To the Graduate Council:

I am submitting herewith a dissertation written by Irma Ortega Perry entitled "A Study of the Direct Economic Returns to Investment in College Degrees of Working Adults in Middle Tennessee." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Educational Administration and Supervision.

Dewey H. Stollar, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Vice Chancellor
Graduate Studies and Research

A STUDY OF THE DIRECT ECONOMIC RETURNS TO INVESTMENT IN COLLEGE DEGREES OF WORKING ADULTS IN MIDDLE TENNESSEE

A Dissertation

Presented for the

Doctor of Education

Degree

The University of Tennessee, Knoxville

Irma Ortega Perry

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ABSTRACT

Institutions of higher education in recent years have been experiencing percentage increases in enrollments of part-time students and older working adults. Little is known, however, about the economic value of degrees obtained by older working adults. The purposes of this study were to: (1) design a methodology to measure the direct economic value of degrees of college graduates who were primarily part-time students and working adults; (2) determine the present value of the costs and benefits of the degrees; (3) determine the private and social internal rates of return; and (4) compare the economic value of the degrees of the working adults to those of typical college graduates.

The college graduates who were primarily working adults included 373 white graduates from The University of Tennessee at Nashville (UTN) in the five-year period between 1973 and 1977 in six degree programs. The basic data included the UTN graduates' 1978 salary, employment work history, foregone earnings obtained through the use of a questionnaire and coursework costs obtained through individual student transcripts. The earnings streams were based on the graduates' 1978 salary and 1972 and 1975 Current Population Survey income data with adjustments for middle Tennessee. The basic data for the typical college graduates were based on average costs for degrees at UTN and 1972 and 1975 Current Population Survey income data.

The results of the study indicated that the lifetime earnings and returns to the typical college graduates were consistent with those found in the literature. For the UTN graduates who were working adults, however, higher returns and lifetime earnings depended on the discipline of the degree and the size of the opportunity costs rather than the level of the degree or the sex of the graduates. In addition, the lifetime earnings of the UTN graduates who were working adults were expected to be less than those of the typical college graduates in middle Tennessee.

Individuals should exercise careful judgement in making educational decisions about the value of an education because there are numerous variables and factors that need to be considered. The present value and the internal rate of return, however, are additional useful tools which may be employed in the attempt to assess and evaluate the direct monetary benefits of college degrees of working adults.

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CHAPTER I

INTRODUCTION

Historically, the American higher education system has been held in high esteem and has provided individuals with skills and education that promise successful careers and high earnings. The long-term effect of education on future earnings has been the subject of discussion and investigation since the 1960's.[1] None of the available studies, however, have dealt with the full-time working adult who delayed his college degree and who completed the coursework on a part-time basis. The lack of data on this type of student makes it necessary to make reference to available studies which deal with typical full-time students.

Some researchers concluded that a tighter job market, particularly in certain fields, tended to lower the economic advantage of college graduates over high school graduates.[2] On the other hand,

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[1]See, e.g., Kenneth J. Arrow, "The Social Discount Rate," in Cost Benefit Analysis of Manpower Policies, eds. G.G. Somers and W.D. Wood (Kingston, Ontario: Industrial Relations Centre, Queens University), pp. 56-75; Mark Blaug, ed., Economics of Education 2: Selected Readings (Baltimore, Maryland: Penguin Books, Inc., 1969); Richard B. Freeman, "The Facts About the Declining Economic Value of Education," The Journal of Human Resources, 15:124-142, Winter, 1980; B.F. Kiker, ed., Investment in Human Capital (Columbia, South Carolina: University of South Carolina Press, 1977); Lester Thurow, Investment in Human Capital (Belmont, California: Wadsworth Publishing Company, Inc., 1970).

[2]Richard B. Freeman, "Overinvestment in College Training?" The Journal of Human Resources, 10:287-311, Summer, 1975; Margaret S. Gordon, "The Changing Labor Market for College Graduates," Higher Education and the Labor Market (New York: McGraw-Hill Book Company, 1974), pp. 27-81.

recent figures from the United States Bureau of the Census (U.S. Census) indicated that earnings were higher for individuals[3] with a college education. The mean annual income for men with four years of college was $20,306 while that for men with four years of high school was $14,115. The corresponding figures for women were $12,451 and $8,338, respectively.[4]

The issue becomes whether the earnings continue to remain substantially high after there is an adjustment for costs, foregone earnings, and taxes. In addition, the marginal returns to a typical college graduate may be different than those to a college graduate who was a full-time working adult while taking coursework. For the latter, returns may be reduced significantly because of the big lag between the beginning of the degree and graduation. On the other hand, these returns may be considerably increased because little or no income is foregone while taking courses and as a result of working experience, job market possibilities and/or advancement are thereby enhanced. By taking costs into account, making necessary adjustments, and estimating the future flow of monetary benefits, economists have calculated a money rate of return to investment in higher education and thereby measured the direct financial impact on the individual or society. The theory of human capital and the analytical framework which accompanies it provide the necessary foundation

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[3]Year-round full-time workers.

[4]U.S. Bureau of the Census, Current Population Reports, Series P-60, no. 114, "Money Income in 1976 of Families and Persons in the United States." (Washington, D.C.: U.S. Government Printing Office, 1978), pp. 192, 197.

to undertake a study to estimate the rate of return on investment in higher education at the only institution in Tennessee which had a student body composed primarily of working adults and part-time students.[5]

I. THE PROBLEM

Statement of the Problem

Prior to 1968, when a program was initiated by the National Center for Educational Statistics (NCES) to provide statistical characteristics of adult education, no comprehensive national survey was available.[6] According to the NCES survey, every year more than 15,000,000 individuals enroll as part-time students in adult education classes in the United States. Over 80 percent of these students are gainfully employed and thereby make societal financial contributions by paying local, state and federal taxes. Over 55 percent of the students want to improve or advance in a job or get a new job. Approximately 20 percent of the students are enrolled in a degree program in institutions of higher education. In 1979 there were more than 5,000,000 adults working toward degree programs in colleges and universities.[7] Despite

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[5]On July 1, 1979, under court order, The University of Tennessee at Nashville (UTN) merged with Tennessee State University (TSU) under the State Board of Regents. The former UTN became known as Tennessee State University, downtown campus.

