from Westat, Inc.'s (1988) National Postsecondary Student Aid Study, Data File User's Manual.

This section will list each variable name followed by the variable label used in the SAS program. Then an operational definition of the variable, including the assigned values of the categorical variables, will be given. The primary source of the data will be listed and any special treatment, such as recoding and renaming will be described.

Aid Amount (AID\_AMT)

Operational Definition: the total amount of student financial aid awarded to postsecondary students (Fall, 1986) to aid payment of educational expenses for the 1986-1987 school year. This included aid of all types (grants, loans, and work-study) from all sources (federal, state, institution, and other).

Primary Source: NCES's derived variable AID\_AMT

**Age (NAGE)****Assigned Values:**

1 = Younger than 24 years

0 = 24 years or older

**Operational Definition:** Age category as of 12/31/86

**Primary Source:** NCES's derived variable AGECAT

**Treatment:** NCES's derived variable AGECAT, consisting of three categorical groups, was recoded and renamed (NAGE) to create a dichotomized variable. Two categories of AGECAT (24-29 and 30 and older) were combined to make one NAGE category of 24 years and older. The reason for this combination was that literature references to older, nontraditional students usually refer to students age 24 and older.

**Sex (ND\_SEX)****Assigned values:**

1 = Male

0 = Female

**Primary Source:** NCES's derived variable D\_SEX

**Treatment:** NCES's derived variable D\_SEX was recoded and renamed (ND\_SEX) to create a 0-1 dummy coded variable.

Race/Ethnicity (NRACE)

Assigned values:

1 = Non-white

0 = White

Operational Definition: race/ethnicity of the student

Primary Source: NCES's derived variable RACE

Treatment: NCES's derived variable RACE was recoded and renamed (NRACE) to create a dichotomized variable. Five categories of RACE (American Indian, Asian American, Black, non-Hispanic, White, non-Hispanic, and Hispanic) were combined to make one category of non-white for NRACE.

Dependency Status (NDEPSTAT)

Assigned values:

1 = Dependent

0 = Independent

Operation Definition: The standard financial aid definition of dependency was used.

Dependent = (1) living with parents at least six weeks in 1985 or 1986,  
(2) parents provided more than \$750 toward support in 1985 or 1986,

(3) parents claimed as an exemption on their  
Federal income tax return in 1985 or 1986.

Independent = none of the three descriptions above is  
applicable.

Primary Source: NCES's derived variable DEP\_STAT

Treatment: NCES's derived variable DEP\_STAT was recoded and  
renamed (NDEPSTAT) to create a 0-1 dummy variable.

Marital Status (NMARITAL)

Assigned Value:

1= Married

0= Not married

Operational Definition:

Married = Anyone who was married (but not separated) when  
the survey was conducted (October, 1986).

Not married = Anyone who was single, separated, divorced,  
or widowed when the survey was conducted.

Primary Source: NCES's derived variable MARITAL

Treatment: NCES's derived variable MARITAL was recoded and  
renamed (NMARITAL).

Ability (Q21D)

Operational Definition: Student's cumulative grade point average at his/her current academic level, as of first semester of school year 1986-1987.

Primary Source: Q21D

Treatment: Only grade point averages on a 4-point scale were retained for this study. This was done by setting the SAS IF command to include only values between .01 and 4.

Attendance Status (NQ22)

Assigned Values:

1 = Full-time

0 = Part-time

Operational Definition: Attendance status of the student (full-time or part-time) reported by the institution based on the institution's definition of full-time and part-time.

Full-time = attended full-time (Fall, 1986).

Part-time = attended part-time (Fall, 1986).

Primary Source: Q22

Treatment: Institutional abstract form Q22 was recoded and renamed (NQ22) to create a 0-1 coded dummy variable.

**Type of Institution (NTYPE)****Assigned Values:**

1 = Two-year (or less) institution

0 = Four-year institution

**Operational Definition:**

Two-year institution = Institution that confers at least a two-year formal award or has a two-year program that can be used in a baccalaureate or higher degree, but does not confer a baccalaureate degree. Also included in this category are institutions whose programs are less than two years long, but that offer one program that is at least 3 months long that leads to a "terminal occupational award" or can be credited to a "formal 2-year or higher award".

(See treatment below.)

Four-year institution = Institution that confers at least a baccalaureate or master's degree in one or more programs.

Primary Source: NCES's derived variable TYPE

Treatment: NCES's derived variable TYPE was recoded and renamed (NTYPE) to create a 0-1 coded dummy variable.

NCES's variable TYPE's two categories of less than 2 year and 2-3 year were combined to make one NTYPE category of 2 year institutions. NCES's variable TYPE's two categories

of 4 year, not PhD and 4 year, PhD granting were combined to make one NTYPE category of 4 year institutions.

Control of Institution (NCTRL)

Assigned Values:

1 = Public

0 = Private, not-for-profit

Operational Definition:

Public = Institution which is supported mostly by public funds with programs and operations under the control of publicly appointed or elected school officials.

Private, not-for-profit = Institution that is supported by funds that are not public, and whose programs and operations are under the control of individuals or agencies that are not municipal, state or federal government officials.

Primary Source: NCES's derived variable CTRL

Treatment: NCES's derived variable CTRL was recoded and renamed (NCTRL) to create a 0-1 coded dummy variable. The private, for profit category of the variable CTRL was eliminated from this study.



Income (INCOME) and (INC2)

INCOME

Operational Definition: Adjusted gross income for 1985 tax year, taken from institution's financial aid records for 1986-1987 school year.

Primary Source: NCES's derived variables DEP\_AGI (amount of adjusted gross and untaxed income for dependent students) and IND\_AGI (amount of adjusted gross and untaxed income for independent students)

Treatment: NCES's derived variables DEP\_AGI and IND\_AGI were summed to eliminate income based on dependency status. The resulting composite variable was renamed INCOME.

INC2

Assigned Values:

1 = Lower income aided students

0 = Higher income aided students

Operational Definition:

Lower income aided students = \$21,403 or less

Higher income aided students = greater than \$21,403

Primary Source: Variable INCOME

Treatment: median value of the composite of independent and dependent students' income (variable INCOME) was calculated

to be \$21,403. This figure was used to create a dichotomized dummy variable (INC2), by dividing at the median.

Student Costs: (STD\_COST)

Operational Definition: Sum of tuition and fees, food and housing expenses, and other expenses such as books and supplies, transportation costs (including expenses commuting to school and auto loan payments and auto service expenses), personal expenses, and child care that are directly related to education.

Primary Source: NCES's Derived variable STD\_COST. This variable consisted of institutional record of tuition and fees, combined with student-reported food, housing, and other expenses. This variable was used directly with no changes made by the researcher. It must be noted that this variable was chosen instead of NCES's derived variable INS\_COST, which consisted of financial aid records of tuition, housing and food, and other expenses. STD\_COST information was available for 31,566 students whereas, INS\_COST information was available for only 7,896 students. (See Appendix A for comparison of institution-reported and student-reported expenses). Care must be exercised in

interpretation of data to keep in mind that student-reported expenses were used in this study.

Ratio of aid amount to student costs (RATIO)

Operational Definition: the percent of total student costs that is met by total aid received.

Primary Source: NCES's derived variables AID\_AMT and STD\_COST

Treatment: NCES's derived variable AID\_AMT was divided by STD\_COST to obtain the variable RATIO.

Analysis of the Data

Preliminary Investigations

This study was an exploratory study and therefore, several different preliminary procedures were tried before determining the best approach in analyzing the antecedents of aid. The rationale and process of these procedures, which led to the final profiles in this study, are explained in this initial section of the method of analysis.

The goal was a descriptive nesting and sorting procedure in which average aid amounts and median income would be displayed for aided students, sorted into various categories based on variables of interest. Initially,

these included DEPENDENCY STATUS, ATTENDANCE STATUS, and SEX. These variables were selected because they were suspected of displaying some bias in distribution of aid.

The sorting procedure was accomplished through using SAS PROC SORT, PROC FREQ, and PROC MEANS (SAS Institute Inc., 1986) and worked in the following way: first the data were sorted by DEPENDENCY STATUS, which produced two cells containing aid amounts. Next, the data were sorted first by DEPENDENCY STATUS and then by ATTENDANCE STATUS, which produced four cells. Then, the third variable, SEX, was included in the sorting and this produced eight cells. The results of this procedure produced average aid received and percentages of students receiving aid in the various grouping categories of aided students. These were then compared to percentages of these targeted groups in the complete undergraduate (aided and unaided) NPSAS sample.

This was a useful preliminary step, but other variables were of equal importance in analyzing aid receipt (the other variables identified in Chapter 2), such as, CONTROL of institution, TYPE of institution, and RACE. Thus, they would have to be included in the nesting and sorting procedure for a complete description. Although

theoretically desirable to sort the data with all 10 variables and make comparisons of differences in aid amounts across all cells, this would be unmanageable for ready comprehension. If these additional variables were added, the nesting and sorting procedure would result in a matrix of  $2^{10}$  cells .

Hence, regression analysis was chosen as a way to reduce the number of variables to be nested. The ten variables could be entered in a regression equation and the predictive power would be reflected by the beta weights. The variables that would later be used to sort the data would be the ones that were significant in the regression models. Given the nature of the variables, such a regression would need to include many interactions that would be hard to interpret and would be subject to problems from multicollinearity. Interaction effects are joint effects of the main variables and when found in categorical variables, are hard to sort out for meaningful interpretation. Multicollinearity is a problem that occurs when one variable is highly correlated with another variable. When multicollinearity is present, parameter estimates do not have good reliability. The partial slope

coefficients then cannot be compared to other partial slope estimates in the regression equation to determine relative effects of the independent variables.

