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ABSTRACT

Results of a study of trends in college-going decisions of new high school graduates between 1972 and 1980 are presented, along with a model of college choice. The focus is the choice between college and noncollege options. Based on a review of empirical and theoretical work on college choice over the past 25 years, information is provided on key variable categories for each major study, along with the dependent variables and data sources employed. Based on studies of traditional students, 13 critical variables and 10 noncritical variables that may influence college choice are examined. Variables for a college choice model for nontraditional students are also identified. Changes in high school graduates' college choices between 1972 and 1980 are assessed, based on results of the National Longitudinal Study (NLS) of the high school class of 1972 and the High School and Beyond (HSB) surveys. Work that was required to prepare comparable NLS and HSB data is also described (i.e., coding, recording, and missing-data procedures). Conferences were held at Harvard University to assess and extend the review of college choice studies and to evaluate the match between data and sample requirements and the national and longitudinal studies. Conference participants are listed. (SW)

WORKABLE, COMPREHENSIVE MODELS OF COLLEGE CHOICE

FINAL AND TECHNICAL REPORT

Contract NIE-R-400-83-0055

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WORKABLE, COMPREHENSIVE MODELS OF COLLEGE CHOICE

FINAL AND TECHNICAL REPORT

Principal Investigator:

Gregory A. Jackson, Harvard University

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Portions of this report have been or will be available in other project-related publications.

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Dawn Geronimo Terkla managed the initial stages of the research, and was assisted by Elizabeth Schoenherr and Harry Levit. Janet Schwartz and Beverley Robinson assisted me with data analysis. William Morgan of the Ohio State University undertook additional data analysis.

Several other individuals contributed to the project through conferences, reviews, or informal comments. Jim Fox of the National Institute of Education served as Project Officer.

Chapter 1: The Student Choice Project

The Structure of College Choice

Fred didn't finish high school, which never attracted him much in any case; the local economy was doing well, and there were numerous incentives to work rather than study. Terry finished high school, but he never gave much thought to college, and didn't enroll; it was enough, he figured, that he had finished high school whereas losers like Fred hadn't. One of Terry's friends ended up enrolling at the local community college, and another -- someone he didn't know that well -- even went to State.

Pat, in contrast, never thought seriously about not going to college; her parents both had done so, and they encouraged her to follow their footsteps. Good test scores and grades helped, too; she wrote to about fifteen colleges, and ended up applying to four, being admitted to all, and choosing Chatham College in Pittsburgh. Her best friend Sara also applied to several schools, although Sara's parents were less enthusiastic about this than Pat's, and was admitted to all save one. Sara entered the University of California at Berkeley, but she ended up dropping out after two years and two majors.

Paul faced a tough decision. His grades and scores were good, and counselors pushed college. His parents were enthusiastic too, partly because neither of them had been to college. But Paul's family was not well off, and he knew his earnings might prove important to his family. Moving away was out of the question, part-time study an attractive

option. Paul spent considerable time analyzing his finances and college costs, and ended up applying for financial aid and enrolling at State while working part-time at an electronic repair service.

Aggregate college participation rates change either (a) when the distribution of prospective students across these types changes or (b) when the decision making of any one type changes. Decision making changes either when influences on decisions change or when their effects vis a vis other influences change. Thus, as an example of change in influences, Paul's decision might have been different if financial aid became hard to get; Pat and Sara, on the other hand, might choose a different college but probably would still enroll. A change in the local economy would influence Fred, Terry, and to a lesser extent Paul, but not the others. A change in effects might arise if, for example, a major statewide change in admissions and campus assignment policies made academic performance relatively less important than it had been, so that students could choose the flagship state university campus despite less-than-stellar grades. Even with influences and their effects steady, an increase in the proportion of all students who resemble Pat and Sara would increase aggregate participation.

The college choices of Fred, Terry, Paul, Pat, and Sara evolved over time. Initially these prospective students identified various options they might pursue after high school, including (except for Fred) one or more colleges. They then considered each option in light of their attributes, including family finances and academic ability, rejecting some as infeasible and obtaining further information -- often incorrect

-- on others. Finally the students analyzed the remaining members of their own "choice sets", evaluating options in terms of their likes and dislikes (what economists call their "utility functions"). They selected the option which appeared to best suit their likes and minimize their dislikes.

These five extremely simplistic stereotypes illustrate the difficulty in analyzing influences on college choice. By "college choice", an ambiguous term, I mean choosing among college and other options, not the choice among colleges. The major difficulty, of course, is that we do not know how many students are like Pat or Sara, how many like Paul, how many like Fred or Terry. We tend to presume that higher family income, more parent education, and high academic achievement produce Pats and Saras, and that the absence of all these produces Freds and Terrys. A mixture produces Pauls. We therefore tend to analyze the effects of family background, academic achievement, and other variables on choice, using these variables as proxies for the underlying classification. Since the variables are not independent of each other, we analyze their joint effects as well, and we also include variables presumed to figure in the utility functions of all prospective college students, such as tuition levels and local college offerings. The results are adequate, but far from ideal.

There are other complications. To identify Freds (high school dropouts) we need data on individuals' high school experiences. To distinguish Pats from Saras (college completers from college dropouts) we need data on college experiences. But such longitudinal data are

rare, and so generally we make do with analyses of high school graduates' college entry decisions -- which means Fred doesn't exist, and Sara's choice is the same as Pat's. In technical terms, the ideal outcome variable for college choice runs on some scale from no high school diploma at the low end to advanced degree completion at the high end. We approximate it with a dichotomy between no college entry and college entry, and with samples that exclude high school dropouts.

High school graduates' college entry decisions are in a sense the least important of the three major educational-persistence decisions. Consider, for example, the crest of the baby boom, children born in 1957. Among the resulting 4,096,000 seventeen-year-olds in the United States in 1974, about 3,080,000 completed high school; of these about 2,394,000 entered college, and of these about 1,243,000 completed degrees. Of the 2,853,000 who did not complete college, therefore, the largest fraction, 40.3 percent, entered but did not complete college; the next largest fraction, 35.6 percent, did not complete high school (Jackson, 1981 and 1985).

The college choices of high school graduates may have changed over time, further complicating analysis. Major instances of historical change in college choice include the creation of the land-grant university system in the late 1900s, which brought higher education to regions and economic sectors which had had little use for it, and the assorted veterans' programs which followed World War II and the Korean War. Each of these programs sought to encourage new kinds of students to think about higher education, sometimes because educating them would have

social benefits and sometimes because it would reward individuals (perhaps keeping them out of the labor force in the process). At the same time high school completion rates reached new highs, making college a useful way for success seekers to distance themselves from the hoi polloi.

Between 1960 and 1970 the Interstate highway system spread its web within and between cities, increasing mobility for everything from furniture to farmworkers to physicists. The draft and the war in Vietnam led many males to think of college not only as education, but as sanctuary. Community colleges sprang up across the nation, often bringing higher education near neighborhoods and within financial reach for the first time. The federal government, responding to perceived Russian superiority, began to provide greater financial incentives for postsecondary education, primarily in the form of loans. Partly in response to these forces, and partly in response to competitive and social pressures, degree credit enrollment in higher education rose from 22.2 percent of eighteen to twenty-four year olds in 1960 to 32.1 percent in 1970 (Grant and Snyder, 1984); entry rates among high school graduates rose commensurately. If Richard Freeman (1975) is correct, this increase in college participation reduced the payoff to investment in higher education.

Environmental changes since 1970 have continued, but somewhat less dramatically. The Higher Education Amendments of 1972, for example, created a new program of need-based grants for higher education, now called Pell grants, and reworked the existing system of federally

guaranteed loans into a much broader, more expensive system. Later legislation, the Middle Income Student Assistance Act or MISAA, extended these programs to middle-income families and students, and so things remained until the program's cost and political changes brought retrenchment and restrictions in 1980 and 1982.

Other changes came as well. Students rediscovered economic success and professional status; conservatism returned to campuses in various guises. Costs rose sharply, increasing the number of part-time students and employed students. High school graduates became fewer in the mid-1970s, and colleges began to woo adult learners. Moreover, in January 1973, largely in response to antiwar activities, military service in the United States become voluntary, although draft registration continued. (In 1970 the previous system of 2-S educational deferments had been replaced by a lottery, essentially eliminating educational sanctuary.)

One last complication requires discussion before I move on. Most surveys of college choice, although they follow students over time, are essentially cross-sectional; that is, individuals are initially surveyed at the same time, so all variation is among individuals. This makes it hard to analyze the effects of changes which occur over time, and do not vary across individuals. Consider, for example, local economic conditions, so important to Fred, Terry, and Paul. There is evidence that if unemployment rises over time so does enrollment in higher education, presumably because education is a productive alternative to nonwork and helps one compete in a tough market. To analyze this one relates unemployment rates to enrollment rates over time, using aggregate data

and controlling for other relevant aggregate changes over time. In a typical college-choice study one has data on numerous high school graduates who live in different places, and it is tempting to see whether inter-place unemployment-rate differences have an effect on choice. They generally don't, which seems contradictory. The point is that diachronic unemployment-rate changes, rather than synchronic differences, affect choice. Such problems constrain the usefulness of longitudinal surveys of individual high school graduates, which are necessary for proper multivariate analysis.

Project Inception

In September 1983 the National Institute of Education (now Center for Research) of the US Department of Education awarded a contract to Harvard University, following a competition, to develop workable, comprehensive models of student postsecondary choice. Harvard proposed to concentrate on the college-going[1] decisions of recent high-school graduates as these have changed over time, with some attention, data permitting, to college participation among young adults. The product was to be a set of equations -- a model -- relating various attributes of potential college students to their likelihood of attendance.

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[1]Here, as below, I use "college" as shorthand for any academic postesecondary institution, including community colleges, four-year colleges, and universities.

Scope of Work

The project comprised three broad tasks. First, it was to review existing work on postsecondary choice, beginning with previous empirical studies and placing them in theoretical context. Second, it was to identify existing datasets appropriate for student-choice analysis. Third, it was to reanalyze selected datasets and assess change in college-choice patterns over time.

Review. Research on college choice emerges primarily from three disciplines: psychology, sociology, and economics. Psychological research deals primarily with counseling, and with the the complex interactions among students, families, peers, and educational institutions. Sociological research deals with the ways educational attainment, the product of college choice, represents and influences social status attainment. Economic research examines educational decisions as consumption, or as investments in the future of individuals or society, and thus studies the costs and benefits of education compared to other postsecondary possibilities. Some student-choice research reflects combinations of these perspectives, but most concentrates on one or another.

My associates and I identified and read numerous reports, articles, monographs, books, and essays concerning college choice. Of particular interest were arguments or evidence that specific student, family, or contextual attributes had substantial positive or negative effects on students' decisions to enroll in college. Much of this material had

been included in earlier reviews of the college choice literature (especially Weinschrott, 1977; Cohn and Morgan, 1978; McPherson, 1978, and Jackson and Weathersby, 1975), but in most cases staff reread original works.

From this emerged a summary of college choice research (Terkla and Jackson, 1984a) organized by choice-influencing variables and integrated using a summary recursive student-choice model based on the theoretical and empirical literature. This document then served as foundation for a one-day multidisciplinary conference at Harvard to assess, critique, extend, and further integrate the review. The 29 conference participants reflected all relevant disciplines, and also included practioners (from admissions and counseling) and the authors of earlier student--choice studies.

Based on the review report and the conference Dawn Terkla and I (1984b) developed a conceptual paper on college choice summarizing empirical and theoretical arguments and proposing a list of variables to be included in comprehensive analysis of college choice. This list served as the starting point for the next project task, identifying and selecting data. The substance of the conceptual paper constitutes Chapter 2 of this final report.

Data. Early research on college choice relied on aggregate time series -- for example, average tuition correlated with participation rates over several years -- or on retrospective interviews or questionnaires. Later work compared the aggregate attributes of college students with those of other high-school graduates, and from this evolved multivariate cross-sectional analysis of college choice. Most recent, comprehensive work requires longitudinal surveys of prospective students, so that multivariate analysis can proceed independent of retrospective data on college and non-college options and of artificially matched subsamples.

The review underlying the conceptual paper suggested strongly that any analysis of college choice rely on multivariate analysis of samples drawn from prospective college students. It also suggested that wherever possible data on attributes and choice should be contemporaneous rather than retrospective ("what other colleges did you consider last year?") or prospective ("where do you think you you go to college next year?"). Following these suggestions we identified several datasets apparently suited to college choice research, including both traditional and non-traditional students, and invited individuals familiar with each to a second conference on college choice data.

We asked each lead participant in the data conference to review the match between our data and sample requirements, as summarized in the concept paper, and a particular dataset or series of datasets. Most of the datasets we had identified were national and longitudinal, and discussion rapidly converged on a few of these: the National Longitudi-

nal Study of the high-school class of 1972 carried out by the Educational Testing Service and the Research Trinagle Institute (NLS), the National Longitudinal Surveys of labor-force behavior carried out by Herbert Parnes at Ohio State University (PNLS), and the High School and Beyond survey of the 1980 high-school sophomore and senior classes carried out by the National Opinion Research Center (HSB)[2]. Conferees argued that parallel analysis of NLS and HSB would provide clear indications of college choice changes between 1972 and 1980, a period of significant policy and social change. Analysis of the young men and women in PNLS might provide partial comparisons between the choices of traditional and nontraditional students.

These recommendations led directly to the third project task, data analysis. We secured NLS and HSB senior data (the appropriate HSB sophomore data were not yet available) for analysis at Harvard and arranged for a consultant at Ohio State University to prepare relevant summaries and subsamples from PNLS.

Analysis. Assessing change in college choice over time required high comparability between the 1972 (NLS) and 1980 (HSB) analyses. We thus devoted considerable time to detailed analysis of coding, recording, and missing-data procedures in these two surveys. Since the two surveys were designed to be comparable most questions and coding

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[2]The National Center for Educational Statistics (now Center for Statistics) commissioned and provided core funding for NLS and HSB, and the Department of Labor contributed to NLS and sponsored PNLS.

were similar, but the treatment of missing data and certain key questions was not.