[6]Dorothy Gilford, "Statistical Snapshots of Adult Continuing Education," Journal of Higher Education, 46:410, July/August, 1975; National Center for Educational Statistics, Participation in Adult Education: Final Report, 1969 (Washington, D.C.: U.S. Government Printing Office, 1974), pp. 409-425.

[7]Ellen Hoffman, The Federal Role in Lifelong Learning (New York: College Entrance Examination Board, 1980), p. vii.

these large numbers of working adults who are working toward a degree program the literature is virtually silent on the economic value of college degrees of working adults and part-time students. The studies reviewed by this writer indicated that Raymond and Sesnowitz[8] were the only researchers who provided adjustments for part-time students; however, part-time students did not constitute the bulk of the group they researched. Other studies reviewed by this writer had adjustments for students that worked part time in the summer.[9] These studies were based on assumptions intended for students in typical institutions of higher education offering day classes for full-time students and did not get at the problem of dealing with the adult who works full-time during the day and who is also completing a degree program at an evening school. This dissertation, accordingly, addressed the problem of the economic value of college degrees of working adults who completed their coursework primarily on a part-time basis.

Purposes of the Study

The purposes of this study were (1) design a methodology to measure the direct economic costs and benefits of degrees of college graduates who were primarily part-time students and working adults;

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[8]Richard Raymond and Michael Sesnowitz, "The Returns to Investemtn in Higher Education: Some New Evidence," The Journal of Human Resources, 10:139-154, Spring, 1975.

[9]Gary S. Becker, Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education (New York: National Bureau of Economic Research, 1964); W. Lee Hansen, "Total and Private Rates of Return to Investment in Schooling," The Journal of Political Economy, 71:128-140, April, 1964.

(2) determine and evaluate the present value of the costs and benefits of the degrees at predetermined interest rates; (3) determine and evaluate the internal rates of return on investment in the degrees from the point of view of the individual and society; and (4) compare the economic value of the degrees to those of typical college graduates.

Questions Pertinent to the Study

In an effort to address the problem the following questions needed to be answered as they related to degrees of the graduates:

1. What were the present values of the costs of the degrees of the graduates, at predetermined interest rates?

2. What were the present values of expected lifetime earnings of the graduates, at predetermined interest rates?

3. Did the benefit-cost ratios of the degrees indicate a satisfactory level of profitability?

4. What were the internal rates of return on the money invested in college degrees?

5. Did the internal rates of return on the money invested in college degrees indicate a satisfactory level of profitability?

6. How did the costs of the degrees of the sample graduates compare to the degree costs of typical college graduates in middle Tennessee?

7. How did the present values of expected lifetime earnings of the sample graduates compare to those of the typical college graduates in middle Tennessee?

8. How did the internal rates of return to the UTN sample graduates compare to those of the typical graduates in middle Tennessee?

Importance of the Study

Institutions of American higher education have shifted drastically from the classical curriculum and preparation for the top professions of medicine, law and the ministry to offerings in a wide variety of fields of specialization. The wide diversity of students means that the missions of colleges will need by necessity to:

> . . . serve people with goals, expectations, skills, abilities and backgrounds different from those of students of previous decades.
>
> There is now a complicated process of matching students with various resources, abilities, values, and aspirations to a variety of colleges, disciplines, curricula, educational styles, residence arrangements, and institutional orientations.[10]

The role and scope of The University of Tennessee at Nashville (UTN) was similar to that of most colleges and universities; the three basic functions included instruction, research, and public service. In terms of mission, however, it occupied a unique position among institutions of higher education. Public service and research were directed toward satisfying the needs of the community and problem solving in state government. The University of Tennessee at Nashville, which grew from an Extension Division of The University of Tennessee, Knoxville, with 192 students in 1947 to a four-year degree-granting institution with 5,685 credit students in the Fall of 1977, was dedicated to serving working adults through evening programs for vocational development, professional competency and individual improvement.[11]

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[10]Stephen Bassett Withey, A Degree What Else? (New York: McGraw-Hill Book Company, 1971), p.127.

[11]The University of Tennessee at Nashville, Faculty and Staff Handbook (Nashville: Office of Institutional Research, The University of Tennessee at Nashville, 1974), pp. 1-4.

Because little information was available on the UTN graduates, it became necessary to enlighten the public on the economic effects of the degree seeking, working adults who completed coursework primarily on a part-time basis. Working adults and/or part-time students at UTN sought higher education opportunities missed earlier because of raising children, lack of motivation, financial incapacity, or because of retraining desires. This researcher provided a methodology to measure the economic advantages or disadvantages of the degrees of the working adults in Tennessee. Furthermore, the results of the study gave rise to implications for other institutions of higher education with similar missions of serving primarily the working adult.

This study provided the data that served four major purposes. First, for the individual student and for the citizens of Tennessee, it provided data to cost and test the expected feasibility of having given up extra income or leisure time to return to college on a part-time basis for retraining or job advancement. Second, data were available for comparisons on alternative ways to pursue a college education. The benefit-cost ratios and internal rates of return on investment in degrees of UTN graduates were compared to those of typical college graduates in middle Tennessee. Third, this study provided data to check the economic implications and feasibility of special policy decisions with respect to night programs geared toward part-time students and working adults. Lastly, data were available to determine and evaluate a satisfactory level of economic performance of degree programs at minimal costs. The study also provided a convenient computerized methodology for future research in the economics of college degrees.