To overcome these problems, factor analysis was used. Factor analysis assesses the interrelationships among a number of variables and offers an explanation of the interrelationships by means of common factors underlying the variables. The purpose of factor analysis is to reduce the information in a set of variables to a smaller set of factors, which underlie the original variables. One reason for using factor analysis is to identify a concept which underlies a set of variables and which may be not readily observed. Another reason for using factor analysis is to identify factors as appropriate variables to be employed in later regression, correlation, or discriminant analysis. These two reasons supported the rationale for the use of factor analysis.

#### Factor Analyses

Using a sub-sample of 1000 undergraduates, a factor analysis was done to determine underlying factors that explained the receipt of aid and to help reduce the number of variables to be entered in the regression models. Two

factor analyses were done. In the first factor analysis, all the independent variables of interest, as discussed in Chapter 2, were used. In the second factor analysis, only the variables that loaded into two factors resulting from the first factor analysis, were used. This produced clean factor scores.

#### Factor Analysis 1

The independent variables considered to have the greatest impact on the variance of total aid received by undergraduate students (see Chapter 2) were used in the first factor analysis. The independent variables entered in the factor analysis were: DEPENDENCY STATUS, AGE, INCOME, STUDENT COSTS, TYPE of institution, CONTROL of institution, SEX, RACE, ATTENDANCE STATUS, and MARITAL STATUS. Factor analysis was done using the SAS PROC FACTOR procedure (SAS Institute Inc., 1986). Principal factor analysis was used to extract the initial factors. When this was completed, the common factors then were not correlated with each other. The factors were rotated by an orthogonal transformation and the rotated factors also were uncorrelated. With an orthogonal transformation, the process of extraction is done in such a way to keep the

axes of the factors at  $90^0$ , which means that each of the factors is kept independent (uncorrelated) from the other factors. Orthogonal rotation was important for this study given the need to reduce the number of variables into a smaller number of uncorrelated variables for use in regression analysis later. While the rotation did not change the statistical explanatory power, it did help to make the factors more easily interpretable. The goal of the procedure was to get the least complex structure of factors.

### Factor Analysis 2

The five variables that loaded above .5 on the two factors in the first factor analysis, were used in the second factor analysis. The variables below .5 were removed for this analysis. In deciding which factor loadings to consider, it is generally accepted by factor analysts that, if a loading is .5 or greater, then it is identified as very significant. The factor analysis was run to see if the factors established in the first factor analysis were legitimate factors which would remain stable after the effects of the other five variables were removed. The variables used in this analysis were: DEPENDENCY



STATUS, AGE, and MARITAL STATUS which had factor loadings above .5 on Factor 1 and STUDENT COST and CONTROL of institution which had factor loadings above .5 on Factor 2. An output data set was created which contained all the data that initially was put in, plus the variables FACTOR 1 and FACTOR 2, containing estimated factor scores for each observation. This output data set would be used as input for the regression analyses. The factors identified became the proxy variables for MATURITY and PRICE. A factor is a mythical variable and as such, is subject to guesswork and subjectivity in its label. The researcher labelled FACTOR 1 as MATURITY and FACTOR 2 as PRICE. Other labels could have been given to these factors, but these were deemed the most appropriate by the researcher. The definitions of the factor variables of maturity and price are as follows:

MATURITY (FACTOR 1)

Operational Definition: the maturity of a students gauged by combination of age, dependency, and marital status.

Primary Source: FACTOR 1 scores from factor analysis

Treatment: Factor analysis of five variables resulted in a factor (FACTOR 1) where three variables DEPENDENCY STATUS, MARITAL STATUS, and AGE exceeded .5 factor loadings.

PRICE (FACTOR 2)

Operational Definition: the price of the institution gauged by the combination of CONTROL of institution and STUDENT COST.

Primary Source: FACTOR 2 scores from factor analysis

Treatment: Factor analysis of five variables resulted in a factor (FACTOR 2) where two variables, STUDENT COST and CONTROL of institution, exceeded .5 factor loadings.

Regression Analyses

After the factor analyses were completed, two factors were retained for use in the regression models.

Alternative models, using the two factors (FACTOR 1/MATURITY and FACTOR 2/PRICE) and the five variables of policy interest (SEX, RACE, INCOME, TYPE, and ATTENDANCE STATUS), were proposed and tested to predict the differences in the distribution of aid, based on competing theories. These models would provide guidelines for the sorting procedure. Two different multiple regression techniques were used: stepwise regression (SAS's PROC STEPWISE) and forced-entry regression (SAS's PROC REG with SS1, SEQB, and STB options) (SAS Institute Inc., 1986). For this study, two stepwise regression models were tested.

### Stepwise Regression Model 1

The first stepwise procedure included MATURITY (FACTOR 1), INCOME, and PRICE (FACTOR 2) as independent variables and AID AMOUNT as the dependent variable. This model was used because it incorporated the needs analysis components (as discussed in Chapter 2) and some of the student demographic variables, suggested as biasing factors (see Chapter 2). This model was based on the theory that the amount of aid was a function of income, institutional choice characteristics, that were incorporated in PRICE (FACTOR 2), and student demographic characteristics, that were incorporated in MATURITY (FACTOR 1).

### Stepwise Regression Model 2

The second stepwise regression model was an expanded version of the first and included additional variables that were theorized to increase the predictive power of the model to account for differences in the amount of financial aid. TYPE of institution and ATTENDANCE STATUS were added as institutional choice variables, and RACE and SEX were added as student demographic characteristics. The predictive ability of the model was evaluated by looking at the total  $R^2$  to see what proportion of the variance was

accounted for. Incremental  $R^2$ s were used to help determine the rank ordering of the independent variables in predicting the differences in aid.

#### Forced Entry Regression Models

Forced-entry models based on different theoretical considerations were tried. They were created under PROC REG of SAS (SAS Institute Inc., 1986), with option on the model statement of SS1 to print the sequential sum of squares (Type 1 SS), SEQB to print a sequence of parameter estimates as each variable was entered into the model, and STB to get standardized regression coefficients. There was no automatic incremental  $R^2$  forced-entry method in SAS that could be specified, so the incremental  $R^2$  had to be calculated by dividing the Type 1 sum of squares for each variable by the total sums of squares. "Type 1 SS measures the reduction in SSE (sums of squares error) as that variable is entered into the model in sequence" (SAS Institute Inc., 1985, p. 9). "The Type 1 SS are model-order dependent; each effect is adjusted only for the preceding effects in the model" (SAS Institute Inc., 1985, p. 83). Standardized regression coefficients were used to rank order the independent variables.

Forced Entry Regression Model 1. The first forced - entry model was based on financial aid formula theory and proposed that institutional choice characteristics are more important than income or other student demographic characteristics in accounting for the variance in the amount of aid received. In this model, PRICE, and TYPE of institution (institutional choice characteristics) were entered first and second, followed by INCOME, and then MATURITY.

Forced Entry Regression Model 2. The second forced-entry model, based on the financial aid formula, tested the hypothesis that income is the major predictive factor in the receipt of aid, since it is a key component of the financial aid formula. In this model, INCOME was entered first, followed by PRICE and then MATURITY.

Forced Entry Regression Models 3, 4, and 5. Several additional models tested the idea that bias based on student demographic characteristics may be significant in accounting for the variance in the amount of aid received.

One of these student demographic models (Model 3) entered MATURITY first, followed by INCOME, and then PRICE. Another "bias" model (Model 4) included only MATURITY, SEX,

and RACE--variables that have been implicated for inadequate receipt of aid. Many researchers believe that older students, females, and minorities do not get their fair share of aid. Model 5 expanded the student demographic model and included ATTENDANCE STATUS, PRICE, and INCOME, which were entered after the demographic characteristics in the model.

#### Cross-Validation Procedure

The results of the expanded stepwise regression from the original sub-sample were validated by another sub-sample of 1,000. An advantage of the large database was the capability of using one sample to build the model and another to test the model. The regression coefficients (b-weights) obtained from the regression results on the original sample were multiplied by the values of the variables for the sub-sample to obtain predicted aid amounts. The predicted aid amounts were then correlated with the actual aid amounts. The variable YHAT was created and defined in the following way:

#### Predicted Aid Amount (YHAT)

Operational Definition: the predicted aid amount for a second sample to cross-validate results.

Primary Source: variables FACTOR2, NTYPE, ND\_SEX, NQ22, INCOME

Treatment: Variables FACTOR2, NTYPE, ND\_SEX, NQ22, INCOME were multiplied by their respective b-weights from the regression results of the first sample for all observations in the second sample.

### Descriptive Sorting Procedures

After testing all the regression models and analyzing the results, the expanded stepwise regression model (Model 2) seemed to be the best basis for determining the order of sorting in the final descriptive sorting and nesting procedures. This model was chosen because it had the highest total  $R^2$  and included most of the variables of interest. The purpose of the sorting was to describe the average aid received depending on different institutional choice and/or student demographic characteristics. Sorting was done first on the variable that had the highest  $R^2$  in the regression results, followed by sorting on the next highest incremental  $R^2$ , etc. (See Table 2 for example of how the sorting procedure works.) After the first two sorting procedures were done on the variables with the highest  $R^2$ s, then the sorting was separated into two

Table 2

**Example of Descriptive Sorting Procedure if Data Were Sorted by CONTROL of Institution, INCOME, and TYPE**

Public				Private			
Low Income		High Income		Low Income		High Income	
2 Year	4 Year	2 Year	4 Year	2 Year	4 Year	2 Year	4 Year
*	*	*	*	*	*	*	*

\* Aid amounts would be listed in these cells of the matrix



separate procedures; one based on institutional choice characteristics and the other based on student demographic characteristics. These were logical distinctions based on the literature (as discussed in Chapter 2). Each of the cells in the resulting matrix showed average aid amounts.