One major difference concerned so-called "routing errors". Say, for example, that a respondent answered "no" when asked whether she had received financial aid at a given college, and therefore was supposed to skip the following question about aid types and amounts. Respondents who nevertheless answered the amount question received a special code in NLS, which required extra processing and, in some cases, resolution of conflicts among responses. Securing consistency in these cases required nothing more than careful recoding in NLS.

Another difference concerned construct variables. For example, both NLS and HSB reported a composite "aptitude" test score, but the instruments and scales underlying them differed. Both surveys asked whether students participated in or led various extracurricular activities, but the lists were different. In these cases we specified new construct variables maximizing comparability.

A third difference concerned local-area variables, such as nearby college costs and labor-market attributes. We obtained Zip codes for the NLS high schools, which made it possible to construct good measures of local college costs using data from the Higher Education General Information Surveys (HEGIS) and good measures of the local labor market using data from the fifth count (by three-digit Zip codes) of the 1980 Census. NCES refused to provide high-school Zip codes for HSB, and in any case the US Census Bureau had granted exclusive rights to the 1980 fifth count to a private company, making them too expensive for research

use. We did without labor-market variables (which have very modest cross-sectional effects in any case) and used aggregate student estimates of local college costs.

Several other differences between the surveys received similar treatment, and the results -- after a long period of construction, cross-checking, and reconstruction -- were samples from NLS and HSB encompassing most of the key variables our conceptual paper required, the samples restricted and variables coded almost identically. Chapter 4 of this report summarizes the preparation of the comparable NLS and HSB analysis samples.

Comparability required much more attention than anticipated, largely because NLS and HSB proved less comparable than advertised and because we were refused HSB high-school locations. I began similar attempts to make PNLS comparable to the two traditional-cohort surveys, but put them aside to keep the NLS/HSB work on schedule. Consequently a PNLS subsample was not available in time for full analysis, and we therefore report only superficial results for nontraditional students.

Once comparable samples were available I analyzed the relationship between student attributes and college choice in each. I began by grouping related measures, examining their interrelationships and relative effects on college choice, and combining and selecting so as to eliminate unnecessary redundancy. Thus, for example, I retained leadership and put aside participation as a measure of extracurricular activity.

Next, I used various stepwise, recursive regression procedures to identify variables with substantial zero-order or ceteris paribus effects on college choice in either survey, putting aside only variables with no strong effects in either sample and no substantive importance in their own right. Thus, for example, I retained local-college cost even though it showed no strong effects, and student sex even though it showed no strong effect in HSB.

Finally, I estimated the recursive effects of retained variables on college choice and intervening variables, forcing identical equation specifications in the two samples. The magnitudes of effects and collinearities in these comparable models and their consistency with each other and comparable previous analyses were such that re-estimation using more sophisticated statistical techniques seemed unnecessary. The results of this over-time analysis, the core task in the research project, constitute Chapter 3 of this report.

Staff

I directed the project throughout. The first two tasks, review and data selection, were carried out primarily by Dawn Geronimo Terkla, then Research Associate and Lecturer in Education at Harvard and now Director of Analytic Studies at Tufts University, with the assistance of Harvard graduate students Elizabeth Schoenherr, who specializes in college counseling and related issues, and Harry Levit, an experienced admissions officer.

I did most of the data analysis, with the assistance of Harvard graduate students Janet Schwartz and Beverley Robinson. In addition, William Morgan of the Ohio State University prepared and undertook preliminary analysis of a sample from the PNLS samples of young men and women, and a large number of individuals from Harvard and elsewhere contributed to the project through the Theory and Data conferences.

Summary

The central finding from this research is that student-choice patterns remained remarkably stable between 1972 and 1980, despite the wide range of presumably choice-related changes and events which characterized the period. The negative effects on college choice of being hispanic or black declined over the period, all else held equal, but of course all else did not remain equal for these groups. (The research does not speak directly to the apparently declining participation among these groups since 1980.) The effects of most academic variables, such as test scores and grades, increased somewhat between 1972 and 1980. The effect of financial aid also increased somewhat.

College participation rates changed little between 1972 and 1980; for the NLS and HSB samples I analyzed they remained virtually constant. Given the changes in student attributes between 1972 and 1980 and the choice-model estimates, but excluding the effects of changes in test scores (since this change was impossible to estimate from our samples), participation should have risen by 4.3 to 5.9 percentage points, a substantial increase. Including test scores in the prediction would

reduce it substantially, since test scores (such as SATs) declined over this period and the coefficient of test score is substantial. But clearly some forces not measured in either single-point regression equation worked to keep participation constant, and this leads to a general conclusion that many important influences on college choice cannot be captured by analyses of this type.

The remainder of this report details various aspects of the project. Chapter 2 summarizes the review of earlier empirical and conceptual literature which underlies the empirical work. Chapter 3 summarizes results of the parallel analysis of NLS and HSB data. Chapter 4 summarizes the work required to prepare comparable NLS and HSB samples for analysis.

Chapter 2: Empirical and Theoretical Review

The meaning of "college choice" varies with context. To illustrate the range it is simplest to cite two extreme views, both common in the literature. At one extreme college choice represents a single, discrete choice among specific options, such as the choice between the University of Indiana and Purdue or between Annapolis and West Point. At the other it represents the lengthy chain of specific choices which together lead students from their first educational decision to their last contact with the educational system.

The first view is too narrow and the second too global. One might productively focus on the choice, following high school, between a set of options which primarily involve college or university education and a set which primarily involve work (including homemaking). Or one might view college choice as the selection among categories of postsecondary education, thus concentrating on high school graduates who have decided to enter college. This research project focused, by design, on the choice between college and noncollege options, recognizing that this choice is not independent of others which precede it and that college-noncollege is not a clear dichotomy.

These definitions arose in research concerning traditional college choice: recent graduates from high school deciding whether to attend college full time. However, other individuals figure in broader conceptions of college choice. Some high school graduates make no clear

choice between work and study, and pursue both alternatives simultaneously: part-time students who work full time, for example (Jackson, 1985). In addition, many individuals choose higher education long after leaving high school. Some go to work full time, raise families, or become homemakers after high school. Others enter college, then do something else, and then reenter college. The choices of these nontraditional students may differ qualitatively from those of traditional students.

This chapter has two primary purposes. First, it examines the vast body of literature on college choice which has evolved over the past twenty-five years to see whether key elements have consistently emerged as important influences on college choice. Second, it synthesizes from the diverse theoretical and empirical material a general conceptual model of the college choice process. This model specifies the relationships among different variables presumably influencing college choice. Table 1 presents major choice studies and identifies key variable categories represented in each. It also describes the dependent variables and data sources employed by the various studies. The studies are not totally comparable, of course. Researchers employ different dependent variables, ranging from simple matriculation to attendance at a particular type of institution (public versus private) or a specific institution to the total number of years of postsecondary education training received (educational attainment). Moreover, different variables measure exogenous or independent influences on college choice. For example, some research uses SAT scores or a similar

TABLE 1

	Family Background	Aspiration	Neighborhood Context	High School Context	School Achvts. or Academic Ability	Availability	College Attributes: Price	College Attributes: Aid	Environment	College Effects	Labor Market	Data Set	Dependent Variables
: 1982	X	X		X	X							Study of Academic Prediction and Growth, 1961-69.	Track placement, educational aspirations, applications to and acceptances by colleges.
'8	X	X		X	X							Subset of students in Academic Growth Study; Fall 1965, ninth grade; Fall 1967, eleventh grade; 1969, twelfth grade.	Educational aspirations, applications to and acceptances by colleges.
land 1975	X	X			X							Wisconsin Survey, 1955, and follow-up, 1970.	Educational attainment, early occupational status, present occupational status.
land 1975	X	X			X							National sample of high school sophomores, 1955, and follow-up 1970.	Educational attainment, occupational status.
ill 1976	X			X	X							Survey conducted in 20 public, coeducational high schools, 1964 and 1965.	Educational aspirations, intellectual or scholarly orientation, self-conception of academic competence.
dan, allas 1982	X			X	X							NLS'72 and four follow-ups, 1972-80.	B.A. completion/male-female differences.
n and	X		X		X	X	X		X		X	Wisconsin Survey, high school class of 1957 and SCOPE study, 1966.	Educational attendance.
enwald 1979	X		X			X	X					Current Population Survey, 1975.	Participation, persistence/adults.
972	X				X	X	X	X	X			Pilot of NLS'72 - North Carolina, 1971.	College attendance, matriculation to public/private universities.
	X	X	X		X	X	X			X	X	Project Talent, high school class of 1961.	Educational attendance.
k 1977	X					X	X		X		X	Sample of 57,689 married men and women, aged 25 and over, drawn from Census, 1970.	College attendance.
1967	X											National sample of males, aged 20 - 64. Census Bureau cross-sectional data, 1962.	Educational attainment, early occupational status, present occupational status.
al 1967	X						X					U.S. Time Series Data, ages 18 - 24, 1919-64.	Educational demand and enrollment.

nued:)	Family Background	Aspiration	Neighborhood Context	High School Context	School Achvts. or Academic Ability	College Attributes: Availability	College Attributes: Price	College Attributes: Aid	Environment	College Effects	Labor Market	Data Set	Dependent Variables
dar 5	X					X						440 Wisconsin high school graduates, 1963, and follow-up, 1967.	College attendance.
72	X				X		X		X		X	Project TALENT, Equality of Educational Opportunity, Census Survey - 1959 and 1965, Boston Seniors - random sample in public and private schools, 1960.	College attendance, impact of SATs.
	X				X						X	U.S. Census Data, 1926-1969.	Educational attainment.
erg 1978	X				X		X			X		NLS'72, ACT sample of juniors.	College attendance.
	X					X				X	X	U.S. Time Series Data, 1943-67.	Enrollment rates for freshmen in engineering.
969	X						X				X	U.S. Time Series Data, 1919/20-1964/65.	Enrollment rates.
nder 1978	X	X		X	X	X				X	X	National sample of high school sophomores, males, 1955, and follow-up, 1970.	Occupational status and earnings.
	X	X		X	X	X	X		X			CIRP, SISFAP - A, college freshmen, 1975.	Institutional characteristics - selectivity, tuition fees, educational and general expenditures.
	X						X		X			U.S. Time Series Data, selected years between 1927 and 1973.	Matriculation to public/private universities.
an 1969	X				X		X	X	X		X	Cross-section of Project TALENT data and follow-up, 1960.	College attendance.
	X						X	X			X	Cross-sectional data, 1965.	Individual demand for education in California.
er 1977	X	X			X	X	X	X	X		X	High school graduates, Minnesota, 1948-70.	Prediction of college attendance at University of Minnesota, 1970-76.
	X					X	X		X			Cross-sectional data from 49 states, 1963-64.	Matriculation to public/private universities.
fer 1973	X					X	X	X	X			60 Massachusetts institutions of higher education, 1968 and 1972.	College attendance.
	X	X	X	X	X	X	X	X	X		X	NLS'72.	College attendance.

nued:)	Family Background	Aspiration	Neighborhood Context	High School Context	School Achvts. or Academic Ability	Availability	College Attributes: Price	College Attributes: Aid	Environment	College Effects	Labor Market	Data Set	Dependent Variables
	X	X		X	X							Project TALENT, 1960, and follow-up, 1972.	Educational attainment, occupational status and earnings.
bell 1977	X	X		X	X							Sample of males, in ninth grade, 1969, and follow-up, 1974.	Educational attainment/black-white differences.
	X				X	X	X		X			SCOPE data, 1966.	College attendance, which college, resident/commuter status.
	X			X	X					X		Survey of 1,047 high school seniors in northern Pennsylvania and southern New York areas, 1974.	Educational attainment.
983	X			X	X	X	X	X			X	NLS'72.	College attendance and persistence.
	X	X			X							Project TALENT, twelfth grade, 1960.	Occupational attainment.
	X	X		X	X							Project TALENT, male seniors, high school graduating classes 1960-65.	Occupational attainment/black-white differences.
1976	X	X		X	X							Youth in Transition Project - tenth grade boys, fall 1966, spring 1969, spring and summer 1970.	Educational attainment/black-white differences.
1975	X				X	X	X					SCOPE data, 1966.	College attendance and type of school.
	X		X	X	X							ETS survey, over 30,000 records, 1955.	Educational aspirations.
	X	X		X	X							NLS'72 and follow-ups, 1973 and 1974.	College attendance.
rn 1982	X	X			X	X						CIRP, SISFAP - A, eleventh and twelfth grades, freshmen longitudinal file, 1975.	Selectivity of institution, college entered, tuition and fees.
1976	X	X		X	X							Longitudinal study of Wisconsin sophomores, males, 1955, and follow-up, 1964.	Educational and occupational aspirations.
967	X				X							Longitudinal study of Wisconsin sophomores, males, 1955, and follow-up, 1964.	Educational attainment and occupational status.
1966	X	X	X		v							Longitudinal study of Wisconsin sophomores, males, 1955, and follow-up, 1964.	Educational aspirations and college plans.

nued:)	Family Background	Aspiration	Neighborhood Context	High School Context	School Achvts. or Academic Ability	Availability	College Attributes: Price	College Attributes: Aid	Environment	College Effects	Labor Market	Data Set	Dependent Variables
r,	X			X	X							NLS'72.	College attendance, aptitude, curriculum placement, class rank.
	X	X				X	X	X	X			Subset of CIRP National Data Base, high school seniors, 1974-75.	Matriculation to public/private universities.
	X	X	X	X	X	X		X				Longitudinal study of senior class of 1959 - California, Midwest, and Pennsylvania, and follow-up in 1962, 1963, 1964.	Educational attainment.
1968	X	X		X	X	X						Longitudinal study of senior class of 1959 - California, Midwest, and Pennsylvania, and follow-ups in 1962, 1963, and 1964.	College attendance.
84	X	X		X	X							High School and Beyond seniors, 1980 and follow-up, 1982.	Postsecondary attendance.
983	X	X			X	X						New England Region College Board Data, SAT submissions, 1978-81.	Market segmentation - which types of colleges students apply to.

tions:

Institutional Research Program

urvey of entering college freshmen conducted since 1966.

nducted by the Higher Education Research Institute (HERI) at the alifornia, Los Angeles, under the continued sponsorship of the l on Education.