The new and growing variety of higher education institutions means research is needed and perhaps Withey expressed it best when he said:

> Studies are needed to update findings in light of changing conditions. Studies are needed on the methodological problems of comparability of information from people with different levels of education. Projects need to focus on differences of institutions, programs, and students. Researchers need to widen their scope to include social issues surrounding the college, the complex interactions of many variables, and the time-extended, life-cycle consequences of college. Although it is clear that a college of any kind has some significant social impact, higher education will better serve society if its patterns of influence and impact, success and failure, are better understood.[12]

Delimitations and Limitations of the Study

The following delimitations and limitations were placed on this study:

1. The study was delimited to white graduates of UTN during the five-year period from Spring 1973 through Spring 1977.

2. The study was delimited to the following degree programs: (a) Associates degrees in Nursing; (b) Bachelors degrees in Arts and Sciences; (c) Bachelors degrees in Business and Administration; (d) Bachelors degrees in Education; (e) Bachelors degrees in Engineering; and (f) Masters degrees in Business Administration.

3. The study was delimited to men in two degree programs; these included the Bachelors degree in Engineering and the Masters degree in Business Administration.

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[12]Withey, p. 132.

4. The private costs of the degree programs were delimited to tuition, foregone earnings of the students, and miscellaneous student expenditures.

5. The social costs of the degree programs were delimited to total institutional current operating educational and general expenditures, foregone earnings of the students and miscellaneous student expenditures.

6. The relevant interest rates of discount used in determining the present value of future earnings and degree costs and in evaluation of the internal rates of return were delimited to 10 and 15 percent.

7. In calculating the lifetime earnings of individuals, this study delimited the cutoff age for future earnings to age 64.

8. The accuracy of the estimated rates of return and present values of costs and benefits were limited by the accuracy and appropriateness of the data from which they were derived.

II. ASSUMPTIONS OF THE STUDY

The following assumptions were considered basic to the study:

1. An individual's incremental increase or decrease in personal income was attributed to the degree program.

2. An individual's earning stream before graduation and while taking coursework was attributed to his past experience and training.

3. When the 1978 earnings were unknown, an individual's lifetime wage earning capacity was considered to be equivalent to that of average year-round full-time workers in middle Tennessee of the same sex and in the same education level as the graduate.

4. When the 1978 earnings were known, an individual's rate of growth in lifetime earning was considered to be equivalent to that of the average year-round full-time worker of the same sex and in the same education level as the graduate.

5. After graduation unemployed persons were assumed to earn the same as employed persons.

6. An individual who worked 40 hours or more per week while taking coursework was considered to forego no income, if none was specified in the questionnaire mailed to the UTN graduates.

7. An individual who worked less than 40 but more than zero hours per week while taking coursework was considered to forego a percentage of the earnings of the average individual in middle Tennessee of the same sex in a lower education as the graduate.

8. When foregone earnings were unknown for an individual who was unemployed while taking coursework, foregone earnings were considered to be equivalent to the earnings of the average individual in middle Tennessee of the same sex and in a lower education level as the graduate.

9. All graduates were assumed to have graduated from UTN in 1977.

10. A full-time student credit hour load was assumed to be 15 quarter hours per term and 45 quarter hours per year.

11. If the degrees were Associates degrees in Nursing or Masters degrees in Business Administration, the number of years of costs did not exceed four.

12. If the degrees were Bachelors degrees, the number of years of costs did not exceed six.

13. If the number of years of coursework exceeded the limits set in assumption 11 or 12 above, past costs were considered to equal past benefits.

14. The typical college graduate who was a full-time graduate, in addition to the assumptions, one through ten above, was also assumed:

a. to be a full-time student working zero hours;

b. to have completed the Associates degree in Nursing or the Masters degree in Business Administration in two years;

c. to have completed Bachelors degrees in four years;

d. To have been 18 years old at the time of graduation from high school;

e. to have completed all coursework requirements based on the 1977 UTN Catalog;

f. to have begun degree work right after high school graduation or right after completing a Bachelors degree, in the case of the Masters degree in Business Administration;

g. to have average per credit hour costs.

15. The typical college graduate who was a part-time graduate, in addition to the assumptions 1 through 13 above was also assumed:

a. to be a part-time student and gainfully employed with no foregone earnings;

b. to be as old as the average male or female UTN graduate in the given degree program;

c. to have completed all coursework requirements based on the 1977 UTN Catalog;

d. to have average per credit hour costs.

16. All things being equal, individuals were assumed to differ only in educational attainment.

III. DEFINITIONS OF TERMS

Administration costs. Administration costs were defined as the sum of all current fund educational and general expenditures minus instruction.

Alternative earnings. Alternative earnings were those earnings which the graduates would have earned after 1977 over a lifetime, in a lower education level, had they not completed the degree.

Current fund educational and general expenditures. Current fund educational and general expenditures were defined to include instruction, research, public service, academic support, student services, institutional support, operation and maintenance of plant and other general institutional expenses.

Direct benefits. Those benefits which were quantified monetarily and which came about as a direct result of education investment were termed direct benefits.

Direct costs. Those costs which were quantified monetarily and which came about as a direct result of education investment were termed direct costs.

Direct instruction costs. Direct instruction costs was the term used to refer to the instructional costs portion of current fund educational and general expenditures.

Foregone earnings. Foregone earnings were defined as those earnings which the graduates gave up prior to graduation and as a result of being in classes.

Full-time graduate. The typical college graduate in this study who was assumed to have completed all coursework on a full-time basis and who was unemployed during coursework completion was termed full-time graduate.

Gross earnings. Gross earnings were those earnings which the graduates earned without regard to degree costs, taxes or alternative earnings.

Incremental earnings. The difference between gross earnings and alternative earnings was defined as incremental earnings.

Internal rate of return. The rate of interest which set the estimated future earnings streams and the costs of obtaining the degree equal to zero, at the initial point of time, was defined as the internal rate of return.

Middle Tennessee. Middle Tennessee was used to refer to the Nashville-Davidson County Standard Metropolitan Statistical Area (SMSA).

Negative benefits. Negative benefits were defined as the difference in net incremental earnings between two educational levels whereby the earnings in the higher level were less than the earnings of the lower level.

Net incremental earnings. The term, incremental earnings, was used to refer to the resulting earnings after gross earnings were adjusted for alternative earnings and degree costs.

Part-time graduate. The typical college graduate in this study was assumed to have completed all coursework on a part-time basis and who had no foregone earnings was termed part-time graduate.