The sorting was done using SAS PROC SORT, PROC FREQ, and PROC MEANS (SAS Institute Inc., 1986) on the unweighted sample of 11,141 students with a non-missing data set in order to get a more refined analysis of the differences in the average aid received among targeted groups. Weighted estimates from the sample data also were obtained for each procedure. CONTROL of institution was the first level of sorting used. CONTROL of institution was used as a surrogate for PRICE (FACTOR 2), which had the largest standardized coefficients and incremental  $R^2$ s. This was used because it was highly correlated with PRICE and was already a dichotomized variable; and because factor scores were not available for the 11,141 students in this sample. Factor scores had been calculated for the 1,000 students in the factor analysis sample only.

The next level of sorting was by INCOME, because this was the second most important theoretical variable from the

regression model. At this point, there was a division into two procedures: (a) an institutional characteristics' procedure, which sorted by TYPE of institution, followed by ATTENDANCE STATUS, and (b) a demographic characteristics' procedure which sorted by SEX, followed by RACE. A 16-cell matrix ( $2^4$ ) of average aid amounts resulted from each of these procedures. For each of the two sorting procedures, weighted estimates of the sample data were obtained.

#### Addendum: Study Repeated with

#### ABILITY Added in the Regression Model

Because there was still a large part of the variance left unexplained by the resulting models and because researchers have offered ability as an explanatory factor in the receipt of aid, the analytic procedures were repeated with a measure of student ABILITY added. Because the income measure, which was employed in the main study, was restricted to only need-based aid recipients, this addendum study was constrained and could look at only the relationship between student financial aid in that group. However, if there were a strong relationship between aid and ability within this restricted range of need-based

recipients, this may be an indication that aid was not being distributed solely by need.

This addendum study was also limited in that grade point average was an imperfect measure of ability. It lacked standardization across types of institutions. Data on GPA were collected on differing scales as well, so for this addendum study, only students whose GPA was reported on a 4-point scale were used. The 4-point scale was the scale used for 59% of the students in NPSAS.

Despite the limitations, the addendum study was conducted. First, a factor analysis was run with ABILITY entered as an additional independent variable. Then a stepwise regression was run with ABILITY entered in the regression equation. Results of this stepwise regression were analyzed to see how much additional variance, if any, was accounted for by ABILITY.

#### Summary

In this chapter, the data and methods used to investigate the variance in the amount of total student financial aid received by need-based aided undergraduate students, were described. The data for this study were derived from the National Postsecondary Student Aid Study

done in school year 1986-1987. The population of interest was student financial aid recipients among undergraduate students in public and private-not-for-profit institutions in Fall, 1986. The sample for the factor analysis and the regression analyses included 1000 students from the target population. The sample for the sorting procedures was 11,141 students. Weighted estimates were obtained for the number of aid recipients and for the average amount of aid that they have received. Factor analysis, stepwise and forced-entry regression methods, and descriptive sorting and nesting procedures were employed to analyze the data.

## CHAPTER 4

### RESULTS

The purpose of this chapter is to present the results of the analyses of several subsets from the NPSAS data. The analyses consisted of factor analyses and regression analyses, which were done to provide a reduced number of variables for the final descriptive profile of aid recipients and the amount of aid received, presented in Chapter 5. This chapter is divided into two main sections:

1. Identification of Predictor Variables
2. Antecedents of Student Aid

#### Identification of Predictor Variables

Ten independent variables: DEPENDENCY STATUS (NDEPSTAT), AGE, (NAGE), MARITAL STATUS (NMARITAL), CONTROL of institution (NCTRL), STUDENT COST (STD\_COST), SEX (ND\_SEX), RACE (NRACE), ATTENDANCE STATUS (part-time/full-time) (NQ22), TYPE of institution (NTYPE), and INCOME (INCOME) were chosen (from among those identified in Chapter 2) as likely predictor variables of the amount of aid received. These were selected because of their role in

financial aid formulas or because of indications from the literature that they impacted the amount of aid received (See Chapter 2.)

### Factor Analysis 1

The 10 variables were entered into a factor analysis in order to determine the number of variables that could be used in subsequent analyses with the same (or equivalent) effect as the original 10 variables. This goal was met when the ten original independent variables were reduced to two factors (containing five of these variables) and to five unassimilated independent variables. Two factors were retained by the eigenvalue proportion criterion; that is, the 2 factors accounted for over 100% of the common variance. After orthogonal rotation, the resulting two factors were labelled MATURITY ( FACTOR 1) and PRICE (FACTOR 2). (See Chapter 3 for operational definitions.) MATURITY (FACTOR). FACTOR 1 had three variables which loaded above .5. These were DEPENDENCY STATUS (.83), AGE (.78), and MARITAL STATUS (-.57). This factor was labelled MATURITY and consisted of student demographic characteristics.

PRICE (FACTOR 2). FACTOR 2 had two variables which loaded above .5. These were STUDENT COST (.71) and CONTROL of institution (-.64). This factor was labelled PRICE and consisted of institutional choice characteristics.

Other variables. The remaining five variables did not correlate highly with either factor or with each other. They were saved because of their policy relevance. (See Table 3 for results of Factor Analysis 1.)

#### Factor Analysis 2

A second factor analysis, with only the five variables that loaded onto the two factors in the first factor analysis, produced the following loadings. FACTOR 1 showed high loadings on the relevant variables: DEPENDENCY STATUS (.81), AGE (.79), and MARITAL STATUS (-.57) and low loadings on the non-relevant variables: STUDENT COST (.14) and CONTROL of institution (-.03). FACTOR 2 had high loadings on the relevant variables: STUDENT COST(.66) and CONTROL of institution (-.65) and low loadings on DEPENDENCY STATUS (.14), AGE (.14), and MARITAL STATUS (-.02). (See Table 4 for factor patterns for Factor Analysis 2.)

Table 3

Results of Factor Analysis 1

Eigenvalues of the Reduced Correlation Matrix

	Variables									
	1	2	3	4	5	6	7	8	9	10
Eigenvalue	2.29	.87	.23	.17	.06	-.05	-.08	-.11	-.22	-.27
Difference	1.42	.64	.06	.11	.11	.02	.03	.12	.05	—
Proportion	.79	.30	.08	.06	.02	-.02	-.02	-.04	-.08	-.09
Cumulative	.79	1.09	1.17	1.23	1.25	1.23	1.21	1.17	1.09	1.00

Initial Factor Pattern

Factor Loadings

Variable	FACTOR 1	FACTOR 2
AGE	.76*	.25
ATTENDANCE	.38	.04
CONTROL	.31	-.55*
DEPENDENCY	.81*	.28
INCOME	.40	-.19
MARITAL	-.51*	-.27
RACE	-.07	.08
SEX	.10	-.07
STD. COST	.47	-.55*
TYPE	-.31	.07

Rotated Factor Pattern

Factor Loadings

Variable	FACTOR 1	FACTOR 2
AGE	.78*	.14
ATTENDANCE	.36	.15
CONTROL	.00	-.64*
DEPENDENCY	.83*	.17
INCOME	.33	.40
MARITAL	-.57*	-.01
RACE	-.02	-.10
SEX	.06	.11
STD. COST	.14	.71*
TYPE	-.23	-.21

\* Retained for respective factor (over 0.5)

Source: A random sample of 1,000 aided undergraduate students taken from NPSAS database.



Table 4

Factor Patterns from Factor Analysis 2**Initial Factor Pattern  
Factor Loadings**

Variable	FACTOR 1	FACTOR 2
AGE	.79*	.16
CONTROL	-.27	.60
DEPENDENCY	.81*	.17
MARITAL	-.54	-.19
STD. COST	.37	-.56

**Rotated Factor Pattern  
Factor Loadings**

Variable	FACTOR 1	FACTOR 2
AGE	.79*	.14
CONTROL	-.03	-.65*
DEPENDENCY	.82*	.14
MARITAL	-.57*	-.02
STD. COST	.14	.66*

\* Retained for respective factor (over 0.5)

Source: A random sample of 1,000 aided undergraduate students taken from NPSAS database.

### Summary of Factor Analysis

Factor scores for both factors and the remaining five variables were assigned to each individual subject and were saved in an output data set for later use in regression models. Use of factor analysis enabled reduction of the number of variables to be incorporated in the regression models and reduced multicollinearity (high interrelationships among the independent variables). The remaining five variables did not correlate highly with either factor and had low pairwise correlations with each other (See Table 5.)

In order to make interpretation easier and more meaningful for the regression analyses and the descriptive sorting profile, the two factors and the five variables were placed into three logical groupings (as suggested by the literature): (a) institutional choice variables: which consisted of PRICE (FACTOR 2), (representing STUDENT COST and CONTROL of institution), TYPE of institution (two-year/four-year), and ATTENDANCE STATUS (part-time/full-time), (b) student demographic variables: MATURITY (FACTOR 1) (representing AGE, DEPENDENCY STATUS, and MARITAL

Table 5  
Pearson Correlation Coefficients of Variables to be Used in Stepwise Regression Models

	AID AMOUNT	PRICE	TYPE	ATTEND- ANCE	SEX	RACE	MATURITY	INCOME
AID AMOUNT	—	.49	-.21	.14	.11	.06	.02	-.10
PRICE	.49	—	-.16	.14	.09	-.04	.11	.32
TYPE	-.21	-.16	—	-.18	-.07	.002	-.20	-.18
ATTENDANCE	.14	.14	-.18	—	.08	-.04	.32	.13
SEX	.11	.09	-.07	.08	—	-.07	.05	.02
RACE	.06	-.04	.002	-.04	-.07	—	-.02	-.17
MATURITY	.02	.11	-.20	.32	.05	-.02	—	.36
INCOME	-.10	.32	-.18	.13	.02	-.16	.36	—

Source: A random sample of 1,000 aided undergraduate students taken from NPSAS database.

STATUS), RACE, and SEX, and (c) INCOME: which was considered separately since it loaded equally on the two factors.

#### Antecedents of Student Aid

Two stepwise regression models and several forced-entry regression models were used to determine the most important factors in accounting for the total amount of aid received.