Beyond

longitudinal study of sophomores and seniors. Base year data was ophomores and seniors in the spring of 1980. The first follow-up n 1982.

and conducted by the national Center for Educational Statistics (NCES).

ngitudinal Surveys of Labor Market Experience

g national study of approximately 5,000 individuals which includes our subsets of the U.S. civilian population - men, 45-49 years of age ("middle-aged men"), women, 30-44 years of age ("mature women"), and young men and women between the ages of 14 and 24.

Supported by the U.S. Department of Labor's Employment and Training Administration. Conducted by the Center for Human Research, Ohio State University.

NLS'72

The National Longitudinal Study of the High School Senior Class of 1972

A national study of 18,000 students from the 1972 high school graduating class, with follow-ups in 1973, 1974, 1976, and 1979.

Initiated and conducted for the National Center for Education Statistics (NCES).

Project SCOPE

School to College: Opportunities for Postsecondary Education

A study which follows the educational and occupational careers of nearly 90,000 ninth and twelfth graders of 1966 in four states - California, Illinois, North Carolina, and Massachusetts.

(continued...)

Project SCOPE (continued:)

Sponsored by the Center for Research and Development in Higher Education at the University of California, Berkeley and by the College Entrance Examination Board.

Project TALENT

A national study of more than 400,000 U.S. high school students, grades 9-12, begun in 1960 with follow-ups conducted approximately one, five, ten, and twenty years following graduation of each high school class.

See Wise, L.L., McLaughlin, D.H., and Steel, L. The Project TALENT Data Bank Handbook. Palo Alto, California: American Institutes for Research, 1977.

The Wisconsin Longitudinal Study of Social and Psychological Factors in Aspirations and Achievements

A 1957 survey of the post-high school educational plans of all high school seniors in the public, private, and parochial schools of Wisconsin with follow-ups.

Initial study conducted by J. Kenneth Little with the cooperation of the Wisconsin State Superintendent of Schools. Since 1962, support of the study has come principally from the National Institute of Mental Health (NIMH) and the research has been conducted at the University of Wisconsin-Madison.

standardized test score to measure of student ability while other research uses the student's high school grade point average (GPA). In addition, studies involve different cohorts and various data sets. The military draft (or its absence), the state of the economy, perceived employment opportunities for college graduates, and other such forces probably contribute to students' decisions at certain points in time, but are rarely represented in choice models. They thus may cause otherwise unexplained differences among studies of different cohorts.

Virtually all college choice studies have focused upon the traditional college-age student, and the first section of this chapter follows suit. A very limited number of comparable analyses (Bishop & Van Dyk, 1977; Anderson & Darkenwald,1979) have analyzed adults' decisions to attend institutions of higher education, and a later section briefly discusses some factors which influence a non-traditional student's matriculation decision.

Influences on Traditional Students

In a prior review of the literature Terkla and I (1984a) identified eleven major categories of variables which influence students' matriculation decisions (Figure 1). These categories fell along a continuum ranking them according to the magnitude of influence -- strong to weak -- on choice. This chapter examines specific variables within the broad categories. Table 2 identifies both critical and non-critical (but important) variables which should be included in a comprehensive model of college choice. A discussion of these follows.

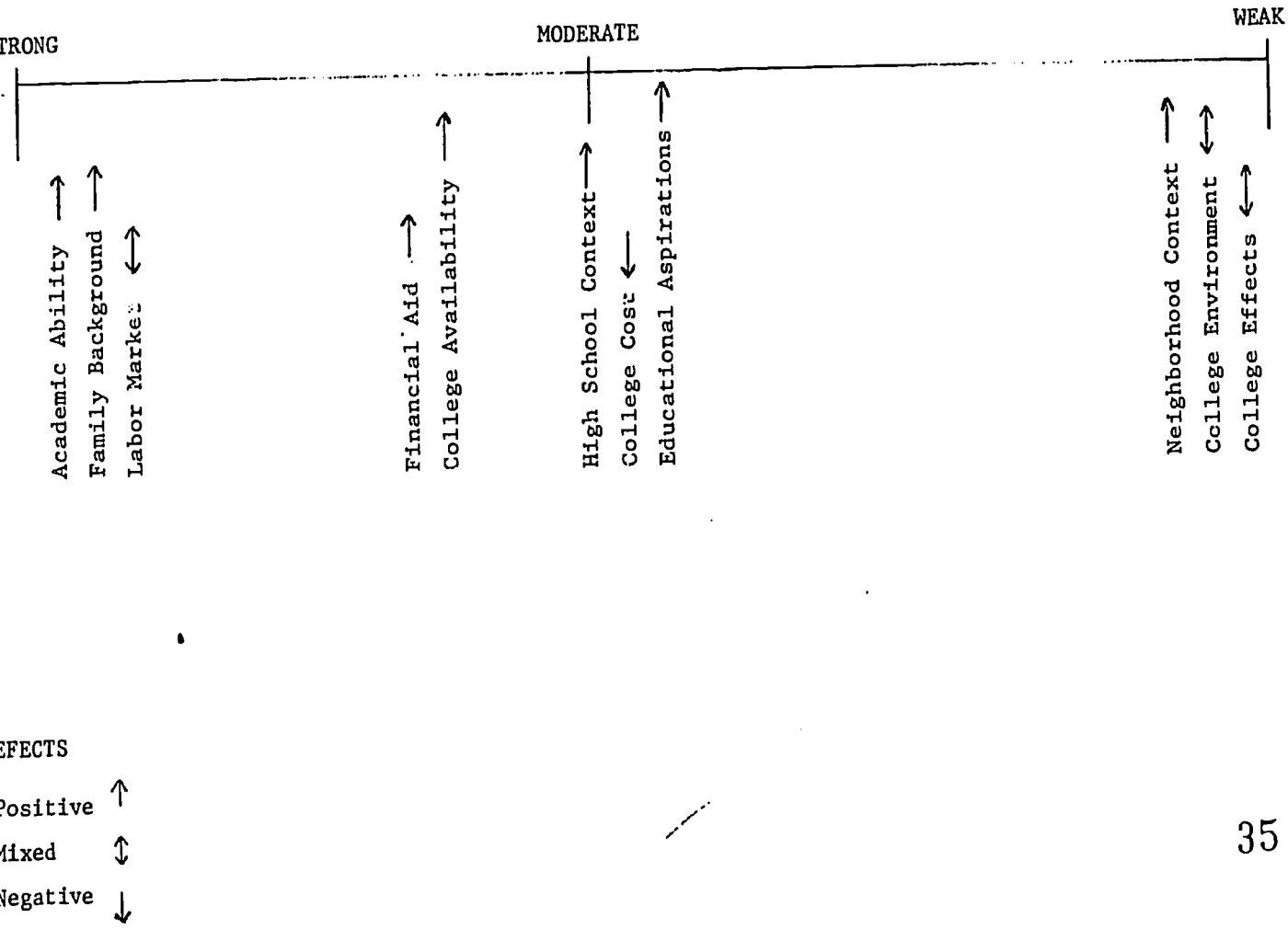
Table 2

Variable Specification

Critical Variables	Non-Critical Variables
family income	peers' plans
father's education	high school curriculum - (track placement)
father's occupation	high school sector
mother's education	student's aspirations
mother's occupation	post secondary institution sector
student's GPA	type of community student resides in
student's SAT scores	institution's prestige ranking
unemployment rate for age cohort	student's anticipated lifetime earnings
proportion of age cohort entering the military	measure of student's ambition or motivatic
distance of institution from student's home	social integration measure
total cost of attendance	
financial aid award	
institution's admission requirements	

FIGURE 1

COLLEGE CHOICE INFLUENCES



Family Background. Most studies conclude that family background variables such as parents' educations, occupations, and income strongly influence traditional students' college choice decisions. These effects are both direct and indirect. Often the indirect effects manifest themselves through mediating variables. These findings are not terribly surprising, since they do not diverge from conventional wisdom concerning the influence of family background characteristics. It seems quite reasonable that college-educated parents will provide various incentives and influence their children's matriculation decisions. In addition, college finances should dissuade students from high-income families less than than they do less affluent students.

Early sociological studies were the first to confirm the importance of socioeconomic variables. Blau and Duncan (1967) found that father's education and occcupation had a significant effect on the son's educational attainment, using a 1962 Current Population Survey (CPS) sample of males aged 20 to 64. The model employed variables from four distinct phases of the son's life cycle: father's education and occupation, son's educational attainment, son's early occupational status, and son's current occupational status. The analysis was somewhat limited as it did not contain measures of academic ability or family background variables other than father's education and occupation.

Sewell and Shah (1967), employing a survey of Wisconsin high school seniors begun in 1957 and followed up in 1964, extended the Blau and Duncan model to include additional family background variables and a

measure of academic ability. Sewell and Shah reported that specific family background variables -- father's education, mother's education, parents' financial contribution for postsecondary education, and family income -- had a significant direct effect on educational attendance and attainment. They also found academic ability to be significant, about which more below.

Sewell and Hauser (1976), who used the same Wisconsin data as Sewell and Shah, also extended the Blau and Duncan model. In addition to socioeconomic and academic ability measures, their model included high school performance, peers' plans, educational plans, and occupational aspirations. Sewell and Hauser found that socioeconomic background (which included father's education, mother's education, parental income, and father's occupation) accounted for 15 percent of the total variance in postsecondary educational attainment. Controlling ability, they found that high status students were twice as likely as low status students to continue their education beyond high school.

Using the "Exploration in Equality of Opportunity" survey, Alexander and Eckland (1975a, 1975b) replicated and further extended the Blau and Duncan model. They incorporated a variety of family background variables (mother's education, father's education and occupation, and a household items index), student's educational aspirations, and a twenty-two item aptitude test administered by ETS. They found that family background had both a significant direct effect and an indirect effect (mediated by educational aspirations) on educational attainment.

Trent and Medsker (1968) focused on social and psychological factors that influence college choice, including three family background variables (mother's education, father's education and occupation), parental and student educational aspirations, the influence of peers and school personnel, and academic ability in their model. Using a five year longitudinal survey of 1959 high school graduates from nine states, they found that family background variables had a significant effect on college attendance.

Economic studies which have examined either educational attainment (or occupational status, which is closely related) have in most cases incorporated into their models some measures of family background. Many studies used only family or parental income (Hoenack & Weiler, 1977; Campbell & Siegal, 1967; Hoenack, 1968; Galper & Dunn, 1969; Hu & Stromsdorfer, 1973; Hight, 1975; Radner & Miller, 1975). Others added parent education (Kohn, Manski, & Mundel, 1974; Tierney, 1980; Hoenack & Feldman, 1969; Hopkins, 1974; Dresch & Waldenberg, 1978). Corrazzini et al. (1972) chose to examine father's occupation and income as their measure of family background, whereas Leslie et al. (1977) chose to examine father's occupation along with family income and parental education. Most of these studies found that family background had a significant effect on educational attendance or attainment.

Some exceptions to this predominant finding need to be addressed. Leslie et al., in their analysis of 1,047 Pennsylvania and New York 1974 high school seniors, found that family income did not have a significant effect on educational attainment but that parental education and

father's occupation were significant. Tierney (1980) found a significant effect of family background (family income, mother's education, and father's education) on college attendance. Upper-income white students, the one exception to this, were more likely to attend a private institution.

Other studies have also incorporated family background variables into their research designs. Anderson, Bowman, and Tinto (1972) examined the effects of family income, father's education, and the resources available to finance the student's postsecondary education. Bishop (1975), who analyzed Project Talent data for the high school graduating class of 1961, used family income, resources available for financing postsecondary education and number of siblings as measures of family background. Griffin and Alexander (1978) and Jackson (1978) included many of the same measures of family background -- family or parental income, parents' education, household items index, and religion. The former also included in their list father's occupation. Manski and Wise (1983), like many of the studies with an economic perspective, examined the effects of parent's income (which they found was not very important), mother's education, father's education, and whether the family resided in the south or non-south.

The thread linking these studies is a significant effect of family background on educational attendance or attainment. Family background affects matriculation decisions significantly, particularly considering indirect effects. A model of college choice should include, if possible, parents' occupations, family income, and parents' educations.

Aspirations. A third of the studies in Figure 1 included educational and/or occupational aspirations. Educational aspirations usually referred to the amount of education the student hoped to attain.

Trent and Medsker (1968) were among the first to examine individual values and attitudes that influence matriculation, including both parental and personal aspirations for educational attainment. Both parental and student educational aspirations had a significant effect on matriculation. In fact, a strong desire to attend college was the single variable most related to actual attendance.

Others reported that aspirations had a significant positive effect on attendance and/or attainment (Trent, 1970; Alexander & Eckland, 1975; Radner & Miller, 1975; Griffin & Alexander, 1978; and Jackson, 1978). However, they do not concur with Trent and Medsker with regard to magnitude. Tierney (1980) reported that degree aspiration only had a significant effect on matriculation decisions of upper income white students.

Michael Olneck (1984), who participated in the first project conference, argued persuasively that the influence of "noncognitive traits" on students' matriculation decisions deserved attention. The few studies which have examined the effects of noncognitive characteristics employ different variables: social integration, conformity, ambition, self-esteem, industriousness, cooperativeness, executive ability, and motivation, for example. From a policy perspective these variables -- particularly ambition -- are less influences that partial outcomes of

students' decision processes. Many empirical models, including the one Chapter 3 reports, thus omit them.