Present value of benefits. The future dreams of lifetime earnings discounted back to the present or an arbitrary point in time, at an assumed rate of interest, was defined as the present value of benefits.

Present value of costs. The past stream of costs compounded forward to the present or an arbitrary point in time, at an assumed rate of interest, was defined as the present value of costs.

Private benefits. Private benefits were defined as the increased future stream of lifetime earnings which accrued to the individual graduate.

Private costs. Degree costs which were borne by the individual graduate were defined as private costs, i.e., tuition, foregone earnings, and cost of books.

Rate of compound. Rate of compound was the term used for the interest rate which determined the present value of a degree cost or series of degree costs.

Rate of discount. Rate of discount was defined as the interest rate which determined the present value of the future flow of earning.

Sample graduates. The term, sample graduates, was used to refer to graduates who actually graduated from UTN and who responded to the questionnaire.

Social benefits. Social benefits were defined as the future flow of direct monetary benefits which accrued to society.

Social costs. Direct degree costs which were born by society were termed social costs.

State benefits. State benefits were defined as those direct degree benefits which accrued to state and local government in Tennessee or other states, i.e., taxes.

State costs. State costs were defined as those direct degree costs borne by state and local governments in Tennessee or other states, i.e., state appropriations to higher education.

The University of Tennessee at Nashville (UTN). Although the former UTN became known as Tennessee State University, downtown, on July 1, 1979, reference was made to UTN because the research focused on the graduates from a five-year period during the existence of UTN.

Total instruction costs. Instruction costs was the term used to refer to the total institutional cost of delivery of the education or the sum of direct instruction costs and the administration costs of degrees.

Typical college graduates. When the part-time and full-time graduates were discussed together as a group, they were referred to as typical college graduates.

UTN graduates. When the full-time, part-time and sample graduates were discussed together as a group, they were referred to as UTN graduates.

IV. PROCEDURES AND SOURCES OF DATA

Procedures

This study was descriptive and analytical in method. In estimating the human capital value of the graduates and returns on investment, six types of degrees awarded at UTN were studied. For each degree, three types of graduates were studied and compared; these included the sample graduates who responded to the questionnaire and two sets of typical middle Tennessee college graduates who had average earnings of individuals in middle Tennessee and average degree costs of students at UTN. These typical college graduates were the full-time graduates who were assumed to have attended school on a full-time basis and the part-time graduates who were assumed to have attended school on a part-time basis. The rationale and methodology for the calculation of human capital and investment have been set forth by Becker, Hansen, Mishan, Schultz, Thurow and Van Horne.[13] The procedure for this study was undertaken in six phases: (1) review of selected literature; (2) identification of participants and data collection; (3) design of an original computer program and 12 computer data storage files; (4) calculation of current degree costs; (5) calculation of the present value of costs and lifetime earnings; and (6) calculation of the internal rates of return.

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[13]Becker, Human Capital; Hansen, "Total and Private Rates of Return," pp. 128-140; E.J. Mishan, Cost Benefit Analysis: An Introduction (New York: Praeger Publishers, 1971); Theodore W. Schultz, The Economic Value of Education (New York: Columbia University Press, 1963); Lester C. Thurow, Investment in Human Capital; James C. Van Horne, Financial Management and Policy (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1980).

Review of selected literature. The review of selected literature brought forth the concepts and estimating procedures used by this researcher to measure and evaluate the investment in human capital of the working adults. The review included a discussion of human capital, presentation of estimation procedures for measuring human capital, and summaries of selected studies.

Identification of participants and data collection. The identification of participants and data collection phase included: (1) developing a questionnaire designed to collect data on education, income, employment, and to secure permission to examine individual transcripts for purposes of costing coursework; (2) testing the validity of the sample; (3) securing student and institutional data from UTN administration officials; and (4) collecting of instruction costs, U.S. Census data on earnings, tax rates, institutional data on enrollment and finances. Socio-economic data were derived from returned questionnaires and education data were taken from the transcripts. A detailed documentation of sources of data is provided in Appendix A.

Design of computer program and files. The volume of data from different sources to be manipulated made it imperative to resort to computer programming and storage files. From a list of specifications one basic original computer program was written specifically for this study to perform the mathematical calculations. The original program included three subroutines which estimated degree costs based on the assumption that all students graduated in 1977, estimated the individuals'

foregone earnings and estimated the present value of costs and earnings and the internal rate of return based on the assumption that benefits for all graduates began in 1978. A documentation for the basic program is found in Appendix B.

Calculation of current degree costs. The type of student who attended and graduated from UTN had a direct bearing in the design of the methodology for computation of current degree costs. Most of the UTN students were independent working adults who completed their degree coursework primarily on a part-time basis and who took a certain amount of the coursework at institutions other than UTN. To compute costs for coursework taken at UTN alone would seriously underestimate the total individual and social costs of the degree. This being the case, costs were computed for coursework taken at all other institutions of higher education.

Mean average current degree costs were estimated for the typical graduates, the part-time graduates and the full-time graduates, in each of the six degree programs studied. Consistent coursework cost data were not available to cost the sample graduates' coursework prior to 1970 and therefore the years of coursework were adjusted forward based on a graduation year of 1977. Depending on the assumptions for the type of graduate and the specific degree, annual degree costs were computed for two, four, or six years. Three basic types of costs were computed: (1) total instruction; (2) books and supplies, and (3) foregone earnings. These costs were examined from the point of view of the individual and

society. The individual point of view also referred to as the private point of view. The three types of costs were computed for both male and female graduates.

Calculation of the present value of costs and earnings. The mean average present value of degree costs and benefits were estimated for male and female graduates in each of the six degree programs studied. The graduation year, 1977, was the reference point for the present value. After computing the annual lifetime earnings stream of the graduates, current degree costs were compounded forward to the reference point and lifetime earnings were discounted back to the same reference point. The lifetime earnings were begun in 1978, a year after graduation and ended at age 64. The present value of costs and benefits were computed, at predetermined interest rates, from the point of view of the individual and society. The present value of costs and benefits were evaluated for profitability through the use of benefit-cost ratios.