#### Stepwise Regression Model 1

An abbreviated stepwise regression model, using MATURITY (FACTOR 1), PRICE (FACTOR 2), and INCOME, was run first. The incremental  $R^2$  was 24% for PRICE, 7% for INCOME, .4% for MATURITY. Overall  $R^2$  was 32% (See Table 6.) Other variables would most likely help increase total  $R^2$ , so Stepwise Regression Model 2 was run.

#### Stepwise Regression Model 2

The variables used in this model were: (a) institutional choice variables: PRICE (FACTOR 2), TYPE (two-year/four-year), ATTENDANCE STATUS (part-time/full-time), (b) student demographic variables: MATURITY (FACTOR 1), RACE, SEX, and (c) INCOME variable.

Table 6

**Summary of Stepwise Regression Procedures for Dependent Variable AID AMOUNT**

**Stepwise Regression Model 1**

Step	Variable	b Value	Individual R **2	Cumulative R**2
1	PRICE	2618.99	.244	.24
2	INCOME	-.06	.073	.32
3	MATURITY	245.37	.004	.32

**Stepwise Regression Model 2**

Step	Variable	b Value	Individual R **2	Cumulative R**2
1	PRICE	2481.83	.244	.24
2	INCOME	-0.06	.073	.32
3	TYPE	-1442.04	.027	.34
4	ATTENDANCE	956.33	.006	.35
5	SEX	301.80	.002	.35

*Source: A random sample of 1,000 aided undergraduate students taken from NPSAS database.*

The variables that met the requirements for entry in the equation were PRICE, INCOME, TYPE, ATTENDANCE STATUS, and SEX. MATURITY and RACE did not meet the .15 significance level for entry.

The overall  $R^2$  for this model was .35 and F was significant at the .0001 level.

It can be seen by the stepwise procedure results (Table 6) that PRICE (FACTOR 2) ranked first in this model. It accounted for 24% of the variance; TYPE accounted for an additional 3% of the variance, and ATTENDANCE STATUS added little (.6%) to the model. Institutional choice variables thus accounted for over 27% of the variance.

INCOME accounted for over 7% of the variance and was the second variable to enter the equation after PRICE.

The only student demographic variable which was retained in the equation was SEX. It accounted for only an additional .2% of the variance, with F significant only at the .08 level. RACE and MATURITY (FACTOR 1) did not meet the .15 significance level criterion (as determined by SAS PROC STEPWISE) to enter the model. Student demographic variables were shown to have little power in this model toward accounting for the variance in the amount of

financial aid received by undergraduate students. (See Appendix B for means and standard deviations and final stepwise results.)

### Testing Different Theoretical Models with Forced Entry

#### Models

Several forced-entry models were used in an attempt to test competing theories of antecedents of financial aid.

#### Financial Aid Formula Components as Predictor Variables

Formulas used by financial aid officers to determine the amount of aid to be awarded typically rely on cost of education and income. Two competing models were used to test this theory.

Forced Entry Regression Model 1. It was theorized in the first model that institutional choice characteristics were the most important antecedents of the amount of aid received. Institutional choice characteristics (PRICE and TYPE) were entered first, followed by INCOME, and MATURITY. Based on the  $R^2$ , the total explanatory power of this model to account for differences in aid was almost 35% (with F significant at the .0001 level). PRICE (.57) ranked first with the largest standardized regression coefficient. This meant that for a change of one standard deviation in

the PRICE, there would be a .57 standard deviation change in aid. INCOME, with a standardized regression coefficient of -.32, ranked second. The negative coefficient indicated that lower income was associated with higher aid. TYPE (-.16) followed next in the ranking. MATURITY (.04) had the smallest regression coefficient and offered negligible explanatory power. (See Table 7.)

Forced Entry Regression Model 2. In the second model, INCOME was entered into the equation first, thus testing the assumption that INCOME is the key component in the aid decision. Nevertheless, based on resulting beta weights, PRICE (.59) ranked first, with INCOME (-.31) and MATURITY (.06). The total  $R^2$  for the model was 32% (See Table 7), with INCOME initially accounting for less than 1%.

#### Student Demographics as Predictor Variables

Forced Entry Regression Models 3,4 and 5. Several forced-entry models were used to test various orderings of demographic variables of SEX, RACE, and MATURITY as primary determinants of financial aid received. If these variables were shown through these models to be major predictor variables, this would have provided some evidence of bias



Table 7

Results of Forced-Entry Regression Models

Variable		Price Model 1	Income Model 2	Maturity Model 3	Demographics Only Model 4	Expanded Demographics Model 5
PRICE	B	.57	.59	.59		.57
	R <sup>2</sup>	24%	31%	31%		28%
	Entry	1	2	3		6
INCOME	B	-.32	-.31	-.31		-.30
	R <sup>2</sup>	8%	.9%	1%		1%
	Entry	3	1	2		5
TYPE	B	-.16				
	R <sup>2</sup>	2%				
	Entry	2				
ATTENDANCE	B					.09
	R <sup>2</sup>					2%
	Entry					4
MATURITY	B	.04	.06	.06	.01	.03
	R <sup>2</sup>	.01%	.03%	.03%	.03%	.03%
	Entry	4	3	1	1	1
SEX	B				.11	.05
	R <sup>2</sup>				1%	1%
	Entry				2	2
RACE	B				-.07	.04
	R <sup>2</sup>				.4%	.4%
	Entry				3	3
Root MSE		2698.27	2746.99	2746.99	3307.29	2728.79
Total R <sup>2</sup> for model		34%	32%	32%	2%	33%

B = Standardized regression coefficient  
 R<sup>2</sup> = Incremental R<sup>2</sup>  
 Entry = Order of entry into model  
 Root MSE = Square root of Mean Square Error

Source: A random sample of 1,000 aided undergraduate students taken from NPSAS

in the distribution process. These demographic variables were tested in various orderings, with and without the institutional choice variables and income. Regardless of entry position in any of the models tested, the above three variables together never accounted for more than 2% of the variance. Although individual cases of bias may have been reported, these student characteristics were not a primary antecedent of the amount of aid received (See Table 7.)

Ability as a Predictor Variable Factor analysis and regression analysis were re-run on a new sub-sample of 1,000 need-based aided undergraduates for whom an ability measure was available. Factor analysis produced the same two factors as in the original factor analysis. ABILITY did not load on either factor. When force-entered first, ABILITY accounted for .6% of the variance. When allowed to enter a stepwise regression, it added only .3% to the  $R^2$ . Therefore, for these data, ability was not a key antecedent variable in the receipt of student financial aid.

#### Cross-Validation of the Regression Model

Cross-validation of the original analysis was done by applying the coefficients from the stepwise regression results on the original sample to a second sub-sample of

1000 aided undergraduate students and predicting their aid amounts based on the model. The correlation coefficient obtained was .57 indicating a moderate relationship of the actual aid amount with the predicted aid amount. The mean for the actual aid amount was \$4639 and the mean for the predicted aid amount was \$4703. There was only a \$64 difference in the amount of aid received by the students in the two samples. This 1% difference did not appear to be significant.

#### Summary

The regression models indicated that the most important antecedent variable in the amount of aid received was PRICE (FACTOR 2), a factor variable comprised of STUDENT COST and CONTROL of institution. PRICE consistently ranked first, with standardized regression coefficients ranging from .57 to .59. INCOME ranked second with regression coefficients of -.30 to -.32. All other variables accounted for a smaller amount of the variance.

The expanded stepwise regression model 2 (Table 6) was selected for determining the order of sorting in descriptive profiles to be discussed in Chapter 5, because it had the largest total  $R^2$  and because its rank ordering

of variables was comparable to the ordering of the forced entry regression coefficients. About 65% of the variance was still unaccounted for in these data.

## CHAPTER 5

### SUMMARY AND DISCUSSION AND IMPLICATIONS

This chapter includes a summary of the findings, including a brief review of the methods and results and detailed descriptive profiles of student financial aid recipients, and the discussion and implications for future research that are shown by this study.

#### Summary

##### Overview of the Study

The purpose of this study was to look at who benefits from student aid, that is, to determine which variables best account for differences in aid amounts so that descriptive profiles of aid may be created. The study employed data from the National Postsecondary Student Aid Study, which collected enrollment information, student demographic characteristics, and financial aid information for 59,886 postsecondary education students in the fall of 1986. The factor analyses and regression analyses of this study were performed on a random sample of 1000 undergraduate students selected from a sample of 11,141 students obtained from NPSAS data. These were need-based

aid recipients who were enrolled in public and private-not-for-profit institutions. Descriptive nesting and sorting procedures were done on the 11,141 need-based aided undergraduate students who had non-missing data on all variables of interest.

Factor analysis was used to reduce the number of variables in the regression models to a significant few. Stepwise and forced-entry regression procedures were used to identify the variables of significance for creating the descriptive profile. Average amounts of aid received for targeted groups are presented in the descriptive profiles.

#### Summary of Factor Analyses and Regression Analyses

There was a large number of variables in the literature that were deemed important in student financial aid decisions. It was necessary to reduce the number of variables by which sorting would be done to get the desired descriptive profiles. Ten variables, considered to be of greatest policy interest, were selected from the literature and then factor analysis and regression were used to reduce the number of variables.

Two principal factors were identified through factor analysis and were used in the regression analyses. These

were an institutional choice factor (FACTOR 2)--labelled PRICE, which was a composite of two variables STUDENT COST and CONTROL and a student demographic factor (FACTOR 1)--labelled MATURITY, which was a composite of three variables: AGE, MARITAL STATUS, and DEPENDENCY STATUS.

These two factors and the additional institutional choice variables of TYPE and ATTENDANCE STATUS and the additional student demographic variables of RACE and SEX were entered with INCOME in different combinations into seven alternative regression models to assist in identifying important antecedents of aid. Two stepwise and five forced-entry models were developed. The highest total  $R^2$  (35%) of any of the models was in the expanded stepwise model 2. This model was used as the basis for rank ordering the variables by which the descriptive profiles would be created.