Neighborhood Context. Six studies incorporated neighborhood context. Two asked specifically whether neighborhood context influences the aspirations and plans of youth. Rogoff (1962) assessed the effects of neighborhood context on the educational and occupational plans of students. In addition to measures of community type and size, her research included measures of individual and school differences. Analysis of a 1955 ETS survey indicated that large cities produced fewer college goers than small towns and suburbs.

Sewell and Armer (1966) analyzed the 1957 Wisconsin survey to determine the influence of neighborhood socioeconomic composition on college plans. The college plans of students varied significantly with the socioeconomic characteristics of their neighborhoods, but controlling for sex, family SES, and intelligence greatly reduced the differences. Girls from high SES families, the one exception, were substantially influenced by their neighborhoods.

Bishop's (1975) analysis of Project Talent data for members of the high school class of 1961 indicated that the median family income of the neighborhood surrounding the high school had an influence on educational attendance. Conversely, Jackson (1978) in his analysis of the National Longitudinal Study of the high school class of 1972, found that neighborhood context, measured by location, SES distribution, college offerings, and labor market conditions, was not a significant factor in

college choice. Trent (1970) reported that community effects reflected the clustering of specific social classes in certain communities.

Neighborhood context appears to have no strong independent influence on educational attendance and attainment. Rather, it is important because it reflects family background, an important influence (Jackson, 1982).

High School Context. This entails several possible measures, of which the most frequently used are peers' plans and aspirations: of fourteen studies incorporating high school context, ten used peers' plans. Other measures included school personnel, availability of extracurricular activities, curriculum, availability of electives, and college entry rates.

High school context measures correlated strongly with college choice (Sewell & Hauser, 1976; Trent & Medsker, 1968; Trent, 1970; Griffin & Alexander, 1978; Leslie et al. 1977; Manski & Wise, 1983; Jackson, 1978; Hearn, 1984; Urhan & Hearn, 1984; Porter, 1974; Portes & Wilson, 1976; Alexander & McDill, 1976; Alexander, Cook & McDill, 1978; Alexander & Cook, 1982). Studies of school personnel found they had no significant effect on college attendance (Trent & Medsker, 1968; Trent, 1970; Griffin & Alexander, 1978). Trent and Medsker reported that only 22 percent of the students who were college attenders and 9 percent of those who never enrolled in college received information about college from high school personnel. Tillery (1973) reported similar findings: 43 percent of the high school students indicated that they did not

discuss college options with their school counselors. However, 22 percent of the students surveyed rated their counselors as the most helpful person they had consulted about choosing a college.

Some measures of high school context, notably track placement, curriculum, and high school sector, appear to influence matriculation. For example, Alexander and Cook (1982) reported that placement in an academic track had a small positive effect on educational goals, application to college, and performance on the SAT-M. Rosenbaum (1980), analyzing data from the National Longitudinal Study of the high school class of 1972, and O'Meara and Heyns (1982), analyzing High School and Beyond data, reported that track placement did have an effect on college attendance. Recent analyses of High School and Beyond suggest that students who attend private or parochial high schools have higher educational aspirations than those who attend public institutions (Coleman, Hoffer, and Kilgore, 1982) and that, among comparable high school seniors, those who attend non-public high schools are more likely to attend college than those who attend public institutions (Falsey and Heyns, 1984). Three measures of high school context -- peers' post-high school plans, academic track placement, and type of high school attended -- affect college choice positively, and should be represented in empirical models.

Academic Achievement and Ability. Well over half of the studies included some measures of academic ability or achievement. These included high school grade point average (GPA) (Barnes, 1975; Leslie et

al., 1977; Jackson, 1978), class rank (Manski & Wise, 1983; Griffin & Alexander, 1978; Hoenack & Weiler, 1977) and test scores (Hoenack & Feldman, 1969; Corazzini et al., 1972; Manski & Wise, 1983; Jackson, 1978; Sewell & Shah, 1967; Sewell & Hauser, 1976; Alexander & Eckland, 1975; Trent & Medsker, 1968; Trent, 1970; Griffin & Alexander, 1978; Sewell & Armer, 1966; Zemsky & Oedel, 1983; Tierney, 1980; Kohn, Manski, & Mundel, 1974; Radner & Miller, 1975; Hoenack & Weiler, 1977). Ability clearly influences educational attendance or attainment significantly. This effect persists even when family background variables are controlled. Emprical choice models must include academic measures.

College Characteristics. The institutional attributes analyzed most often are availability, price, price adjustments, and environment. Availability or access is often measured by two variables: the institution's location in relation to the student's home, and admissions requirements or "selectivity", generally measured by the average SAT scores of students admitted. Trent & Medsker (1968) reported that high school graduates were more likely to enroll in college if a college was located in a student's home community. Anderson et al. (1972), a study often named as the classic, analyzed Sewell's 1957 Wisconsin survey and the 1966 SCOPE survey, including several sociological and economic variables -- family status, academic ability, cost of attendance, ability to pay, admissions criteria, awareness of college options, and college location -- and concluded that accessibility plays a minor role in stimulating attendance. Similiar findings have followed (Bishop,

1975; Jackson, 1978; Radner & Miller, 1975; Kohn et al., 1974; Zemsky & Oedel, 1983). Tierney (1980) showed that distance did not have a significant effect on matriculation, but that college selectivity was significant. Availability and access do influence college choice, but more weakly than either family background or academic ability.

Price enters college choice studies in one of three forms: (1) tuition (Campbell & Siegal, 1967; Corrazzini et al., 1972; Galper & Dunn, 1969; Hopkins, 1974; Hight, 1975; Dresch & Waldenberg, 1978), (2) total cost including tuition, living expenses and/or transportation costs (Anderson et al., 1972; Kohn et al., 1974; Radner & Miller, 1975; Hoenack, 1968; Bishop, 1975), or (3) tuition and living expenses adjusted for financial aid (Tierney, 1980; Hoenack & Weiler, 1977; Hoenack & Feldman, 1969; Barnes, 1975; Hu and Stromsdorfer, 1973; Manski & Wise, 1983; Jackson, 1978). Several basic findings emerge from earlier reviews of research on this variable (Jackson & Weathersby, 1975; McPherson, 1978; Weinschrott, 1977; Cohn & Morgan, 1978): (1) cost, however defined, affects matriculation decisions negatively, and (2) financial aid affects matriculation positively. There is some evidence financial aid effects exceed those of cost (Jackson, 1978, 1981). Overall, price affects choice less than family background and academic ability. Even so, price and price adjustments belong in choice models.

College environment usually refers to type of institution, social prestige, whether the institution is single-sex or coeducational, and so on. All studies Table 1 flagged as including college environment in

their research design had a measure of college type. A few added additional attributes. For example, Hu and Stromsdorfer (1973) also included measures of professors' salaries and academic programs offered. Jackson (1978) examined enrollment level and whether doctorates were granted. Kohn et al. (1974) considered coeducation and dormitory capacity. In many cases, these variables were statistically significant, but their overall effects were quite small. This may reflect multicollinearity, as the environmental variables generally correlate highly with selectivity and price. Where possible, choice models should include appropriate institutional attributes.

Return on Investment. Human capital studies examine the relationship between educational attainment and earnings, following Becker (1961). Using 1940 US Census data for white urban males with high school or college degrees, Becker analyzed effects of higher education on lifetime earnings. Adjusting for historical effects, he estimated that investments in higher education yielded a rate of return of 10 to 12 percent. In addition he estimated that under a fifth of this return reflects variation in prospective student ability levels.

Griliches and Mason (1972) assessed the effects of ability and education on economic returns to education. Analyzing a sample of US veterans, they found that educational atteinment significantly explained differences in income while ability, as measured by the Armed Forces Qualifying Test, did not. Dresch and Waldenberg (1978), in turn, found that anticipated lifetime earnings figured in college choice. However,

overall returns to educational investments do have a modest influence on college choice. However, projected lifetime earnings may not be the most appropriate measure. A more appropriate (if unavailable) measure nught be a student's anticipated lifetime earnings.

Labor Market. The labor market generally affects the alternatives to college available to a high school graduate. Labor market measures include local unemployment rates, local wage rates, military enlistment rates, and average starting salaries for college graduates.

Dresch (1975) considered changes in technology and the economy. Examining aggregate data on the labor force between 1926 and 1969, he found that demographic characteristics, the wage differential between college goers and non-college goers, the size of the educational market, and changes in technological demands were major determinants of educational attainment.

Bishop (1975) modified the traditional human capital model of college attendance to account for capital market imperfections. Analyzing Project Talent data, he reported that foregone earnings had a very small impact on college attendance. A one-third reduction in the income differential between college and high school graduates ($1000 in 1960 prices) produced a 2.1 percent drop in the college entrance rate. He concluded that the effects of higher foregone earnings on attendance were significantly less negative than those of tuition.

Hoenack and Weiler (1977) incorporated college graduate and non-graduate salaries as well as national unemployment rates for 18 and 19

year olds and college graduates into their enrollment demand model. College graduate salary affected attendance significantly and positively, whereas noncollege earnings had a nonsignificant negative effect. Their findings with regard to unemployment rates were inconclusive. Other research found that when wage rates are high and unemployment rates are low, individuals are less likely to attend college (Hoenack, 1968; Hoenack & Feldman, 1969; Freeman, 1971; Manski & Wise, 1983), although Corazzini et al. (1972) found no significant wage effect. Finally, Hoenack and Weiler (1977) reported that their measure of "draft pressure", a form of labor market variable, had no significant effect on enrollment. Labor markets do influence college choice, especially the interaction between wage rates and unemployment. Much of this labor market effect is diachronic, however, and thus it does not necessarily entail including cross sectional labor market variables in single cohort studies.

Influences on Non-Traditional Students

I now turn to nontraditional students. Much research on nontraditional students has comprised surveys of programs and characteristics of participants. I rely primarily on the work of Bishop and Van Dyk (1977) and Anderson and Darkenwald (1979), the major empirical studies of nontraditional college choices, with some supporting data from other nontraditional surveys.

Different family background variables are important for nontraditional and traditional students. As one might expect, parents' educa-

tion and occupation no longer play a prominent role. The individual's occupation and educational level, those of his or her spouse, and the individual's own or family income figure prominently in the nontraditional choice.

Bishop and Van Dyk, who analyzed a sample drawn from the 1970 US Census of married men and women aged 25 years and older, included a variety of family background variables: age, sex, occupation, number of children, presence of children under the age of six, veteran status, and family income. Two variables had a significant negative effect on college attendance: the presence of children and not working for pay. Individuals with high family income were more likely to matriculate, as were veterans. This latter effect probably reflects GI Bill educational benefits.

Anderson and Darkenwald (1979) analyzed a May 1975 CPS supplemental survey of participation in adult and continuing education which is included in the larger survey every three years. They identified over nine thousand individuals who were engaged in educational activities, excluding full time students. Like Bishop and Van Dyk, Anderson and Darkenwald included a wide variety of background variables. Age, sex, and race had significant impacts on participation. Younger students were more likely to participate, the strongest background effect; sex and race had modest effects. Educational attainment played a major role in nontraditional choice, explaining a third of the total variance attributable to the model. Occupational status, employment in the human services sector, and residence in one of the Western states had

moderately strong positive effects on participation, while income, full time employment, and suburban residence had small effects. A separate analysis of women in the labor force found that full time employment, marital status, and number of dependents under age 18 had no impact on nontraditional choice.

Other less sophisticated studies have reported similar findings to Bishop and Van Dyk and Anderson and Darkenwald (Paltridge et al., 1978; Medsker et al., 1975; Cross, 1978). Family characteristics -- the nuclear family, not the family of origin -- strongly determine nontraditional students' college choice.

Educational aspirations also affect nontraditional students. Medsker et al. (1975) found that students most frequently cited as their primary educational objective (1) personal enrichment, (2) a college degree, and (3) job oriented skills. Paltridge et al. (1978) found that men most often returned to school to satisfy a personal desire for a college degree, while women sought greater personal enrichment.

Little evidence exists linking accessibility to nontraditional choice. Bishop and Van Dyk (1975) found neither a smaller attendance area nor location increased college attendance for nontraditional students. Anderson and Darkenwald (1977) reported that proximity to organizations providing adult education directly and positively affected participation, using Western residence as a proxy: California, they argued, provides "greater access to school- and college-sponsored adult education than do most other states" (p.4). Paltridge et al. (1978) reported that 89 percent of the nontraditional students surveyed in

seven communities indicated that the availability of courses near their home or work was a very important factor in their decision to return to school.

College cost influences nontraditional choice. Bishop and Van Dyk (1975) found this directly, while Anderson and Darkenwald (1979) found that veterans' benefits had a moderately strong positive effect on participation and Paltridge et al. (1978) reported 64 percent of nontraditional students listed the availability of financial support as an important factor. Despite meager evidence, it appears price-related variables do affect nontraditional students and thus belong in models of nontraditional college choice. Bishop and Van Dyk (1977) reported that a two-year college within commuting distance increased nontraditional attendance, while a four-year college did not.