Calculation of the internal rate of return. The internal rates of return were estimated for men and women and for both men and women in each degree program. This was accomplished by estimation of a rate of discount which made the entire stream of costs and lifetime earnings equal to zero. The rates of return were estimated from the point of view of the individual and society. The internal rates of return were evaluated for profitability by comparing them to a required interest rate.

Sources of Data

The data were obtained from the following sources:

1. The University of Tennessee at Nashville.
2. Questionnaire sent to the UTN graduates (sample graduates).
3. United States Bureau of the Census.
4. The Tennessee Higher Education Commission.
5. National Center for Educational Statistics.
6. Urban Observatory of Metropolitan Nashville.
7. United States Department of the Treasury.
8. United Bureau Department of Labor Statistics.
9. The research of several noted economists.

V. ORGANIZATION OF STUDY

Chapter I contains the introduction to the study, statement of the problem, purpose of the study, questions pertinent to the study, importance of the study, delimitations and limitations, basic assumptions, definitions of appropriate terms, procedures and sources of data, and a brief outline of the organization of the study.

Chapter II reviews selected literature pertinent to the problem.

Chapter III contains the methodology and analytical framework for the study. This includes the methods utilized including equations for calculation of current degree costs, the lifetime earnings streams, the present value of costs and earnings, and the internal rates of return.

Chapter IV contains the presentation and discussion of data including the present value of the degree costs, the present value of

the expected lifetime earnings, the benefit-cost ratios of the degrees, the internal rates of return and discussion.

Chapter V presents the summary, conclusions and recommendations which were derived from the study.

Extensive time was spent in the collection of data to be used for costing the coursework. A detailed documentation of all data sources and preparation of the computer storage files is provided in Appendix A. Appendix B provides a computer-generated listing of the basic computer program including the subroutines and inputs.

CHAPTER II

REVIEW OF SELECTED LITERATURE

The value of an education includes both monetary and nonmonetary returns. There are numerous nonmonetary returns (such as, children of educated parents receiving positive intergenerational transfers of knowledge, educated citizens participating more actively in a democratic society, individuals enjoying the satisfaction of attending college, positive societal attitudes toward educated individuals) that are valued highly by both individuals and society. Many more examples of the nonmonetary benefits could be cited but "sooner or later everyone will ask how much is it worth in dollars."[1] For younger full-time college students there are studies available that address this question. However, the economic value of an education for working adults has been neglected from research. Available studies can be used on a limited comparative basis only. As a result, this chapter deals with pertinent literature to bring forth the concepts and estimation procedures which were used by this researcher to measure and evaluate the investment in human capital made by the college graduates who were working adults. This chapter deals with the following: human capital, estimation procedures in the measurement of human capital, and selected research studies.

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[1]Kern Alexander, "The Value of an Education," Journal of Education Finance, 1:456, Spring, 1976.

I. HUMAN CAPITAL

The human capital theory and analytical framework popularized by Schultz, Becker and Mincer have provided the foundation for researchers to study the effect of education on earnings.[2] The theory of human capital shares some analogies with physical capital, but also has some differences that need to be recognized. Both are discussed below.

Similarities Between Human and Physical Capital

Analysis of investment in human beings can be done quite easily because the theory which was developed for physical capital can be applied as a result of four basic similarities between physical and human capital. First, by definition, capital refers to all man-made resources that help produce goods and services.[3] Human capital refers to any individual quality or characteristics of man which contributes to his ability to produce goods and services or produce monetary and nonmonetary streams over time.[4]

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[2]Gary S. Becker, Human Capital: A Theoretical and Empirical Analysis With Special Reference to Education (New York: National Bureau of Economic Research, 1964); Jacob Mincer, Schooling, Experience, and Earnings (New York: National Bureau of Economic Research, 1974); Theodore W. Schultz, "Investment in Human Capital," The American Economic Review, 51:1-17, March, 1961.

[3]Campbell R. McConnell, Economics: Principles, Problems and Policies (New York: McGraw Hill Book Company, 1960), p. 22.

[4]Theodore Schultz, "Investment in Human Capital: Reply," The American Economic Review, 50:1035-1038, December, 1961.

Second, human capital, like physical capital, has inputs into a production function; the physical capital factors of production include land, labor and natural resources. The inputs into the human capital production function may be expressed as follows:

$$\text{EARNINGS} = \int(\text{Ed}, \text{HC}, \text{K}, \text{R})$$

Where: Ed = Education
HC = Human capital, excluding individual's formal education
K = Physical capital
R = Natural resources[5]

The human capital input (HC) in the above equation may include on-the-job training, work experience and other types of human capital which exclude formal education. Physical capital (K) may include educational components, e.g., classrooms, books, typewriters. The natural resources input (R) may include such factors as the individual's health and ability. The use of U.S. Census cross-sectional income data in which grouping is done by sex and race implies that if all things are equal, individuals in the specific demographic group differ only in educational attainment. This assumption was basic to this study.

Third, there are complimentaries or interrelationships that exist between the two concepts. Physical capital has a small value without human capital skills and knowledge necessary for efficient production. Likewise, human capital is hampered without the necessary physical capital with which to work.[6]

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[5]Lester Thurow, Investment in Human Capital (Belmont, California: Wadsworth Publishing Company, Inc., 1970) p. 52.

[6]Thurow, p. 54.

Fourth, there is the existence of maximization of profit or expected utility on the part of individuals when considering investment in physical capital and human capital. In other words, individuals who save do so "because the benefit of future consumption provided by an extra dollar of saving exceeds the benefit of using it for consumption today."[7] Maximization of profit or expected utility are based on the assumption that individuals will make rational decisions based on specific objectives and available data on alternative investments.[8]

Differences Between Human and Physical Capital

Similarities between human capital and physical capital easily permit the analytical framework for physical capital to be applied to monetary investment in individuals; however, four areas of differences provide weaknesses in the conceptual jump from physical to human capital. The differences stem from two factors: (1) unlike physical capital, human capital " . . . is embedded in the person investing;"[9] and (2) physical capital is only a producer of goods and services while an individual " . . . is both a consumer of goods and services and a producer of goods and services."[10]

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[7]Thomas E. Copeland and J. Fred Weston, Financial Theory and Corporate Policy (Reading, Massachusetts: Addison-Wesley Publishing Co., 1979), p. 15.