The regression analyses demonstrated that for these data the kind of college attended accounted for more variability in the amount of aid received than did individual student demographic characteristics. PRICE ranked first in the models with the largest standardized regression coefficients. It was followed by INCOME, and

then TYPE. Student demographic characteristics accounted for less than 2% of the variance, having minimal contributory predictive power. Thus, the choices made about the kind of institution attended for this sample determined much more of the difference in the amount of aid received than did individual student demographic characteristics.

### Description of Total Financial Aid

#### Overview of the Descriptive Profiles

The purpose of the study was to get a picture of who benefits from financial aid, that is: to present a descriptive profile of the distribution of student financial aid across variables which represent different types of student financial aid recipients. It was hoped that the most salient variables for displaying where the student financial aid money was going could be found. After factor analysis and regression analysis, the number of meaningful variables was reduced to six (PRICE, INCOME, TYPE, ATTENDANCE STATUS, SEX, RACE) from the original ten variables (Table 8). The other variables were not discussed further. Of the six variables, four variables were retained because they were of theoretical significance



Table 8

Variables Used in this Study

Original Variables	Variables Significant ( $p < .05$ ) in Stepwise Regression Analysis <sup>a</sup>	Variables Used in the Descriptive Profile
CONTROL	PRICE (FACTOR 2)	CONTROL/PRICE
TYPE	INCOME	INCOME
ATTENDANCE STATUS	TYPE	TYPE
DEPENDENCY STATUS	ATTENDANCE	ATTENDANCE STATUS
AGE		SEX
SEX		RACE
RACE		
MARITAL STATUS		
STUDENT COST		
INCOME		

<sup>a</sup> listed according to rank order in the model

in the regression model. These were PRICE, INCOME, TYPE, and ATTENDANCE STATUS. The rank ordering of the variables in the regression model was the basis of the order for sorting the weighted data for the descriptive profiles. Variables that were not significant in the regression equation, but were deemed policy relevant were SEX and RACE. These were also included in the sorting procedure of the descriptive profiles.

In order to give a better picture of the total amount of aid received by targeted groups in specific sectors and income brackets, two sorting and nesting procedures were employed using these variables. One procedure focused on institutional choice characteristics and income, and the other procedure included student demographic characteristics, as well as institutional choice characteristics and income. Unweighted results for the sample and weighted estimates of the 11,141 were obtained for both sorting procedures. While analyses are valid only for unweighted data, this discussion focused on the weighted data because the purpose of the study was to look at the segment of population of undergraduate students in the United States (2,758,793) who were represented by this

sample. (Refer to Appendix C for descriptive profiles of unweighted samples.) The sample for the descriptive profile was 11,141 need-based aided undergraduate students with non-missing data on the variables of interest. Weighted estimates for that sample were derived by using the NPSAS weighting procedure. The weighting should not be interpreted as providing weighted national estimates for the entire postsecondary population.

Sorting was first done by CONTROL of institution (a surrogate for the PRICE factor), which consistently ranked first in the regression equation. CONTROL was selected as a surrogate because it was highly correlated with PRICE. Although CONTROL was not a perfect measure for PRICE, it was a reasonable substitute for it, since it was not feasible to get factor scores (re-run the factor analysis ) for PRICE for each of the 11,141 subjects in the descriptive profile sample. The second level of sorting was by INCOME. The sample of aided students had been divided at the median income of \$21,403 into low and high income and were sorted accordingly. At that point, the data were sorted either by institutional choice characteristics (TYPE of institution and then by ATTENDANCE

STATUS), or by student demographic characteristics (SEX and then by RACE).

When taking a closer look through sorting and nesting, at the aided students and the differences in the amount of aid they received, some interesting patterns emerge. Although the regression analysis did not indicate that student demographic characteristics were of theoretical significance, there are differences among targeted groups that become apparent in the descriptive profiles. The descriptive profile data that follow are weighted, but these are not nationally representative weights. The differences in the weighted data are not to be taken as interval or ratio estimates, but rather as ordinal data. Rank orders are valid, although point estimates may not be true to reality.

#### Descriptive Profile of Aid Based on Institutional Choice Characteristics

It was shown by the results of the first sorting and nesting step (by CONTROL/PRICE) that 67% of the aided students in this sample were in public institutions and 33% were in private institutions. The average amount of aid for students in public institutions (\$2923) was less than

the average amount of aid for students in private institutions (\$5674), as would be expected based on the price of these institutions. Ratios of the total amount of aid to students costs in these two sectors were calculated. It may appear that the ratio in the public sector is inflated evoking concern that students are getting more aid than their expenses warrant. However, this is not the most plausible explanation. The higher ratios are more likely the result of a large number of commuting and/or part-time students underestimating their expenses. (Refer once again to Appendix A for NCES' discussion of student cost information.) Higher ratios also may be the result of non-need based aid being included in the total aid amount.

Even allowing for this distortion, the ratio of aid to cost of 1.01 in the public sector and .69 in the private sector, showed that aided students in the public sector had more of their costs met by aid. (See Table 9 for sorting by CONTROL/PRICE.)

The second sorting step was based on INCOME within each CONTROL/PRICE of institution. Within the public sector, the majority (66%) of the aided students were low income, while in the private sector, the majority (59%)

Table 9

**Descriptive Profile When Data Were Sorted by CONTROL of Institution**

	Public	Private
N	1,841,164	917,628
%	67	33
AID AMOUNT	\$2923	\$5674
Ratio <sup>a</sup>	1.01	.69

<sup>a</sup> Ratio = Aid amount/student cost. Ratio in public sector may seem high. See Descriptive Profile of Aid Based on Institutional Choice Characteristics (Chapter 5) for a discussion of the ratios.

Source: Weighted estimates of 11,141 aided undergraduate students from NPSAS data base

were higher income. This indicated that more of the lowest income students were in public institutions. Regardless of income level, average aid was greater in private institutions. For both private and public sectors, average aid to low income students was greater than to high income students (\$3142 v. \$2495 in public and \$6188 v. \$5315 in private).

When aided students were sorted by INCOME into low and high (based on median income of \$21,403), low income students received more aid than high income students within their respective control of institution. A greater percent of the lower income students were in public institutions, indicating that they do not choose or cannot afford to attend private institutions. (See Table 10 for sorting by INCOME. In Table 10, row % is the percent of total students in sample for each cell in that row. The % of previous level means the percent of students who are in the last level by which the data were sorted, e.g. within the public sector, 66% of the students were low income.)

The third sorting step was done by TYPE of institution (two-year/ four-year) within INCOME within CONTROL/PRICE of institution. The vast majority (76%) of the students in

Table 10

**Descriptive Profile When Data Were Sorted by CONTROL of Institution**  
**and INCOME**

	Public		Private	
	Low Income	High Income	Low Income	High Income
N	1,217,569	623,596	376,815	540,813
Row %	44	23	14	20
% of Previous Level	66	34	41	59
Aid	\$3142	\$2495	\$6188	\$5315

*Source: Weighted estimates of 11,141 aided undergraduate students from the NPSAS data base*



this sample were in four-year institutions and only 24% were in two-year institutions. However, proprietary institution students were eliminated from this study, which decreased the number of two-year institution students in the study. Regardless of CONTROL/PRICE of institution, higher income students were more likely to be in four-year institutions than their lower income counterparts (95%/high v. 89%/low in private and 84%/high v. 62%/low in public).

Ratios of aid amounts to student costs were calculated to make comparisons of aid received by students in two-year and four-year institutions. It was shown that low income students had a greater proportion of their costs met by aid than high income students. However, private institution students received a lower proportion of aid within respective income categories than the public institution students. Within public institutions, two-year students received a greater proportion of aid (1.25 for low income and .83 for high income) than four-year students (1.11 for low income and .68 for high income). Within private institutions, the same pattern prevailed, with two-year students receiving a greater proportion of aid (.94 for low income and .70 for high income) than four-year

students (.83 for low income and .58 for high income). Once again, caution must be used in interpreting these ratios, due to the underestimating of student expenses by commuting and/or part-time students and to the inclusion of non-need based aid. Nevertheless, it appeared that two-year students had a greater proportion of their costs met by aid than four-year students within respective income and control of institution categories. Average dollar amounts of aid for the two-year institutions were less than the four-year students amounts of aid. Higher income aided students tended to be in four-year institutions. (See Table 11 for sorting by TYPE. In Table 11, row % is the percent of total students in sample for each cell in that row. The % of previous level means the percent of students who are in the last level by which the data were sorted, e.g. within the low income public sector, 38% of the students were two-year students.)

The fourth sorting was by ATTENDANCE STATUS (full-time/part-time) within TYPE of institution within INCOME and within CONTROL/PRICE of institution. Part-time students were only about 12% of the sample, but they received about 8% of the total aid. Most of the part-time

Table 11

**Descriptive Profile When Data Were Sorted by CONTROL of Institution,  
INCOME, and TYPE**

		Public				Private			
		Low Income		High Income		Low Income		High Income	
		2 Year	4 Year	2 Year	4 Year	2 Year	4 Year	2 Year	4 Year
N		460,236	757,333	101,193	522,403	42,389	334,425	25,088	515,725
Row %		17	27	4	19	2	12	1	18
% of Previous Level		38	62	16	84	11	89	5	95
Aid		\$2318	\$3642	\$1698	\$2649	\$4015	\$6484	\$3574	\$5399
Ratio <sup>a</sup>		1.25	1.11	.83	.68	.94	.83	.70	.58

<sup>a</sup> Ratio = Aid amount/student cost. Some ratios may seem high. See Descriptive Profile of Aid Based on Institutional Choice Characteristics (Chapter 5) for a discussion of the ratios.

Source: Weighted estimates of 11,141 aided undergraduate students from the NPSAS data base

students in this sample were in the public sector.