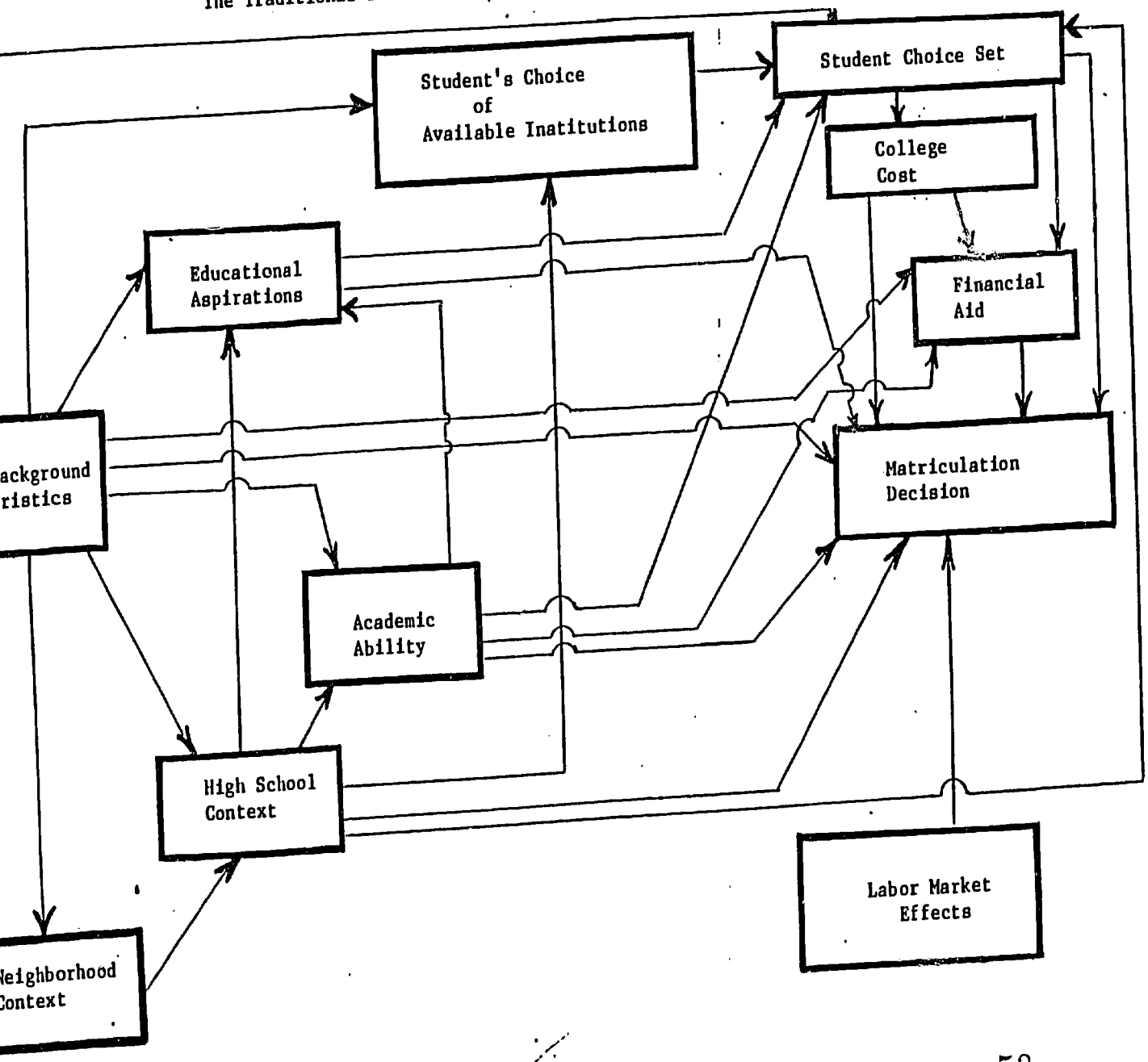
Family background, educational aspirations, prior education, accessibility, college cost, and college availability appear to influence nontraditional choice to some extent. To our knowledge, whether returns to investment, labor markets, academic ability, work attributes, oor other variables significantly influence adults' decisions to go to college has not been examined.

Multivariate Models

Figure 2 suggests how numerous variables interact to affect traditional college choice. College choice varies with family background, neighborhood and high school context, academic ability, educational aspirations and other noncognitive characteristics, college characteris-

Figure 2

The Traditional Student Choice Model



tics, financial aid, returns to investment in higher education, and labor markets. The variable list emerged from the preceding sections, and the variable ordering reflects theoretical conceptions of timing and direction of influence.

Family background characteristics, which include parents' educations and occupations and family income, affect choice directly and indirectly. For example, family background directly influences neighborhood context, high school context, academic ability, and educational aspirations, the choice set, and financial aid. Family background also affects choice indirectly, working through these mediating variables.

Neighborhood context affects choice only indirectly, through high school context. Academic ability, measured by high school GPA and standardized test scores, probably has the strongest direct effect on choice. It mediates both family background and high school context, and influences independently and directly the choice set and college choice itself.

Educational aspirations represent, in one sense, preliminary outcomes of college choice rather than influences on it. Taken as influences, they have both direct and indirect effects on choice. Students' aspirations also influence directly the type of institutions to which they apply.

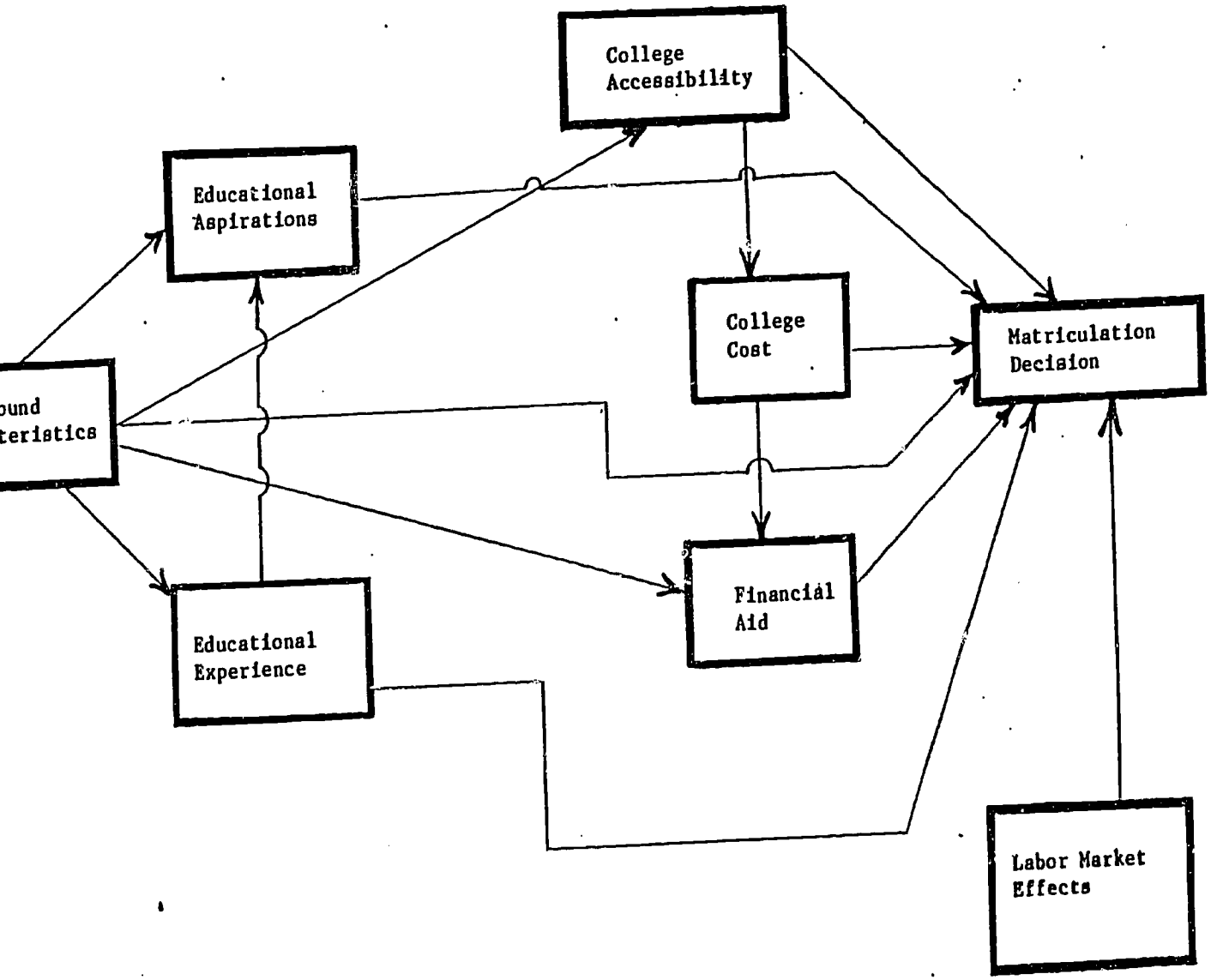
College characteristics, including financial aid and returns to investment, all affect college choice directly. College type and selectivity generally affect college cost, while financial aid reflects

both cost and family income. Last comes the labor market, which has direct effects on choice but is otherwise unrelated to other variables.

Figure 3 represents the model corresponding to Figure 2 for nontraditional students. The paucity of relevant research makes this model more tentative than the one for traditional students. Although it resembles Figure 2, many variables differ. The nontraditional college choice model includes age, race, sex, marital status, number of children, family income, spouse's occupation, student's occupation and previous educational attainment as background variables. The model also includes educational aspirations, college accessibility, college cost, financial aid, and the labor market.

Figure 3

Non-Traditional Student Choice Model



Chapter 3: Traditional College Choice, 1972 to 1980

In this chapter I consider changes in high school graduates' college choices between 1972 and 1980. I choose these years because each offers a longitudinal study of high school graduates, the sine qua non of choice research. But the period has intrinsic interest as well. 1972 marked the beginning of major federal involvement in student financial aid; the last (retrenchment) year of the Carter administration and the election of Ronald Reagan in 1980 marked the beginning of a return, or at least the perception of a return, to a more restricted [illegible] role. The research questions are two: How did the importance of different influences on college choice change over these eight years? How did these changes interact with distributional changes to produce the general trend, a very modestly increasing college-entry rate?

Influences on College Choice

As the stereotypes in Chapter 1 and the review in Chapter 2 made clear, several forces influence high school graduates' college decisions, chief among them socioeconomic background, academic aptitude and performance, and social context. The comprehensive model I outlined in Figure 2.2 includes many indicators of these and other forces, and represents the ideal empirical research must pursue. In practice many of the forces that model includes cannot be measured in single-cohort surveys, many which could be measured are not, and still others which are measured display only modest zero-order or ceteris paribus relation-

ships with college choice. Empirical multivariate models of college choice, including this one, usually turn out simpler that the review in Chapter 2 might suggest.

The general form of most empirical models of college choice is as follows:

```
Attend = f(Locale,
           Family Background,
           Academic Achievement,
           Peer Context,
           College Attributes),
```

with the first few variables having recursive effects on later ones. The variable categories are roughly those defined in Chapter 2.

These variables produce change in higher education participation rates over time two ways. First, the effects of individual variables may remain constant, while the variables' distributions change. For example, the proportion of students receiving financial aid may increase; even if the effect of financial aid on choice remains constant, the result will be increased participation. Second, the effects of individual variables may change, with or without accompanying changes in distributions. If financial aid becomes a more positive influence on college choice, participation will increase even if no more students receive aid.

College admissions decisions play a remarkably small role in college choice, except for a small group of talented, affluent students. Most students seriously consider only colleges located relatively near their homes, and presenting no extraordinary financial or academic obstacles. In 1972 some 91 percent of college applicants were admitted to their

first choice, and over 97 percent were admitted to one of their top three choices (although only about a third of applicants apply to more than one school)[3].

The United States appears to have a higher-education system open to all who seek it. This is not quite correct, however. First, surveys asking about first, second, and third choices tend to be retrospective; students most likely demote colleges which rejected them and promote the one they attend. Second, if cost or the prospect of rejection dissuade students from applying to college, as is also likely, then the system is not truly open to all.

The college retention rate -- the percentage of high school graduates who continue to college at some time -- was 57.9 percent in 1972, counting any enrollment creditable to a bachelor's degree. In 1980 it was 62.2 percent. Table 1 details the trends in these and other statistics between 1970 and 1980. Although the pool of traditional students levelled off in the mid-1970s, first-time enrollments (including nontraditional and part-time students) and college entry rates continued to rise over the decade.

The NLS and HSB Subsamples

The two surveys I analyze provide slightly different indications

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[3]These data come from an earlier analysis of NLS data (Jackson, 1978). They are consistent with Cooperative Institutional Research Program (CIRP) data on the college preferences of enrolled students. Trends in the CIRP surveys suggest the proportion of multiple applicants has increased modestly but steadily over time (CIRP, 1972 et seq.).

Table 1

Traditional College-Age Populations and Participation in Higher Education, 1970-1980

Year	Population Age 18-24	Population Age 17	High School Graduates	High School-College Retention	First Time College Students
	(1,000)	(1,000)	(1,000)	(%)	(1,000)
1970	24,712	3,825	2,896	61.5	2,080
1972		3,973	3,008	57.9	2,171
1974		4,132	3,080	60.2	2,393
1976	28,645	4,272	3,155	58.1	2,377
1978	29,662	4,286	3,134	58.8	2,422
1980	30,337	4,263	3,058	62.2	2,625

Sources:

Grant and Snyder (1984), Tables 76 (col. 1) and 56 (cols. 2,3)
Ottinger (1984), Tables 105 (col. 4) and 58 (col. 5)

from Table 1, largely because of more careful definitions but partly because of timing. 53 percent of the respondents to the National Longitudinal Study (NLS) of the high school class of 1972 were participating in postsecondary education in the fall of that year; 46 percent were enrolled in two-year or four-year academic institutions. 54 percent of the respondents to the High School and Beyond (HSB) survey of 1980 high school seniors entered postsecondary institutions that fall; 49 percent entered academic institutions (Plisko and Stern, 1985, table 5.9).

The National Longitudinal Study of the high school class of 1972 comprised over twenty thousand respondents, about three quarters of whom were originally surveyed and tested in the spring of their senior year in high school. Survey records also include data drawn from school transcripts, from school questionnaires, from banks of labor-market indicators, and from other sources. There have been four followup surveys. The working subsample for this study includes data on almost fifteen thousand respondents.