[8]E.J. Mishan, Cost-Benefit Analysis: An Introduction (New York: Praeger Publishers, 1971), pp. 202-267.

[9]Becker, p. 5.

[10]Thurow, p. 121.

One area of difference lies in the decision-making motivations. Wealth maximization is the only goal for investment in physical capital; however, this is not the case in human capital. While wealth or earnings are a consideration in investing in extra years of education, the dual consumption-production role of individuals helps explain a decision on human investment which may appear financially irrational. Certain occupations may bring a negative return on investment. Therefore, the individual tries to maximize his utility or satisfaction of obtaining the education in addition to, or instead of, maximizing his earnings. This can be illustrated in Senior's description of the education which a gentleman provided for his son:

> . . . the education which is essential to his holding his father's rank . . . is fifty times the average expense of providing in the cheapest manner for the maintenance of a child . . . and that in giving him a more expensive education he is engaging in a speculation which is likely to be unprofitable. To witness a son's daily improvement is, with all well-disposed men, or rather with all men, except a few outcasts, one of the greatest sources of immediate gratification . . . . It is true that a further object may also be obtained but the immediate motive is ample.[11]

A second area of difference concerns the concepts of appreciation and depreciation. Except for a brief breaking-in period, appreciation of physical capital is rare. On the other hand, appreciation of human capital through on-the-job training, work experience, or education is an important consideration in estimating returns. Workers can increase

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[11]Nassau William Senior, An Outline of the Science of Political Economy (New York: Farrar and Rinehart, Inc., 1939), pp. 205-206.

their productivity with on-the-job training and work experience; individuals with formal education have higher expected lifetime earnings than individuals without one. With respect to depreciation, both human capital and physical capital suffer from depreciation, but for humans this element is more severe. An individual carries his human capital with him and thus it cannot be replaced in the event of illness, serious accident, or obsolescence.[12]

Third, risk is an inevitable element in all investments, but for human capital the risk in investment is greater. An investor may use his physical capital as collateral for borrowing necessary financial resources; human capital cannot be repossessed or used as collateral so that the risk is much higher. Human capital is an illiquid asset; whereas, physical capital is negotiable in the event of an emergency or in the case of reinvestment.[13] In addition, in human capital the investment is irreversible and the payoff is of a longer period.[14]

A fourth area which poses problems is in the area of measurement. Physical capital can be bought and sold directly in the market by means of a price system. Monetary value is the common unit of measure in physical capital, e.g., measurement of an investment in gold is done by its price. Except in slavery, the same measuring process is not used

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[12]Mary Jean Bowman and others, eds., Readings in the Economics of Education (Paris, France: United Nation's Educational Scientific and Cultural Organization, 1968), pp. 246-262.

[13]Becker, pp. 55-56.

[14]Ronnie J. Davis and John F. Morrall III, Evaluating Educational Investment (Washington, D.C.: Brookings Institute, 1974), p. 3.

for human beings. It is not the value of the human being that is measured but rather the quality or characteristic which produces the monetary or nonmonetary streams. Indirect measurement of productive services is difficult because other human aspects, e.g., sex, mental ability, family background, on-the-job training, have direct or indirect effects on the monetary value. In addition, the dual consumption-production role of humans decreases the effectiveness of measurement because some of the goods and services are consumed.[15]

The differences described above create problems in estimating the monetary value of education because some liberties must be taken with the theoretical and analytical framework developed for physical capital. These areas of problems have not been brought out to discredit the value of estimating the human capital value of human beings but to point out some limitations that should be kept in mind. Even with the imperfections, the study of human capital and the relationship between education and earnings provide a worthwhile contribution "to knowledge in this area by going far beyond circumstantial evidence and analysis."[16]

II. METHODS FOR ESTIMATION OF HUMAN CAPITAL

The purpose of this study was to determine the human capital value or economic value of the education of the graduates of UTN and

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[15]Thurow, pp. 9, 125.

[16]Becker, p. 3.

provide a measure for the profitability of that education. If earnings are defined as a function of education and the monetary investment associated with it, then measurement and evaluation of human capital can be made possible through the application of investment criteria.

Investment Criteria

Two methods for determining whether an investment is profitable, the present value criterion and the internal rate of return criterion are shown in Figure 1. Both are based on the procedure of reducing a stream of benefits and costs to a single value at a point in time.[17] The present value criterion determines "the value of an investment stream at an arbitrary point in time."[18] The internal rate of return criterion determines "an average rate of return by reference to the condition that the value be reduced to zero at the initial point in time."[19]

Evaluation of the present value criterion and the internal rate of return criterion is done differently and both methods usually produce consistent results with respect to acceptability or rejection of a project. The present value criterion is evaluated through the use of the net present value (B-C) or benefit-cost ratio (B/C). If the net

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[17]Mishan, Cost-Benefit Analysis: An Introduction, p. 189; James C. Van Horne, Financial Management and Policy (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1977), pp. 83-86.

[18]Mishan, Cost-Benefit Analysis: An Introduction, p. 189.

[19]Mishan, Cost-Benefit Analysis: An Introduction, p. 189.

Methodology	Criteria: Present Value	Criteria: Internal Rate of Return
Method for Calculation	$\sum_{t=0}^{n} \frac{B_t - C_t}{(1+i)^t}$	$\sum_{t=0}^{n} \frac{B_t - C_t}{(1+r)^t} = 0$
Method for Evaluation	B/C	Required Interest Rate
Decision Rule	Select the project with the highest benefit cost ratio first, then pursue successive projects in descending order of ratios.	Select the project with the highest rate of return (r), then pursue successive projects in descending order of r until r equals the required interest rate (i).