Average amounts of aid for full-time students were higher than for part-time students in all sectors studied, as would be expected. Ratios were employed that compared the amount of part-time aid to the amount of full-time aid in order to examine in a more meaningful way the differences in amount of aid received. Within the public sector, whether two-year or four-year institutions, higher income part-time students received a higher proportion of aid (.96 and .85) than their lower income counterparts (.69 and .72). Part-time higher income students in the public sector fared best (.96). In the private sector, low income four-year students received the lowest proportion of aid (.54), while high income four-year students received the highest proportion of aid (.71).

It appeared that part-time students in the public sector received more aid relative to full-time students, especially if part-time students had a higher income. (See Table 12 for sorting by ATTENDANCE STATUS.)

Table 12

**Descriptive Profile When Data Were Sorted by CONTROL of Institution, INCOME, TYPE and ATTENDANCE STATUS**

		Public						Private								
		Low Income			High Income			Low Income			High Income					
2 Year		4 Year		2 Year		4 Year		2 Year		4 Year		2 Year		4 Year		
Full Time	Part Time	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time	
N	347,613	112,623	675,191	82,142	86,913	14,280	489,868	32,535	34,814	7,576	305,198	29,227	22,410	2,678	497,795	17,934
Row %	13	4	24	3	3	.5	18	1	1	2	11	1	.8	.09	18	.6
% of Previous Level	76	24	89	11	86	14	94	6	82	18	91	9	89	11	97	3
Aid	\$2505	\$1740	\$3756	\$2712	\$1707	\$1641	\$2674	\$2278	\$4351	\$2474	\$6732	\$3661	\$3713	\$2411	\$5456	\$3851
Ratio <sup>a</sup>	.69		.72		.96		.85		.57		.54		.65		.71	

<sup>a</sup> Ratio of Part-time/Full-time aid

Source: Weighted estimates of 11,141 aided undergraduate students from NPSAS data base

Descriptive Profiles of Aid Based on Student Demographic Characteristics.

The first and second sorting steps in the student demographics profile were the same as in the institutional choice profile. Sorting was first done by CONTROL/PRICE of institution, followed by sorting by INCOME within CONTROL/PRICE of institution. (See Tables 9 and 10.)

Then, in order to display the distribution of aid according to two student demographic characteristics, the third sorting step was by SEX, followed by a sorting by RACE. It was shown by the results that females were 57% of this weighted sample of aided undergraduates, but they received about 55% of the aid. Males, on the average, consistently received greater aid amounts than females within their respective INCOME and CONTROL/PRICE sectors. The discrepancy between the sexes was greatest in the low income private sector where males received an average aid amount of \$6638 while females received \$5864. In the high income private sector, males received an average aid amount of \$5482 and females received \$5171. In the public sector, low income males received higher amounts (\$3331) than comparable females (\$3014), but higher income males and

females received similar amounts of aid (\$2522/males v. \$2471/females). (See Table 13 for sorting by SEX.)

The fourth level of sorting was by RACE (non-white (minority) v. white). Non-whites comprised about 25% of the aided students in this sample, but they received 27% of the aid. Within the public sector, low income male non-whites received less (\$3114) than comparable whites (\$3432), but high income female non-whites received more (\$2845) than comparable whites (\$2393).

Within the private sector, non-white aid amounts averaged much higher than white aid amounts for both males and females, except among low income females, where white females and non-white females received about the same amounts of aid. Males, both non-white and white, received higher aid amounts than females. Within the private sector, low income male non-white students received an average aid amount of \$7238 and low income male white students received \$6430. Within the private sector, low income female non-white students received an average aid amount of \$5932 and low income female white students received \$5828. Within the private sector, high income male non-white students received an average aid amount of

Table 13

**Descriptive Profile When Data Were Sorted by CONTROL of Institution.**  
**INCOME and SEX**

		Public				Private			
		Low Income		High Income		Low Income		High Income	
		Male	Female	Male	Female	Male	Female	Male	Female
N		489,632	727,937	287,185	336,410	156,464	220,224	251,104	289,710
Row %		18	26	10	12	6	8	9	11
% of Previous Level		40	60	46	54	42	58	46	54
Aid		\$3331	\$3014	\$2522	\$2471	\$6638	\$5864	\$5482	\$5171

*Source: Weighted estimates of 11,141 aided undergraduate students from the NPSAS data base*



\$6484 and high income male white students received an average aid amount of \$5337. Within the private sector, high income female non-white students received an average amount of aid of \$5893 and high income female white students received \$5055. (See Table 14 for sorting by RACE.)

Through this student demographic sorting procedure, it was shown that males received higher amounts of aid than females and that non-whites in the private sector received more aid than whites. Non-whites and whites in the public sector received similar amounts of aid overall.

#### Discussion and Implications for Future Research

In this study, it was hoped to get a picture of who is benefiting from student financial aid and to determine if those benefiting are the students that were supposed to benefit, as specified in the Higher Education Act.

The information obtained from this study indicates that for this sample of need-based undergraduate students, the needs analysis formula, used by financial aid offices, appears to operate as intended; that is, the poorest students receive the most aid. This seems to be true even though some non-need based aid may be included in the total

Table 14

**Descriptive Profile When Data Were Sorted by CONTROL of Institution, INCOME, SEX and RACE**

		Public						Private							
		Low Income			High Income			Low Income			High Income				
		Male		Female		Male		Female		Male		Female			
		Minority	White	Minority	White	Minority	White	Minority	White	Minority	White	Minority	White		
N	155,334	333,924	252,816	474,429	36,047	251,138	58,616	277,492	40,487	115,731	72,880	146,304	220,681	142,938	245,977
Row %	6	12	9	17	1	9	2	10	1	4	3	5	1	8	9
% of Previous Level	32	68	35	65	13	87	17	83	26	74	33	67	12	88	85
Aid	\$3114	\$3432	\$3022	\$3009	\$2601	\$2511	\$2845	\$2393	\$7238	\$6430	\$5932	\$5828	\$6484	\$5337	\$5055

Source: Weighted estimates of 11,141 aided undergraduate students from NPSAS data base

amount of aid. In looking at two main elements of the needs analysis formula-- price and income-- in relationship to this study's results, it can be seen that the weight attached to the price of institutions for accounting for the differences in the amount of aid is greater than that of income. Price offsets income. Within the same income categories, the kind of institution attended is by far the largest determinant of aid amount. This concurs with Augenblick and Hyde (1979) and Caplan (1980) and others, who also found that the kind of institution attended has a strong relationship with aid received. In this study, PRICE (composed of CONTROL of institution and STUDENT COST) ranks first in determining the amount of financial aid received. Private institution students get more aid dollars but appear to have less of their costs covered by aid compared to public institution students.

The ratios obtained in this study make it seem that students in some sectors are getting more aid than they need based on their perceived expenses. This is not the most plausible explanation. The inflated ratios are more likely a result of the commuting students' underestimating their costs (compared to institution's estimates of

students costs for calculating aid) or of the inclusion of non-need based aid in the total aid amount. However, this should be investigated further. There is a more general question of the validity of the estimates of expenses that are related to education, especially as estimated by students. It was necessary to use student cost due to the large amount of missing institutional cost data. Because the validity of student-reported expenses is suspect, it might be a useful follow-up study to use institution-reported costs from NPSAS and compare results, even though the sample would be reduced in size.

It is of concern that such a large amount of this institutional cost data, as well as income data was missing in NPSAS. There is question that poor record keeping on the part of the institution and/or inadequate transcribing on the part of the survey collectors resulted in this loss of information. Investigation as to the reason for such a big loss of data should be pursued.

NCES also found that the average cost was reduced more by aid for students in the public sector. (Korb et al, 1988, p. 85). The fact that more costs are covered by aid in the public sector lends credence to the idea that more

lower income students choose public institutions. The percentage of lower income students within the private sector in this study is only 14% compared to 44% of the low income students in the public sector. This gives the impression that lower income students may find it financially difficult to attend private institutions and may attend public institutions instead. It supports the hypothesis that while most prestige institutions have "need-blind" admission, the high tuition still requires that all but the poorest students contribute more toward defraying costs than they feel they can. The level of aid compared to the cost is a lower percent in private institutions than in public institutions and the actual dollars that have to be paid by the student are greater too. Therefore, this may place an insupportable burden on that student, forcing that student to opt for the less expensive public institutions.

Tuition continues to rise making it increasingly harder for low income students to attend private institutions. One example is at Johns Hopkins University where "freshmen receiving aid are contributing an average of \$6,212, a figure that could discourage many students

from applying" (Vobejda, 1989, p. A12). Higher education has been seen as a great equalizer, with aid programs striving to "level up" the opportunity for disadvantaged students (which has happened to a certain extent).

Nevertheless, what has actually occurred is an even greater class stratification in higher education. The poor and minorities are clustered in two-year and less prestigious four-year institutions, while the wealthy students are an increasing percentage of the prestigious institutions.

"College officials acknowledge that the pool of students feeding these (prestigious) schools remains limited to a narrow segment of society. Affirmative action and financial aid have brought in minorities and low-income students, but prestigious private schools, for the most part, still enroll white students from relatively wealthy families" (Vobejda, 1989, p. A12).

A major issue is the question of whether institutions raise their tuition in order to get more aid dollars. Smith (1979) emphasized that price is highly related to need and this could lead to increasing the tuition to gain more aid.

Since need is the difference between the price charged by the institution and what a student can pay, it is directly related to the price of the institution. Under such a system, it would make great economic sense for an institution to raise its fees and thereby gain more aid, particularly where the fees are considerably less than the costs (p. 13).

Through this study, it can be seen that the lower income students are receiving more aid than the higher income students, giving the impression that aid distribution is occurring overall as the Higher Education Act intends. For this sample, INCOME does not play as large a part in accounting for the variance as would be expected from the needs analysis formula. INCOME might have been a stronger predictor if GSL recipients had not been included as need-based recipients. A large percent of aid is GSLs and recipients of GSLs were not subject to strict needs analysis at the time of this survey, unless their income was over \$30,000. It would be interesting to see if INCOME would be a higher ranked predictor in a future study (after the 1986 Amendments have in been in

effect) after GSLs become subject to more stringent needs analysis.