The High School and Beyond surveys of the senior and sophomore classes of 1980 replicated NLS in key respects, but for various reasons only samples of the original 28,000 respondents in each group have been followed over time. The present analytic subsample includes data on almost ten thousand 1980 seniors; second followup data on the sophomores were not available in time.

I concentrate on college and university enrollment fifteen months following high school graduation; that is, fall 1973 for 1972 seniors

and 1981 for 1980 seniors. This permits the use of contemporaneous rather than retrospective enrollment reports, since these are the years of the NLS and HSB followup surveys. Enrollment at this point also represents a more stable decision, I believe, that immediate enrollment: it encompasses students who have stuck with higher education and students who have begun it following some reflection. Most data other than college choice come from the NLS and HSB baseline surveys, which took place in the spring of 1972 and 1980[4].

Table 2 presents means and standard deviations for sixteen student attributes (as opposed to attitudes) one might expect to influence college choice. Missing from this list, unfortunately, are measures of local economic conditions and detailed descriptions of nearby colleges and universities. HSB suppresses the location of students' high schools. Although NLS generally suppresses these data as well, I had access to these locations and was able, for some earlier work, to construct local-area variables. Constructing similar variables for HSB proved impossible, and the limited file of local-area variables NCES made available was incompatible with data available for NLS. The only surviving measure of local conditions is average college cost, an

[4]Detailed subsampling procedures appear in Chapter 4. The subsamples exclude individuals for whom key data were missing or, in the case of NLS, whose baseline surveys were administered retrospectively in 1973. They also exclude certain individuals with excessively inconsistent responses. Riccobono et al. (1981) provide detailed documentation of the NLS surveys; Jones et al. (1983) document HSB. Jackson (1978) and Manski and Wise (1983) describe earlier choice analyses based on NLS; to my knowledge no comparable analysis of HSB is in print, although O'Meara and Heyns (1982) and Falsey and Heyns (1984) report some preliminary analyses based on parent questionnaires.

Table 2

Attributes of High School Graduates

1972 (NLS) and 1980 (HSB)

Variable	Units	Means		Standard Deviations	
		1972	1980	1972	1980
black	1/0	0.082	0.106	0.274	0.308
hispanic	1/0	0.032	0.092	0.176	0.289
female	1/0	0.500	0.526	0.500	0.499
south	1/0	0.269	0.307	0.443	0.461
northeast	1/0	0.271	0.233	0.444	0.423
west	1/0	0.170	0.167	0.376	0.373
local cost	$1,000	2.151	2.774	0.767	0.700
(1980 dollars)		4.243	2.774	1.513	0.700
father education	years	12.516	13.120	2.428	2.626
mother education	years	12.224	12.716	1.897	2.072
family income	$1,000	11.703	21.776	5.953	10.978
(1980 dollars)		23.083	21.776	11.742	10.978
test score	m=5,sd=1	5.101	5.225	0.854	0.857
grades	0-4.0	2.786	2.881	0.705	0.715
academic program	1/0	0.465	0.387	0.499	0.487
leader	#	0.302	0.398	0.459	0.489
college peers	1/0	0.586	0.702	0.493	0.457
any aid	1/0	0.243	0.357	0.429	0.479
aid (incl zero)	$1,000	0.284	0.695	0.678	1.366
(1980 dollars)		0.560	0.695	1.337	1.366
aid (excl 0)		1.169	1.947		
(1980 dollars)		2.305	1.947	0.000	0.000
apply	1/0	0.561	0.657	0.496	0.475
attend	1/0	0.464	0.460	0.499	0.498
n (max)		14,863	9,665		

All statistics calculated using weights for baseline and first followup surveys, adjusted so weighted n equals sample size

average based on student estimates. My earlier work, not constrained by comparability, suggested local-area variables had no or very modest zero-order effects on choice, and no effects in a multivariate framework.

Comparability was a major concern in this research. It is quite well established in other contexts that apparently minor differences in the coding of variables can have substantial effects on statistical results, particularly in recursive social models[5]. Since the primary research question here involved comparison, variable comparability received much attention[6]. The local-variable problem illustrates an extreme result of this concern, but there were others. For example, the composite test scores in NLS and HSB reflected different subscales, and so new composites were required. HSB's list of potential extracurricular activities was longer than NLS's, complicating the construction of the Leader variable. In several cases one of the surveys offered several versions of a variable; for example, NLS offered both high school and student grade reports, HSB only student reports. In such cases I chose to maximize comparability, which sometimes meant ignoring better or more detailed data in one of the surveys.

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[5]See, for example, chapters 10 and 11 in Jencks et al. (1979).

[6] Chapter 4 details the construction of each variable for each survey. Since the HSB questionnaire drew heavily on the NLS instrument, the construction of most variables proceeded identically for the two surveys.

Attributes and Outcomes

46.4 percent of the NLS subsample attended two-year or four-year academic colleges or universities in the fall of 1973 (Table 2, "Attend"). 46.0 percent of the HSB subsample did so. Given the entry data above, HSB respondents thus either were somewhat more likely to leave college after one year than their NLS counterparts, somewhat less likely to enter after a year's wait, or both. In general, however, college participation remained stable between 1972 and 1980. One explanation of this stability might be that both the attributes of students and the effects of those attributes on college choice were the same in 1972 and 1980.

Table 2 belies this. There were, for example, many more hispanic respondents in 1980 as in 1972, although this stems in part from one of the few incomparabilities between the NLS and HSB surveys: NLS asked one race-origin question, thereby forcing black hispanics to be one or the other, while HSB more properly separated the attributes. Changes in the proportion of black respondents and in regional distributions were more modest. Students estimated that the cost of four-year public colleges or universities averaged $2,151 in 1972, $2,774 in 1980[7]. This is a 35 percent decline, adjusting for changes in the consumer price

[7]Tuition, fees, room, and board and four-year public universities actually averaged $1,760 in 1974, the earliest year for which comparable data are available. The figure for 1980 was $2,711. Other four-year publics averaged slightly less in each year (Grant and Snyder, 1984, table 123).

index[8]; it represents a decline from 18.4 to 12.7 percent of average gross family income.

Socioeconomic variables also changed between 1972 and 1980. Father's education increased from an average of 12.5 years to 13.1 years, mother's education from 12.2 to 12.7 years. Gross family income, reported by students in categories, rose from an average of $11,703 to $21,776 -- a small decline in purchasing power, after CPI adjustment[9].

Academic variables changed more modestly. The NLS and HSB tests were developed separately and standardized similarly to a mean of 5 and subscale standard deviation of one, and this (rather than any secular trend) accounts for their similarity. Student reports of their grades in 1972 averaged B or B- on a four-point scale, and 2.9 in 1980. Fewer students reported being in an academic program in 1980 than did so in 1972.

Students reported leading an average of 0.3 extracurricular activities in high school in 1972, 0.4 in 1980 (based on comparable lists of activities; the trend for participation is similar). 58.6 percent of 1972 students reported that friends planned to attend college; by 1980 this had risen to 70.2 percent[10].

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[8]The CPI stood at 125.3 in 1972, 246.8 in 1980.

[9]According to data from the Bureau of the Census median family income in the United States was $11,116 in 1972 and $21,023 in 1980, remarkably close to these student-reported figures (Ottinger, 1984, table 18).

[10]There is another incomparability here, which probably underplays the change: NLS asked about "most of your friends", HSB about "your closest friend who is a senior".

56.1 percent of 1972 seniors applied to college, which includes students who simply entered an institution -- often a community college -- in the fall of 1972 without a formal application. In 1980 65.7 percent did so. Apply, essentially a proxy for aspiration or attendance, plays no further role in this analysis.

In the spring of 1972 24.3 percent of all seniors admitted to college received some financial-aid offer from a college or university. By 1980 this proportion had increased to 35.7 percent. These offers typically consisted of loans plus some grant and perhaps a job. The increase almost certainly reflects increased federal involvement in financial aid, and particularly its extension to middle income students. The maximum aid offers students received from colleges in 1972 averaged $284, including the 75.7 percent who had zero awards; the average for students who received some aid was $1,169, or 54.3 percent of mean estimated four-year college cost. Maximum offers in 1980 averaged $695; this represented $1,947 for those who received some aid offer, or 70.2 percent of college cost. These financial aid data, unlike the other student attributes, come from the followup survey fifteen months after high school graduation, and thus may incorporate recollection errors[11].

[11]The financial-aid variables required extensive manipulation, which is summarized in Chapter 4.

Attribute/Outcome Relationships

The strongest zero-order correlates of college entry in both 1972 and 1980 were academic track placement, test score, college-going peers, and grades. As Table 3 shows, these and other correlations generally rose by 1980. Table 3 also presents bivariate regression coefficients corresponding to the correlations, which give a better picture of how individual attributes' effects on college entry changed over the eight years. Student attributes interact to influence college entry decisions, however, and a still better picture of individual variables' effects on college choice comes from a comparison of bivariate abd multiple regression coefficients, which also appear in Table 3.

All of the statistics in Table 3 (and following tables) involve a dichotomous outcome, Attend. Because the variances of such variables depend on their means, and residual errors distribute poorly, least squares estimates of their relationships to other variables (including correlation coefficients) can be problematic. Most of the more technical problems only appear if the dichotomy's mean approaches its extremes, zero or one. In all cases, however, significance tests are inaccurate (generally overestimates), and coefficients of determination R^2 have top limits well below the usual 1.0 value[12]. There are several methods for dealing with these problems, especially conditional-logit

[12]Useful discussion of various sophisticated techniques for analyzing dichotomous outcomes appears in Manski and McFadden (1982). A summary comparing these and other methods appears in Jackson (1980); a comparison of logistic to least-squares methods using variables typical of those in choice models and Monte Carlo methods appears in Jackson (1981).

Table 3

Bivariate and Multivariate Relationships between Attributes of High School Graduates and Attendance

1972 (NLS) and 1980 (HSB)

Variable	Correlation		Bivariate Regression		Multivariate Regression	
	1972	1980	1972	1980	1972	1980
black	-0.046	-0.039	-0.084	-0.063	0.096	0.080
hispanic	-0.029	-0.086	-0.082	-0.148	0.106	0.051
female	-0.033	0.024	-0.033	0.024	-0.037	0.011
south	-0.034	-0.061	-0.038	-0.066		
northeast	0.059	0.058	0.066	0.068		
west	0.015	-0.003	0.020	-0.004		
local cost	-0.002	-0.007	-0.001	-0.005	0.001	-0.011
(1980 dollars)	-0.002	-0.007	-0.001	-0.005	0.001	-0.011
father education	0.280	0.319	0.058	0.060	0.013	0.014
mother education	0.268	0.295	0.070	0.071	0.017	0.018
family income	0.231	0.239	0.019	0.011	0.005	0.004
(1980 dollars)	0.231	0.239	0.010	0.011	0.003	0.004
test score	0.399	0.442	0.233	0.257	0.075	0.095
grades	0.315	0.384	0.223	0.267	0.070	0.100
academic program	0.426	0.450	0.426	0.460	0.211	0.216
leader	0.186	0.230	0.202	0.234	0.053	0.067
college peers	0.384	0.332	0.389	0.362	0.176	0.153
any aid	0.083	0.103	0.097	0.107	0.065	0.078
maximum aid	0.072	0.108	0.053	0.039		
(1980 dollars)	0.072	0.108	0.027	0.039		
apply	0.823	0.664	0.828	0.696		
constant	-	-	-	-	-0.775	-1.066

All statistics computed using weights for baseline and first followup surveys, adjusted so weighted n equals sample size

analysis, but they generally bring new problems of interpretability or unknown robustness. For this analysis least squares methods appear to be convenient, clear, and appropriate.

Bivariate statistics suggest that being black or hispanic works against college entry: blacks were 8.4 percentage points less likely than other high school graduates to enter college in 1972, hispanics 8.2 percentage points less likely. In 1980 blacks were 6.3 and hispanics 14.8 percentage points less likely to enter college, a substantial change. The multivariate statistics suggest that these differences between minority and other students, which may reflect discrimination, stem largely from other relevant characteristics of black and hispanic high school graduates. In the complete model, which includes socioeconomic, academic, contextual, and financial variables, black and hispanic students were more likely to enroll in college than the average student with similar characteristics in both 1972 and 1980.

Black and hispanic students enter higher education less frequently than others in large part because they perform below average on tests, which translates into lower grades. Table 4, which provides unstandardized regressions of test scores, grades, contextual, and financial-aid variables on background variables, documents this. Black and hispanic students scored over half a standard deviation below average in 1972 and 1980, even after controlling other background variables. It is difficult to believe that this difference results solely from differences in innate intelligence or ability, and this accounts for much of the

Table 4

Recursive Regression Equations for Background, Other Attributes of High School Graduates, and Attendance

1972 High School Graduates, NLS, n=14,863

Variable	Outcome Variable test	grades	acad	leader	peers	any aid	attend
black	-0.711		0.170	0.064	0.090	0.189	0.096
hispanic	-0.545		0.077			0.106	0.106
female	-0.009 ~	0.318	-0.064			-0.042	-0.037
south	-0.023 ~	0.161		0.023 ?		-0.071	
northeast	0.145		0.161	-0.082		-0.004 ~	
local cost						0.002 ~	0.001 ~
father educ	0.059		0.012		0.017	-0.005 ~	0.013
mother educ	0.068		0.017				0.017
fam income	0.014		0.006	0.003	0.006	-0.020	0.005
test score		0.435	0.217	0.022	0.099	0.050	0.075
grades			0.084	0.123	0.064	0.089	0.070
acad program				0.089	0.229		0.211
leader					0.085	0.081	0.053
coll peers							0.176
any aid							0.065
constant	3.417	0.365	-1.328	-0.217	-0.519	0.027	-0.775
rsquare	0.213	0.317	0.282	0.077	0.231	0.126	0.298

1980 High School Graduates, HSB, n=9,665

Variable	Outcome Variable test	grades	acad	leader	peers	any aid	attend
black	-0.611		0.188	0.078	0.137	0.122	0.080
hispanic	-0.520		0.086			0.035 ~	0.051 ?
female	-0.041 ?	0.282	0.003 ~			-0.024 ~	0.011 ~
south	-0.119	0.142		0.058		-0.005 ~	
northeast	0.113		0.102	-0.069		0.071	
local cost						-0.015 ~	-0.011 ~
father educ	0.063		0.023		0.016	-0.015	0.014
mother educ	0.060		0.009				0.018
fam income	0.005		0.002	0.004	0.002	-0.011	0.004
test score		0.434	0.193	0.040	0.057	0.062	0.095
grades			0.119	0.123	0.063	0.070	0.100
acad program				0.084	0.139		0.216
leader					0.066	0.094	0.067
coll peers							0.153
any aid							0.078
constant	3.660	0.422	-1.479	-0.296	-0.116	0.256	-1.066
rsquare	0.250	0.293	0.281	0.088	0.128	0.110	0.354

Statistics calculated using weights for baseline and first followup survey, adjusted so weighted n equals sample size.