Where: B_t = Benefits in year t
C_t = Costs in year t
n = Number of years spanned by the analysis
i = relevant discount rate
r = rate of return
B = present value of benefits
C = present value of costs

Figure 1. Methods for Calculation, Evaluation and Decision Rule for the Present Value and Internal Rate of Return Criteria.

SOURCE: Derived from Steve L. Barsby. Cost Benefit and Manpower Programs (Lexington, Massachusetts: D.C. Heath and Company, 1972), p. 11; Becker, pp. 37-66; Mishan, Cost-Benefit Analysis: An Introduction, pp. 181-266; Mishan, Cost-Benefit Analysis: New and Expanded Edition (New York: Praeger Publishers, 1976), pp. 170-195; VanHorne, Financial Management and Policy, 1977, pp. 17-19.

present value is used and the results are positive the project is acceptable. If the benefit-cost ratio is used and it is determined to be greater, the project is considered acceptable.[20] The evaluation of the internal rate of return is done by a comparison of the computed discount rate "with a required rate of return, known also as the cutoff, or hurdle rate."[21] If the computed discount rate is larger than the required rate, the investment proposal is considered acceptable.[22]

With respect to the relevant rate of discount for determining the present value or the required interest rate for evaluation of the internal rate of return, researchers have used the interest rate which makes the individual indifferent between consumption in the present and investment in the future.[23] The current yield on government or riskless securities has been defined as the relevant or required interest rate because informed rational individuals would invest only if the return on investment in education is greater than the riskless rate.[24]

Both criteria produce consistent results with respect to the decision rule; the project with the highest benefit-cost ratio (or the highest net present value) should also be the project with the highest internal rate of return.[25] There are three conditions or problem areas

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[20]Copeland and Weston, p. 26.

[21]VanHorne, Financial Management and Policy, 1977, p. 84.

[22]VanHorne, Financial Management and Policy, 1977, pp. 84-85.

[23]Mishan, Cost-Benefit Analysis: An Introduction, p. 202.

[24]Becker, p. 55.

[25]Van Horne, Financial Management and Policy, 1977, pp. 88-89.

with the internal rate of return criterion which could produce inconsistency in the ranking of the results from both criteria.[26] The first of these stems from differences in the scale of the investment. For evaluation, the present value criterion makes use of the net present value, i.e., benefits minus costs (B-C), when the scale of the investment of different projects is equal. However, when there is a difference in the scale of the investment, or the amount of money for investment of the different projects, it is necessary to make comparisons of the present value per dollar of outlay or through the use of a benefit-cost ratio as is shown in Figure 1 (p. 30).[27] The use of the benefit-cost ratio provides the necessary data for comparisons of the present value per dollar of outlay which is lacking through the use of the internal rate of return criterion. This study required the use of the benefit-cost ratio (B/C), or profitability index, because there were large differences in the initial outlays of the different degree programs. For example, the degree costs for the part-time graduates with Associates Degrees in Nursing and who had no foregone earnings were considerably less than those for the full-time graduates with Bachelors Degrees in Business and who were unemployed while in school. When the use of either the net present value or benefit-cost ratios provide discrepancies

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[26] Van Horne, Financial Management and Policy, 1980, pp. 130-137.

[27] Mishan, Cost-Benefit Analysis: New and Expanded Edition, pp. 193-195; Ezra Solomon, "The Arithmetic of Capital Budgeting Decisions," Foundations for Financial Management, ed. James C. Horne (Homewood, Illinois: Richard D. Irwin, Inc., 1966), p. 291.

in comparison to the internal rate of return, ranking of acceptability of projects by the present value criterion is preferred.[28]

A second condition which causes discrepancies in the ranking of the projects by the two criteria results from the existence of multiple internal rates of return for an individual project. Investments of this type are rare, but the situation arises if the stream of lifetime benefits changes sign more than once, i.e., negative benefits (costs) occur more than once at different points of the benefit stream.[29] In situations where there are multiple rates of return, the rate of return criterion for evaluating the acceptability of investment proposals becomes ambiguous or anomalous.[30]

The third problem which produces inconsistency between the rankings provided by the two investment criteria lies in the reinvestment interest rate assumption.[31] The present value method operates under the assumption that individuals can reinvest their money at the relevant or required interest rate (cost of capital) which is determined by economic market conditions. The internal rate of return method, on the other hand, violates the reinvestment interest rate assumption

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[28]Van Horne, Financial Management and Policy, 1977, pp. 92-93; Copeland and Weston, p. 33; Mishan Cost-Benefit Analysis: An Introduction, pp. 226-234; Mishan, Cost-Benefit Analysis: New and Expanded Edition, pp. 187-195.

[29]James H. Lorie and Leonard J. Savage, "Three Problems in Rationing Capital," Foundations for Financial Management: A Book of Readings, ed. James C. Van Horne (Homewood, Illinois: Richard D. Irwin, Inc., 1966), pp. 295-309; Copeland and Weston, p. 30, Mishan, Cost-Benefit Analysis: New and Expanded Edition, pp. 191-193.

[30]Lorie and Savage, p. 309.

[31]Copeland and Weston, p. 29.

because discounting is performed at the computed internal rate of return which may be below or above the required interest rate or cost of capital. This discrepancy could produce severe errors.[32]

When discrepancies occur one important consideration that must be taken into account is whether or not the projects are mutually exclusive and independent.[33] When projects are not independent and inconsistencies do occur, the range of the inconsistencies may be such that a number of the projects would still be considered acceptable by both criteria, given the required interest rate.[34] It is when the projects are mutually exclusive and when only one can be chosen and all the rest rejected that the precise ranking is required. In the absence of the three problem areas the results of the internal rate of return criterion and the present value criterion produce consistent ranking of projects. When discrepancies do occur, however, and the projects are mutually exclusive the present value criterion is considered to be superior.[35]

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[32]Van Horne, Financial Management and Policy, 1977, pp. 90-92; Copeland and Weston, pp. 28-29, 33; Lorie and Savage, p. 307.

[33]Van Horne, Financial Management and Policy, 1977, pp. 86-87; Copeland and Weston, pp. 23-24.