Nevertheless, income is a significant predictor variable accounting for about 7% of the total variance. Perhaps it would have been a better measure if other assets of the student/family were included in the calculation of income. Taking into account the size of family, number of dependents, and other variables that impact assessment of needs formulas also might have produced an income variable that would have accounted for more variance and would be fairer for students. In this study, it is shown that lower income students in both public and private sectors receive higher amounts of aid than their higher income counterparts. Caplan (1980) also found that income had a strong relationship to aid received.

Low income has a strong correlation to receiving package aid while high income correlates positively to receiving loan assistance only. Students from low income families generally attend public two year and four year colleges, but low income students who do attend schools in the private sector receive large amounts of financial assistance (p. 14).



While in Caplan's study, it was found that 40% of aid recipients attended two year institutions (including proprietary ), only 24% of aid recipients in this study are in two-year institutions. However, this study eliminated all proprietary institutions, which are predominantly two-year institutions and which have many aid recipients attending them. Therefore, it is hard to judge from this study, if there has been a shift in aided recipients, since 1980. A future study could include proprietary school segment for a more complete evaluation of aid in two-year versus four-year institutions.

In this study, it is shown that the TYPE of institution is contributing to a small degree in accounting for differences in aid amount. Students in four-year institutions get more aid dollars, but students in two-year institutions appear to have a greater percentage of their costs met by aid than do the aided four-year institution students, within their respective income and control of institution sectors. This is in large part due to the fact that most of these two-year students are commuting students and have underestimated their expenses, compared to what the institution would estimate as their expenses.

Nevertheless two-year institutions appear to be doing a better job in meeting the aid needs compared to the perceived expense needs of their students.

Another important institutional choice characteristic that is explored by this study is ATTENDANCE STATUS (part-time/full-time). Ratios of amount of aid received by part-time students versus full-time students were calculated also. Only 12% of the aided students in this sample are part-time students, which reflects the way that the provisions of the Higher Education Act were written at the time of the study (1986); that is, many part-time students were ineligible for aid. Results show that part-time students in public institutions fare better compared to full-time students in the amount of aid received than did students in private institutions. This finding is meaningful in that it indicates to private institutions that they might have to be more accommodating to meet the aid needs of part-time students, since an increasing larger percent of students are part-time students. It would be interesting for future study to look at the improvement in the ratio of part-time aid to full-time aid and in the percent of aided part-time students to see if this has

changed considerably in light of the 1986 Higher Education Amendments. "The bill for the first time makes eligible for Pell grants students who are enrolled less than half time. It also expands access to other forms of federal aid" (Hook, 1986, p. 2218).

Students enrolled part time will be able to receive a 'reasonable proportion' of student aid funds under the campus-based programs. Under the existing law, the number of part-time students was calculated into the institution's formula for receiving aid, yet these students rarely received a share of the funds.

(Project on the Status and Education of Women, 1987, p. 7)

It would be interesting to determine why higher income part-time students get more of their costs covered by aid than lower-income part-time students in three out of four sectors examined. This does not appear to be intended by the Higher Education Act, but it may be a function of the type of the aid, e.g. GSLs or the source of the aid, e.g. employer support.

Although student demographic characteristics contribute little to accounting for differences in the

amount of aid received, there are, nonetheless, some differences among targeted groups. This may indicate that some inequity in distribution is occurring. Moreover, it addresses the issue of whether aid programs are targeted in the manner intended. Policy makers need to take a careful look at these targeted groups, especially nontraditional students, as the percent of traditional students decreases, to see how best to meet the needs of the student and ultimately boost the enrollment of the institution. Gladieux (1983, Fall) emphasizes that "the shrinking pool of traditional students will lead all sectors to look at proposed alternatives and changes in allocation formulas, eligibility criteria, and definitions of student need that determine who gets what, where, and how...from the student aid programs" (p. 16).

Even though MATURITY was not a significant variable in this study, it also would be of policy interest to investigate the differences in the amount of aid by age category. There has been much discussion about insufficient aid being awarded to older students. This might show up in a descriptive profile in which students

were sorted by age category, dependency status, or marital status.

Because the number of females in higher education is getting larger and females often have different needs, this is an important targeted group to consider. As shown in this study, females receive less average aid dollars than males within both income categories and whether in public or private institutions. Moran (1986) and Fenske et al (1985) also found that women were not receiving the aid that they should receive.

There are several factors to consider in hypothesizing why women received less aid in this study. It seems clear that women are receiving less aid, but the reasons for this are not readily apparent and need further research. A large number of women are part-time and this may have restricted their aid amount. It may be that women are more often in the highest bracket of income for aided students as defined by this study and therefore would get less aid. A finer breakdown of income into more narrow categories might address this. It may be that women are not getting timely aid information and thus, are getting left out of

the aid pool. Finally, there may be some bias operating to restrict their receipt of aid.

Policy makers need to be cognizant of the disparity between the aid received by males and females, especially in private institutions, where low income females' aid amounts appear to be the lowest. It would be good to look again at females and the amount of aid they receive, perhaps using the 1990 NPSAS survey, to see if the average aid has increased due to the new provisions of the 1986 Higher Education Amendments. The Project on the Status and Education of Women (1987) speculated on provisions of the 1986 Amendments that would help ensure equity for women: including child and dependent care costs in eligibility formulas for aid, waiving of including home equity for displaced homemakers, student aid not being considered income for the purposes of receiving aid for other federal programs, giving more student aid for part-time students, many of whom are females, and giving a six-month GSL deferment for parents of new babies. (p. 7) Future researchers could use this study's model to investigate the effects of one's gender on the amount of aid received in light of these new provisions. The model could also be used

to study ATTENDANCE STATUS and SEX together. This model provides a good framework for investigating other variables.

While the percent of aided non-whites is less than the percent of aided whites across all cells of aided students, it is slightly higher than the percent of non-whites in the postsecondary population, as sampled by NPSAS. It is also shown in this study that non-whites were over 24% of the aided students in the weighted estimate from this sample, compared to 16% non-Caucasians in Caplan's 1980 study. However, in this study, non-whites received 27% of the aid and the average amounts of aid are higher for non-whites in seven out of eight sectors in this study. In the public sector, whites and non-whites received overall fairly similar amounts of aid, though non-whites generally received slightly higher amounts. But in the private sector, non-whites received much larger amounts. It is not possible from these data to say what is causing the awarding of aid to occur in this manner, but this would be an interesting topic for further research. Some possible explanations include the following:

1. Many minorities are low income proportionally and it may be that more minorities are in the lower end of the lower income category as defined by this study. This would mean that they should receive more aid. A breakdown of income into narrower categories would help answer this hypothesis.

2. More minorities attend community colleges proportionately and community colleges are more revenue-driven and need to offer good financial aid packages to keep enrollment bolstered. The community college may be meeting the needs of minorities.

3. Minorities may have heightened awareness about availability of aid.

4. Awareness of minority status is occurring in the awarding of aid.

Private institutions appear to be reaching out to non-whites. However, these institutions will have to provide an increasing amount of their funds to close the gap and the federal government policy makers will have to consider making more grants to these minority and other disadvantaged students.



It would also be good for future research to use the model of this study to analyze with a finer breakdown of non-whites, into Hispanic, Black, and Oriental, etc. to examine the differences in the average amount of aid received by the various groups of non-whites. The model could also be used to study RACE and TYPE together.

Although the differences between sectors in this study are not interval data, their ordinal rankings are valid for policy interpretation. It is then feasible to say which sector receives more aid, but the dollar amounts may not conform to reality.

Future research should be done to see if ability is entering into the aid decision in any important way. A better ability measure, such as SATs could be used for such an assessment. It would be more valuable to look at all aided students, not just need-based, in determining the relationship between ability and aid. This was not possible in this study due to the structure of the data.

There has been a major shift from grants to loans in the last decade that is affecting all aided students. Future research could use the model of this study to look at the distribution of aid according to grants, loans, and

work-study, instead of just the total amount of aid received. This would give a more detailed picture of how aid is distributed.

Many poor non-white and white students are reluctant to take on such large debts and are opting out of expensive and/or lengthy programs at four year and private institutions. By providing larger grants, the government would foster more choice of an institution for these disadvantaged groups.

One of the major changes in the reauthorization of the Higher Education Act is "a \$200 increase in the Pell grant maximum each year beginning with a \$2300 maximum for FY 1987 (contingent upon the appropriation process)" (Ozer, 1986, p. 25). The question is whether this increase will be enough to offset increases in the price of institutions. Doyle and Hartle (1985) argue that "students do not have a right to a Harvard or Stanford education and the federal government has no obligation to pay for their education if they choose such high-priced schools" (p. 55). But the precedent for low income students to be able to choose high-priced schools has been established. It would require major policy adaptation to change this precedent, an

adaptation that private schools would strongly resist. The remaining issue is "how to best spend money on student aid in a period of tight budgets" (Doyle and Hartle, 1985, p. 8).

Of major concern are all the undergraduate students who are not receiving aid but who need aid to pursue postsecondary education. This study was unable to address this issue. It would be an important contribution for future research to look at which groups are not receiving the aid that they should and to examine why this is occurring.

Gladioux (1983) echoes a common concern for financial aid in the future. "One thing is clear. There will not be enough money to go all the way around in coming years. 'Trade-offs' between part-time and full-time, independent and dependent, graduate and undergraduate, older and younger students will make the business of student aid administration even more complicated--and more highly charged with issues of social equity--than it has been in the past" (p. 422).

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**APPENDIX A**

## Comparison of Institution-Reported and Student-Reported Expenses

It is important to be aware that student estimates are not perfect measures and that they are conceptually and statistically different than the institution-reported expenses.