~ denotes p>.05 ? denotes .05>p>.01

current attention to the experience of minority students with standardized tests.

Parent educational levels have strong bivariate effects on college going: each additional year of parent education increases the likelihood of enrollment by about six percentage points. Controlling other variables reduces this effect substantially, to about 1.4 percentage points for fathers and 1.8 for mothers.

In 1980 dollars, family income averaged $23,082 (sd = $11,742) in 1972 and $21,776 ($10,978) in 1980. In bivariate terms a student whose family income was one standard deviation above average in 1972 (about twelve thousand 1980 dollars or six thousand 1972 dollars) was 11.3 percentage points more likely to enter college; in 1980, this bivariate effect rose to 12.1 percentage points. Controlling other attributes in the multiple regression these effects were much smaller: 3.0 percentage points in 1972, 4.4 percentage points in 1980.

The effects of test scores and grades increased modestly between 1972 and 1980. As one would expect, bivariate effects are much stronger than multivariate effects. In bivariate terms, students scoring one standard deviation above the mean on tests were 19.9 percentage points more likely than average to enroll in 1972, 22.0 percentage points in 1980. Students with grades one standard deviation (about 0.7 letter point) above average were 15.7 percentage points more likely to enroll in 1972 and 19.1 percentage points more likely in 1980. Controlling other attributes reduces these estimates substantially: to 6.4 and 8.1 for test scores, and to 4.9 and 7.2 for grades.

As Table 4 makes clear, test scores and grades are closely related, so "controlling" one or the other has limited significance. Students with test scores one standard deviation above average in 1972 had grades 0.371 points above average, controlling background attributes, and any estimate of their likelihood of enrollment must take this into account. Similar comments apply to other endogenous attributes, such as context and financial aid.

Students in academic programs were 42.6 percentage points more likely to enroll in 1972, 46.0 percentage points in 1980. Controlling other attributes, these effects were still substantial: 21.1 and 21.6 percentage points respectively. The strongest influence on track placement in both years, from Table 4, was test score, followed by being black (a positive effect, with other attributes controlled), grades, and being in the Northeast. Having college-bound friends was almost as important in attendance decisions as academic track; leading extracurricular activities was less so.

Students who received financial-aid awards were 9.7 percentage points more likely to enter college in 1972, 10.7 percentage points more likely in 1980. Controlling other attributes, many of which themselves influence aid awards, reduces these effects somewhat, to 6.5 and 7.8 percentage points respectively. Analyzing the amount of aid yields similar results, but explains choice less well[13]; differences between

[13]For example, the bivariate effect of the maximum award was 5.3 percentage points per thousand dollars of aid in 1972; the average recipient received $1,169 in aid, and therefore was 1.169 x 5.3 = 6.2 percentage points more likely to enter college than a nonrecipient, not

award recipients and other students appear more important to college going decisions than differences among aid recipients.

1972-1980 Differences

Most variables with substantial positive effects on college going increased between 1972 and 1980, the major exceptions being Family Income (when adjusted for increases in the consumer price index), Test Score (though standardization elides this change here), and Academic Program. At the same time the effects of most family background variables remained steady or increased somewhat, the exceptions being a modest decline in the effects of Black and a sharp decline in the effect of Hispanic. The effects of most other variables increased modestly, with the exception of College Peers.

Given these differences between 1972 and 1980, how should college attendance rates have changed? Table 5 provides a partial answer. The first columns present mean differences between 1972 and 1980 variables. They omit current-dollar figures for Local Cost and Family Income, since the units are different, and for Test Score, since the instruments in the two years were standardized separately. The largest differences, in terms of standard deviations, are for Local Cost (a decline, adjusted for CPI change), Any Aid, College Peers, the parents' Educations, and Leader.

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controlling other attributes. The corresponding figure for 1980 is 1.947 x 3.9 = 7.6 percentage points.

Table 5

Predicted Differences in Higher Education Enrollment
Based on Attributes and Equations
for 1972 and 1980

Variable	72-80 Change (from tab. 2)		Regression Equation (from tab. 3)		Predicted Difference (raw*reg)	
	raw	raw/sd	1972	1980	1972	1980
black	0.024	0.082	0.096	0.080	0.002	0.002
hispanic	0.060	0.258	0.106	0.051	0.006	0.003
female	0.026	0.052	-0.037	0.011	-0.001	.000
south	0.038	0.084				
northeast	-0.038	-0.088				
west	-0.003	-0.008				
local cost (1980 dollars)	0.623 -1.469	-1.327	0.001	-0.011	-0.001	0.016
father education	0.604	0.239	0.013	0.014	0.008	0.008
mother education	0.492	0.248	0.017	0.018	0.008	0.009
family income (1980 dollars)	10.073 -1.307	-0.115	0.003	0.004	-0.003	-0.005
test score	0.124	0.145	0.075	0.095		
grades	0.095	0.134	0.070	0.100	0.007	0.009
academic program	-0.078	-0.158	0.211	0.216	-0.016	-0.017
leader	0.096	0.203	0.053	0.067	0.005	0.006
college peers	0.116	0.244	0.176	0.153	0.020	0.018
any aid	0.114	0.251	0.065	0.078	0.007	0.009
attend	-0.004	-0.008	-0.775	-1.066		
predicted change					0.043	0.059

Statistics calculated using weights for baseline and first followup survey, adjusted so weighted n equals sample size

The second two columns in Table 5 present multiple regression coefficients from Table 3. These represent the expected difference in enrollment likelihood attributable to a one-unit change in the corresponding independent variable, all else constant. The last two columns are the observed change in each variable, from the first column, times each of the two corresponding regression coefficients. These are the expected changes in enrollment rates attributable to changes in each independent variable, assuming the other variables in the multivariate equation do not change.

If cross-sectional differences among students in a given year generalize to differences in the behavior of similar students over time, then the sum of the predicted differences in the last two columns of Table 5 plus the unestimated effect of Test Score changes should correspond to the change in enrollment rates between 1972 and 1980. These sums are 4.3 percentage points using the 1972 coefficients, and 5.9 percentage points using the 1980 ones, implying that the rise in enrollment rates between 1972 and 1980 lay between these figures.

The enrollment rates in my 1972 and 1980 subsamples were virtually identical, 46.4 and 46.0 percent respectively; the academic enrollment rates for the full NLS and HSB samples (using different definitions of "enrolled") were 46 and 49 percent. From Table 2 high school to college retention, reflecting an "ever attended" definition, rose from 57.9 to 62.2 percent between 1972 and 1980 (although it was 60.2 percent in 1974, and 58.8 percent in 1978). The omission of test score changes accounts for part of this. The mean SAT fell somewhat between 1972 and

1980, and thus including test score changes might reduce the predictions modestly. Table 5 thus overpredicts changes in college enrollment rates slightly, suggesting that cross-sectional differences in college choice do not predict change over time.

Random variation from year to year might explain this result: if the choice process changed each year, a given year's pattern should have little impact on another's. But the choice processes summarized in Tables 3 and 4 are remarkably similar, a point even more apparent in the last two columns of Table 5. The effects of different variables are quite consistent between the two years, with some exceptions, and this tends to belie the random-variation explanation.

Important variables omitted from these models might also explain the results. But it is hard to see what these might be. The exhaustive review of earlier research on student choice in Chapter 2 reflects both extensive library work and a full-day conference at which I asked college choice researchers -- psychologists, sociologists, and economists included -- to think of important forces not reflected in the review. The resulting conceptual model specified the important influences on college choice, and the empirical model includes measures of virtually all. Initial analysis involved multiple indicators of different influences and numerous additional variables. The final analysis reported here reflects all important relationships that appeared in earlier research or preliminary data analysis. In short, no variables with substantial cross-sectional effects are missing from the models.

The models do omit variables with no cross-sectional effects. For example, although the enactment of MISAA may have increased enrollment likelihoods, it did not vary among individuals, and thus would not figure in a cross-sectional model. The end of the war in Vietnam had a similar effect: it restored military service as a (literally) viable option for many prospective students, but did not treat individuals differently. Each of these changes may well have induced changes in enrollment likelihoods, but neither would appear in models like those estimated here.

Two broad conclusions, neither particularly novel, emerge from all this. First, college choice processes appear remarkably stable over time, and since most influences on college choice also change relatively slowly this means college participation among recent high school graduates does not fluctuate widely. Second, major changes in college participation, when they do occur, typically arise from forces that do not produce cross-sectional differences, and in many cases from one-time policy or social changes.

This cuts both ways for projection. The stability of college choice means that projection methods based on demographic cohort analysis will generally prove satisfactory. Since such methods do not require extensive attribute or attitude data, they simplify projection. But the history of major changes arising from policy changes and similar imponderables makes long-term projections inaccurate.

What about college choice between 1972 and 1980, then? These NLS and HSB data suggest that high school seniors, taken together, decided

whether to enter college in 1980 much as they had in 1972, which means that MISAA, the end of US involvement in Vietnam, the end of the draft, and similar events had no substantial effect on college going. Other data, such as those in Table 1, suggest that the overall rate of college going remained essentially steady over the same period, which means these forces did not have an overall step effect either.

Many changes between 1972 and 1980, including those sketched in Chapter 1, would have affected subsets of the college-age population -- specifically Terrys, Freds, and Pauls, to recover the introductory stereotypes -- rather than everybody. Many federal programs of the time were supposed to increase college participation among groups traditionally underrepresented: the poor, particularly, and disadvantaged minorities. Whether these programs had the desired effect -- the evidence is somewhat controversial at this point, although the consensus is that they did -- they produced neither an overall change in enrollment rates nor a substantial change in overall choice patterns.

Chapter 4: Coding and Subsampling

Coding

Responses recorded on the NLS and HSB data tapes generally required some recoding before they yielded appropriate variables for the regression analyses reported in Chapter 3. Most recoding was minor, such as that required to produce Black from responses to a question about race or continuous Father Education from responses categorized by degree. In some cases several variables had to be combined into one, often with conditional processing, as was the case for Any Aid, Aid, and Test Score. In the interest of comparability variable construction or coding often differed from what would have been optimal for one of the surveys analyzed alone; this was particularly true for Local College Cost, region (Northeast, South, West), Grades, and Attend.

The following paragraphs summarize variable codings. Parenthetical references are to NLS baseline and first followup questions (NB and NF respectively) or codebook variable label (N) and to HSB baseline and first followup questions (HB, HF, and H), as numbered in the appropriate user's manuals (Riccobono et al., 1981; Jones et al., 1983). The order corresponds to Table 3.2, which presents means and standard deviations.

Black. NB84 asked respondents "How do you describe yourself?", and listed eight racial and origin categories. HSB89 asked "What is your race?", reserving origin for a separate question (see below). Black takes the value 1 for respondents who classified themselves as "black, afro-american...", and 0 otherwise.

Hispanic. NB84 included response categories of "mexican or chicano", "puerto rican", and "other latin american". HB90 asked respondents what their "origin or descent" was, listing 4 hispanic categories and 27 others. These items were independent of spanish-surname coding (which was used in sampling) and of items concerning the language spoken at home. Hispanic (an inappropriate but common and unavoidable label) takes the value 1 for respondents who classified themselves into appropriate categories, 0 otherwise.

Female. This became 1 for responses of "female" to NBSEX or HB83, and 0 otherwise.

South, Northeast, West. These variables come directly from high school location data in the data tapes. HSB identified only broad (fourfold) Census region. I had access to NLS data giving high school Zip code, but to insure comparability did not use them. It is possible, particularly in HSB, that a student lives in another state and even region, but such cases probably are rare enough to require no further attention. In any event, they cannot be identified, since no residence

data are available. Northeast comprises the New England and Middle Atlantic Census regions, South the South Atlantic and East South Central regions, West the Pacific, Mountain, and West South Central regions, and the null North Central the East North Central and West North Central regions.

Local Cost. I had access to the detailed location of NLS high schools, but was unable to obtain similar data for HSB. In each survey, therefore, local college costs are based on respondent estimates of college costs rather than actual summaries of local colleges' room and board costs[14]. Even so, the underlying items are somewhat different in the two surveys. HB111 asked respondents how much they thought it would cost to attend each of several categories of institution "for a year": public two-year colleges, public four-year colleges or universities, and private four-year colleges or universities. NB70 asked respondents what sort of institution they would attend if they were going to college next year, and NB73 asked how much respondents expected college to cost if they attended. I assumed, with support from preliminary analyses, that the estimate in NB73 referred to the institutional type in NB70.