NCES summarizes the comparison of institution-reported and student-reported expenses in the following way:

Undergraduates' perceptions and reports of their expenses differed from the expenses used by the institution to determine need-based financial aid award amounts. Yet, the differences followed a consistent pattern. Expenses of students living in school-owned housing tended to more closely approximate institution-determined expenses than those of undergraduates who lived off campus with or not with their parents. It is possible that students who lived with their parents did not perceive a large share of their food and housing expenses to be related to their postsecondary attendance, although they are

allowable expenses in awarding need-based aid to students. (Korb et al, 1988, p. vii)

"Students who lived at home with their parents reported food and housing expenses that were roughly \$1,000 less than the institution-determined expenses" (Korb et al, 1988, p. 20). NCES also reported that differences between institution-reported and student-reported expenses did not "vary in a consistent way by control of institution. Generally, the pattern of differences that emerged when expenses were examined by housing arrangement persisted when expenses were examined by control of institution" (Korb et al, 1988, p. 22).

**APPENDIX B**

Table B-1

**Means and Standard Deviations for Stepwise Regression Model 2 Variables**

<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>Standard Deviation</b>
MATURITY (FACTOR 1)	1000	-3.96-16	0.88
PRICE (FACTOR 2)	1000	-1.09-15	0.75
INCOME	1000	25510.56	18407.68
RACE	999	0.20	0.40
SEX	1000	0.44	0.50
ATTENDANCE	1000	0.93	0.26
TYPE	1000	0.15	0.36

Table B-2

Stepwise Regression Model 2 – Summary Chart

	<b>DF</b>	<b>Sum of Squares</b>	<b>Mean Squares</b>	<b>F</b>	<b>Prob &gt; F</b>
Regression	5	3898487236.99	779697447.39	108.00	.0001
Error	993	7168674099.84	721908.56		
Total	998	11067161336.83			

**APPENDIX C**

## Aid Based on Institutional Choice Characteristics

### Unweighted Results for Sample

It was shown by the results of the first sorting and nesting step (by CONTROL) that 43% of the aided students in this sample were in public institutions and 57% were in private institutions. The average amount of aid for students in public institutions (\$3115) was less than the average amount of aid for students in private institutions (\$5814), as would be expected based on the price of these institutions. Ratios of the total amount of aid to students costs in these two sectors were calculated. The ratio of aid to cost was .99 in the public sector and .71 in the private sector.

The second sorting step was based on INCOME within each CONTROL of institution. Within the public sector, the majority (62%) of the aided students were low income, while in the private sector, the majority (59%) were high income. This indicated that more of the lowest income students were in public institutions. Regardless of income level, average aid was greater in private institutions. For both private and public sectors, average aid to low income students was greater than to high income students (\$3424 v.



\$2612 in public and \$6290 v. \$5486 in private). This indicated that aid to need-based recipients was being distributed as intended, with low income students receiving more aid than high income students within their respective sectors.

The third sorting step was done by TYPE of institution (two-year/ four-year) within INCOME within CONTROL of institution. The vast majority (84%) of the students in this sample were in four-year institutions and only 16% were in two-year institutions. There was little difference between public and private institutions in the percent of students in four-year institutions (90% high income v. 78% low income in private and 91% high v. 79% low in public).

Ratios of aid amounts to student costs were calculated to make meaningful comparisons of aid received by students in two-year and four-year institutions. Within public and private institutions, low income students had a greater proportion of their costs met by aid than high income. Private institution students received a lower proportion of aid within respective income categories than the public institutions. Within public institutions, two-year students received a greater proportion of aid (1.32 for low

income and .84 for high income) than four-year students (1.12 for low income and .70 for high income). Within private institutions, the same pattern prevailed, with two-year students receiving a greater proportion of aid (.93 for low income and .71 for high income) than four-year students (.84 for low income and .59 for high income).

The results of this sorting procedure showed that two-year students had a greater proportion of their costs met by aid than four-year students within respective income and control of institution categories. Higher income aided students tended to be in four-year institutions more than lower income aided students.

The fourth sorting step sorted by ATTENDANCE STATUS (full-time/part-time) within TYPE of institution within INCOME and within CONTROL of institution. Part-time students were less than 8% of the sample; full-time were 92%. Ratios of part-time aid amount to full-time aid amount were employed to examine in a more meaningful way the differences in amount of aid received. Within the public sector, higher income part-time students received a higher proportion of aid (.79 and .83) than their lower income counterparts (.66 and .72). Within the public

sector, four-year part-time students received a higher proportion of aid (.72 and .83) than their two-year counterparts (.66 and .79). Within the private sector, low income four-year students received the lowest proportion of aid (.53), while high income four-year students received the highest proportion of aid (.71).

It appeared that part-time students fared best compared to full-time in the public sector, especially if they were higher income. (See Table C-1 for summary of sorting by institutional choice characteristics.)

#### Aid Based on Student Demographic Characteristics

##### Unweighted Results for the Sample

The first and second sorting steps were the same as followed in sorting procedure based on institutional choice characteristics with sorting being done by CONTROL of institution first, followed by sorting by INCOME within CONTROL of institution.

The third sorting step consisted of sorting by SEX within INCOME within CONTROL of institution. Females were 55% of this sample of aided undergraduates, with males being 45%.

Table C-1

**Descriptive Profile When Data Were Sorted by CONTROL OF INSTITUTION, INCOME, TYPE, and ATTENDANCE STATUS**

	Public				Private			
	2 year	4 year	2 year	4 year	2 year	4 year	2 year	4 year
N	4814				6327			
% of Previous Level	43%				57%			
Aid Amount	\$3115				\$5814			
	Low Income				High Income			
N	2989	1825	2583	3744	2989	1825	2583	3744
% of Sample	27%	16%	23%	34%	27%	16%	23%	34%
% of Previous Level	62%	38%	41%	59%	62%	38%	41%	59%
Aid Amount	\$3423	\$2612	\$6290	\$5486	\$3423	\$2612	\$6290	\$5486
	2 year		4 year		2 year		4 year	
N	637	2352	167	1658	561	2022	390	3354
% of Sample	6%	21%	1%	15%	5%	18%	4%	30%
% of Previous Level	21%	79%	9%	91%	22%	78%	10%	90%
Aid Amount	\$2449	\$3687	\$1922	\$2681	\$4202	\$6870	\$3631	\$5701
	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time
N	511	126	485	76	485	76	354	36
% of Sample	5%	1%	4%	.7%	4%	.7%	3%	.3%
% of Previous Level	80%	20%	86%	14%	86%	14%	91%	9%
Aid Amount	\$2624	\$1738	\$4430	\$2744	\$4430	\$2744	\$3757	\$2387
	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time
N	2624	1738	2258	2707	2258	2707	3812	4062
% of Sample	80%	20%	94%	6%	94%	6%	97%	3%
% of Previous Level	80%	20%	94%	6%	94%	6%	97%	3%
Aid Amount	\$2624	\$1738	\$4430	\$2744	\$4430	\$2744	\$3757	\$2387

Source: 11,141 aided undergraduate students taken from NPSAS database.

Results indicated that males consistently received greater aid amounts than females within their respective income and control sectors. The discrepancy was greatest in the low income private sector where males received an average aid amount of \$6874 while females received \$5863. In the high income private sector, males received average aid amount of \$5732 and females received \$5275. The discrepancy was not that large in the public sector, but still was present.

The fourth sorting step sorted by RACE (minority/white) within SEX within INCOME within CONTROL of institution. Non-whites comprised only about 22% of the aided students in this sample. Within the public sector, non-whites and white received similar average amounts of aid, except in the high income female sector, where non-white average aid amount was \$2883, while whites received only \$2521. Within the private sector, non-white aid amount averaged much higher than white aid amount for both males and females (both high and low income). Males, both non-white and white, received higher aid amounts than females. Within the private sector, low income male non-white students received average aid amount of \$7681 and low

income male white students received \$6604. Within the private sector, low income female non-white students received average aid amount of \$6048 and low income female white students received \$5772. Within the private sector, high income male non-white students received average aid amount of \$6639 and high income male white students received average aid amount of \$5603. Within the private sector, high income female non-white students received average amount of aid of \$5996 and high income female white students received \$5156.

This sorting procedure showed that overall, males received higher amounts of aid than females and that non-whites in the private sector received more aid than whites. (See Table C-2 for summary of sorting by student demographics characteristics.)

Table C-2

**Descriptive Profile When Data Were Sorted by CONTROL of INSTITUTION, INCOME, SEX, and RACE**

		Public				Private			
		Low Income		High Income		Low Income		High Income	
N		4814		6327					
Row %		43%		57%					
Aid Amount		\$3115		\$5814					
N		2989		1825		2583		3744	
Row %		27%		16%		23%		34%	
% of Previous Level		62%		38%		41%		50%	
Aid Amount		\$3423		\$2612		\$6290		\$5486	
		Male		Female		Male		Female	
N		1264		998		1086		1496	
Row %		11%		9%		10%		13%	
% of Previous Level		42%		55%		42%		56%	
Aid Amount		\$3586		\$2581		\$6874		\$5863	
		Minority		White		Minority		White	
N		356		829		277		476	
Row %		3%		7%		2%		4%	
% of Previous Level		28%		83%		26%		32%	
Aid Amount		\$3410		\$2521		\$7681		\$6048	
		Minority		White		Minority		White	
N		356		829		277		476	
Row %		3%		7%		2%		4%	
% of Previous Level		28%		83%		26%		32%	
Aid Amount		\$3410		\$2521		\$7681		\$6048	
		Minority		White		Minority		White	
N		356		829		277		476	
Row %		3%		7%		2%		4%	
% of Previous Level		28%		83%		26%		32%	
Aid Amount		\$3410		\$2521		\$7681		\$6048	

Source: 11,141 aided undergraduate students taken from NPSAS database.

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