For HSB I calculated the mean response for each institutional category in HB111 for each high school in the survey, taking these high school means as estimates of various local college costs. For NLS I

[14]My earlier analysis of NLS (Jackson, 1978) uses actual local college costs derived from high school Zip codes and HEGIS data. Results (no strong effects) do not differ appreciably.

calculated mean cost estimates separately in each high school for respondents whose plans in NB70 called for different institutional types, thus obtaining various estimates corresponding to the HSB variables but based on fewer respondents in each high school. Only for four-year public colleges were there enough stable (that is, based on n larger than 3 or 4) local cost estimates in NLS, and since the different category estimates in HSB were highly correlated I used mean respondent estimates of four-year public college costs to specify local college costs in both NLS and HSB.

I used the Consumer Price Index to construct constant dollar versions of local college cost.

Father Education, Mother Education. NB90A, NB90B, HB39, and HB42 asked identical questions about parents' education, with complete or partial degrees as response categories. In each case "finished high school" became 12, "some college" 14, and so on to 18 for graduate degrees.

Family Income. NB93 and HB101 asked respondents to select a range for their family's total income. The range categories differed between the surveys. I coded to midpoints, using an appropriate value for the open-ended category. Constant-dollar versions of these variables use the Consumer Price Index as a deflator.

Test Score. The tests in NLS and HSB were developed by Educational Testing Service to approximate standard aptitude tests. In each case I summed the standardized scores (mean=50, sd=10) for four subscales, as Riccobono et al. (1981) suggested, to obtain a composite test score, and divided by 10. Since the test subscales were standardized independently to the same means and standard deviations, differences between mean scores in the two surveys are small and meaningless.

Grades. Only NLS provided sufficient school reports of respondent grades (NSRF1), so this variable reflects student responses to identical questions (NB5, HB7). "Mostly A's" became 4.0, "A's and B's" 3.5, "mostly B's" 3.0, and so on. My earlier analysis of NLS school grade reports (Jackson, 1978) suggested that student reports were relatively accurate for all but D students, whose reports tended to exceed the school's.

Academic Program. Here, again, only NLS provided school reports (NSRF7). This variable became 1 for students who reported they were in an academic or college preparatory program or track (NB2, HB2), 0 otherwise. My earlier analysis of NLS (Jackson, 1978) suggested that many students schools classify as "general" classify themselves as "academic".

Leader. Respondents were asked whether they participated in or led various extracurricular activities. NLS and HSB structured questions identically, but NLS listed 9 activities (NB10) while HSB subdivided several NLS items and listed 15 activities (HB32). I combined HSB categories to match NLS, and then counted the number of activities the respondent led to produce Leader.

College Peers. NLS asked respondents what "most of [their] friends" planned to do next year, providing response categories (NB16). HSB asked about "your closest friend who is a senior" (HB51). "Go to college" made College Peers 1, other responses made it 0.

Aid, Any Aid. At the first followup NLS asked respondents what their top three college choices had been, whether they had been accepted to each, whether they had applied for financial aid at each, whether they had received aid at each, and how much scholarship, loan, and job aid each aid offer involved (NF81-84). HSB did the same, with slightly different routing questions (HF30). Careful examination of responses to these questions disclosed two problems.

First, several of the responses made no sense. The major example, in HSB, involved several respondents who reported that national military academies had offered scholarships of $40,000. There were other instances in which financial aid bore no logical relationship to college costs at the institution in question, which I looked up using FICE codes provided on the data tape and standard reference works based on HEGIS.

The multiple instances of the $40,000 problem implied there was a published suggestion somewhere that "free" service academies effectively involved scholarships in this amount, and I kept these cases with the huge scholarships recoded to zero. The inconsistent aid reports generally came from records where there were other data problems (except for a few cases where I could see and correct a clear keypunching error), and I deleted the eleven HSB cases containing them.

Second, routing questions in each survey were such that many aid amounts which should have been zero were coded as missing. This happened whenever respondents said they had received aid from an institution but left one or more of the specific amounts blank. For example, if a student reported receiving aid from her first choice (NF82C, HF30C), left "scholarship" (NF82DA, HF30DA) and "job" (NF82DC, HF30DC) blank, and entered "$2,000", say, under "loan" (NF82DB, HF82DB) the data tape contained "2000" for loan and a missing-data code for scholarship and job.

It seems to me that respondents generally equate blanks with zeros in these circumstances, and if this is so it makes sense to recode most blanks to zero. (There were virtually no valid "0" codes for financial aid variables, which lends strong support to my supposition). Therefore, whenever a respondent (a) reported receiving financial aid from an institution (NF82C, 83C, 84C; HF30C, 30G, 30K) and (b) reported an amount for at least one category of aid for that institution, I recoded missing data for the other aid categories to zeros for that institution. I also recorded zeros for financial aid if a respondent reported

not applying for or not receiving aid at an institution to which he or she was admitted.

Once these data problems were resolved I constructed several summary financial aid variables for each respondent. First, I summed the different categories of aid for each institution to obtain up to three total aid variables. Second, I averaged these to obtain Average Aid. Third, I averaged the separate categories of aid across a respondent's one to three choices to obtain Average Scholarship, Average Loan, and Average Job. Third, I assigned the largest institutional values for the respondent to Maximum Aid (total), Maximum Scholarship, and so on. Fourth, I assigned the value 1 to Any Aid if Maximum Aid exceeded zero, and assigned it 0 if Maximum Aid was zero[15]. As Chapter 3 states, among these diverse specifications Any Aid and Maximum Aid seemed best on the basis of preliminary analysis, and I only report results for them.

As was the case for Family Income and Local Cost, constant dollar aid variables use the Consumer Price Index as a deflator.

Apply. This variable is less straightforward than it seems, since at many institutions, often including community colleges, one need not apply for admission before registering. If application lies conceptually midway between aspiration and enrollment on a scale of college intention, then Apply probably underestimates it somewhat by approaching

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[15]The financial aid variables were missing if respondents (a) applied to no colleges or (b) reported applying to, being admitted to, and receiving aid from institutions but did not report any aid amounts.

Attend too closely. If at the first followup respondents reported that (a) they had applied to at least one college before leaving high school (NF81, HF30) and/or (b) had enrolled in college (see Attend, below), Apply became 1; otherwise it was zero. (If responses to all "did you apply..." questions were missing and the student did not enroll Apply was missing.)

Attend. The NLS and HSB first followups located respondents approximately sixteen to eighteen months following high school graduation, the beginning of the sophomore year for students who entered college directly following high school. NLS asked respondents whether and where they were enrolled in college in the fall of 1973 (NF25, 26A). It then asked whether and where respondents had been enrolled in college the preceding fall (NF29A, NF30). HSB aksed respondents whether they had attended college before February 1982 (HF31), and then asked about each of the colleges they had attended (HF33).

There was some evidence in NLS that responses to the detailed questions about 1973 attendance provided better indications of enrollment status then than the simple "were you enrolled..." item (NF29A). Moreover, there were many more problem responses to the retrospective 1972 question. I was loath to use the inferior item, knowing that data for the following fall were probably better. In addition, research on college persistence suggests that persistence into the second year is in effect an extension of the original entry decision; not until the end of the second year do attrition become significant or the pattern of

influences on persistence begin to differ from influences on entry (Terkla, 1983). Therefore, I use enrollment in an academic postsecondary program at the first followup to measure college entry; Attend is 1 for respondents who reported being enrolled at a specific academic institution in the fall of 1973 (NLS) or 1981 (HSB) and zero otherwise.

Subsampling and Weighting

Both NLS and HSB were stratified, clustered probability samples. Each sought to represent the universe of US high schools, and therefore high school students. This is the same universe required by research on traditional students entering college, making substantive subsampling unnecessary. There are two problems, however: some respondents in each survey lack key data, and weights for individual respondents require modification to yield correct standard errors in statistical analysis.

Missing data. NLS comprises 22,652 respondents, but 5,969 of these were added to the sample between the baseyear and followup surveys[16]. These additional respondents completed an abbreviated, retrospective version of the baseline questionnaire, but they did not take the ETS-developed aptitude test administered to the original group of respondents. They thus lack important data. Moreover, their baseline responses might have been different in 1972. I excluded the additional responses from analysis, selecting sampling weights (see below) which

[16]The additions came from the so-called "extra" and "supplemental" schools.

also excluded them (NWT4). The NLS analysis sample numbers 14,863 respondents.

HSB's senior cohort originally numbered 28,240 respondents, but budget restrictions limited the first followup to 11,500 of these. I analyzed only respondents with baseline, test, and first followup data, selecting weights accordingly (HPANELWT), and I also excluded eleven cases with bad financial-aid data. The HSB analysis sample numbers 9,665 respondents.

Both surveys also had substantial, but not atypical, item nonresponse. Some item nonresponse in fact involved recoverable or imputable responses, as was the case for financial aid offers. I examined summary statistics including correlations for the entire subsamples (pairwise deletion) and for subsamples excluding any respondent with missing data on any key variable (listwise), and since there was no substantial difference between these used the larger subsamples for all analysis. In a few cases patterns of item nonresponses and inconsistencies led me to exclude respondents from analysis.

My treatment of missing data involves substantial assumptions about one variable: financial aid. (The same is true for this and other college attributes in any research on college choice.) By using correlations based on applicants to analyze the full samples I assumed, in effect, that if nonapplicants (whose financial aid variables are all missing by definition) applied to college they would receive the same financial aid applicants with similar attributes received, and that financial aid would influence nonapplicants the same way it does

applicants. The other two possibilities are coding financial aid to zero for all nonapplicants, which presumes no nonapplicant thinks he or she will receive any aid, or restricting the analysis to college applicants, a damaging limit if policy analysis is the object. As it happens analyzing only applicants, as I have done elsewhere for NLS (Jackson, 1978), yields similar findings to those in Chapter 3.

Weights. Sampling for both NLS and HSB drew from a list of US high schools divided into several regional and other strata. Schools were drawn in numbers proportional to stratum sizes, with a few exceptions: NLS oversampled schools serving poor students (defined by Title I or Chapter I eligibility), while HSB oversampled several strata involving hispanic students and private schools. 948 schools participated in NLS baseyear surveys, 1,122 in HSB baseyear surveys. Within each school the surveys sampled a fixed number of seniors (18 in NLS, 36 in HSB, or the whole senior class if necessary) at random.

This unbalanced two-stage cluster procedure yields samples which misrepresent the universe unless individual responses are stratified or weighted to compensate for sampling. The idea is to assign each respondent a weight proportional to the number of potential respondents (i.e., universe members) he or she represents. Thus, for example, respondents from schools serving poor students or from small high schools each represent fewer universe members in NLS than other respondents since proportionally more of them are in the sample, and thus their weights are small compared to those of other respondents. Weights

can also adjust somewhat for instrument nonresponse, or even for nonresponse.

Both NLS and HSB report such weights for the subsamples I analyzed (NWT4, HPANELWT). Simply using these weights causes the weighted sample size to approximate the total universe size (that is, all US high school seniors), which in turn leads to gross underestimates of standard errors of summary statistics. For statistical analysis the weights must be adjusted so weighted sample size equals actual sample size[17]. Dividing each respondent's weight by the mean weight for the sample accomplishes this most simply, and I did this for all analyses reported in Chapter 3.

[17]Since probability samples generally are less efficient than simple or stratified random samples it makes some sense for actual sample size to exceed weighted sample size. However, for samples this large the adjustment is unimportant, and in any case it is not clear how much smaller weighted sample size should be.

Appendix A: Conference Participants

The State of the Art in Student Choice Research

January 23, 1984
Harvard Graduate School of Education
Cambridge, Massachusetts

Sandra Baum, Wellesley College
Sal Corrallo, US Department of Education
K. Patricia Cross, Harvard University
Philip Dooher, Framingham State College
Elaine El-Khawas, American Council on Education
William Fitzsimmons, Harvard University
Carol Frances, Coopers and Lybrand
Nathan Glazer, Harvard University
James C. Hearn, University of Minnesota
Barbara Heyns, New York University
Gregory A. Jackson, Harvard University
Francis Keppel, Harvard University
Karen Kuskin-Smith, Brookline High School
Ross LaRoe, Kalamazoo College
John B. Lee, Applied Systems Institute
Harry Levit, Harvard University
Jim Maxwell, US Department of Education
David Mundel, Greater Boston Forum for Health Action
Richard Murnane, Harvard University
Susan Nelson, US Department of the Treasury
Michael Olneck, University of Wisconsin
Russell Rumberger, Stanford University
Elizabeth Schoenherr, Harvard University
Saul Schwartz, Tufts University
Dawn Terkla, Harvard University
Michael Tierney, University of Pennsylvania
Vincent Tinto, Syracuse University
Dean Whitla, Harvard University
John Williams, Harvard University

Data Conference

June 18, 1984
Harvard Faculty Club
Cambridge, Massachusetts

Hunter Breland, Educational Testing Service
Anthony Bryk, Harvard University
Laura Clausen, Massachusetts Board of Regents
Stephen P. Coelen, University of Massachusetts
James Crouse, University of Delaware
Jerry Davis, Pennsylvania Higher Education Assistance Agency
Lawrence Gladieux, The College Board
Kenneth C. Green, University of California at Los Angeles
Janet Hansen, The College Board
James C. Hearn, University of Minnesota
Thomas Hilton, Educational Testing Service
Gregory A. Jackson, Harvard University
Calvin Jones, National Opinion Research Center
Joe Lee, Applied Systems Institute
Lawrence Litten, Consortium of Financing Higher Education
Andre Mayer, Massachusetts Board of Regents
Mary McKeown, Maryland Board for Higher Education
Michael McPherson, Williams College
William Morgan, Ohio State University
David Mundel, Greater Boston Forum for Health Action
Michael Olneck, University of Wisconsin
Jeff Owings, National Center for Educational Statistics
Samuel Peng, National Center for Educational Statistics
Jennifer Presley, Connecticut Board of Higher Education
Elizabeth K. Schoenherr, Harvard University
Paul Siegal, US Bureau of the Census
Dawn G. Terkla, Harvard University
Michael Tierney, University of Pennsylvania
Charles V. Willie, Harvard University
Paul Wing, New York Department of Education

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