[34]Mishan, Cost-Benefit Analysis: New and Expanded Edition, pp. 190-191.

[35]Van Horne, Financial Management and Policy, 1977, pp. 92-93; Copeland and Weston, p. 33; Mishan, Cost-Benefit Analysis: An Introduction, pp. 226-234; Mishan, Cost Benefit Analysis: New and Expanded Edition, pp. 187-195.

Costs and Earnings

Both the present value criterion and the internal rate of return criterion require the specification of costs and benefits. The costs and benefits of a college degree can be determined from the private or the individual point of view and the social point of view. Both of these are discussed.

Private costs. The private costs include tuition, books, miscellaneous expenditures and foregone earnings. Researchers have based average tuition costs on total tuition paid, total current fund educational and general expenditures and number of full-time equivalent students.[36] The cost of books and supplies per year was estimated to be $150 in 1969.[37] Unless data for foregone earnings were obtained through random sample techniques, most researchers have estimated foregone earnings to be 75 percent of the earnings of average individuals in a lower education level.[38] The amount may be underestimated, however, if more capable individuals go to college and their foregone earnings are measured by the average earnings of less capable individuals who do not go on to college.[39] This study used data from the returned questionnaire as a basis to estimate foregone earnings.

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[36]Becker, pp. 173-174.

[37]Richard Raymond and Michael Sesnowitz, "The Returns to Investments in Higher Education, Some New Evidence," The Journal of Human Resources, 10:138-153, Spring, 1975.

[38]Becker, pp. 169-172; Richard Raymond, Donald Curran, and Michael Sesnowitz, "Loan Financing of Higher Education Report" (Kent, Ohio: Kent State University, 1977), pp. 125-140 (Mimeographed).

[39]Jacob Mincer, "On-the-Job Training: Costs, Returns, and Some Implications," The Journal of Political Economy, 70:58, October, 1962.

Social costs. Social costs for college degrees include total institutional current fund educational and general expenditures, property taxes which would have been levied if the degree-granting institution were not tax-exempt, foregone earnings and costs of books and supplies incurred by the individual.[40] This study referred to total institutional educational and general expenditures as total instruction costs and this included, e.g., academic support, maintenance and plant operation. Becker estimated revenue loss as a result of property tax-exemption to be approximately 1.5 percent of the value of the institutional property.[41] Not all researchers, however, included property tax revenue losses in estimating education costs. This study did not include the loss of property tax revenue as a social cost because the rationale and procedures set forth by Schultz, Hansen, and others did not include this cost[42] and because of the particular circumstances at UTN. The entire campus consisted of one building which was used very efficiently during the day for conferences, workshops, public service seminars, and other public

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[40]Becker, pp. 169-177.

[41]Becker, pp. 175-177.

[42]Theodore W. Schultz, "Capital Formation by Education," The Journal of Political Economy, 68:571-583, December, 1960; W. Lee Hansen, "Total Private Rates of Return to Investment," The Journal of Political Economy, 71:130, April, 1963; Duncan Bailey and Charles Schotta, "Private and Social Rates of Return to Education of Academicians," The American Economic Review, 62:26-28, March, 1972; Fred Hines and others, "Social and Private Rates of Return to Investment in Schooling by Race-Sex Groups and Regions," The Journal of Human Resources, 5:318-321, Summer, 1970; Myron Roomkin, "Evaluating Basic Education for Adults: Some Economic and Methodological Considerations," Adult Education, 23:23-25, Winter, 1972.

service or non-credit activities; all the credit classes were held between the hours of four and ten o'clock in the evening.[43] For the purposes of costs as a result of property tax-exemption only, use of the building for classes in the evening was considered incremental use of the building at no additional cost to society.

Earnings. The literature indicates that earnings data for individuals have been derived from random sample surveys, the U.S. Census of the Population or Current Population Surveys. To arrive at net incremental earnings or the earnings differential between the college graduate and an individual of a lower education level, researchers have adjusted earnings data for alternative earnings, income taxes, and for mortality and unemployment.[44] The alternative earnings of a college graduate have been considered to be those of an individual in a lower education level. With respect to income taxes, only the earnings streams that are computed from the point of the individual have been adjusted for taxes; from the point of view of society, researchers have used individuals' earnings before tax. Tax adjustments have been based

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[43]Statement by Gail Tatum, Director of the Office of Institutional Research, The University of Tennessee at Nasvhille, in a personal interview, Nashville, Tennessee, February 7, 1977.

[44]Becker, pp. 160-169; Richard S. Eckaus, Estimating the Returns to Education: A Disaggregated Approach (Berkeley, California: The Carnegie Commission on Higher Education, 1973), p. 5; Giora Hanoch, "An Economic Analysis of Earnings and Schooling," Investment in Human Capital, B.F. Kiker, ed. (Columbia, South Carolina: University of South Carolina Press, 1971), pp. 190-210.

on Internal Revenue Service data or on an assumed average tax rate.[45] Mortality adjustments have been based on the current rate of unemployment. Although mortality and unemployment are important considerations, the individual contemplating the start of a college degree thinks in terms of expected future earnings if he were employed and if he were to survive through retirement age. For this reason adjustments for mortality and unemployment were not part of this study.

The earnings differential between college graduates and high school graduates has been found to be affected by such factors as ability, intelligence, race, sex, geographical region and other personal variables.[46] Research results have been consistent with respect to the impact of race, sex and geographical region on earnings; this was so mainly because these factors were used to conveniently separate individuals into different demographic groups. However, ability and intelligence have been the source of much disagreement as to how large the

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[45]Becker, p. 168; Mary Jean Bowman, "Economics of Education," Financing Higher Education: Alternatives for the Federal Government, M.D. Orwig, ed. (Iowa City: The American College Testing Program, 1971), p. 149; Raymond, Durran and Sesnowitz, pp. 125-140.

[46]Becker, pp. 61-66; Mary Corcoran and Greg J. Duncan, "Work History, Labor Force Attachment and Earnings Differences Between Races and Sexes," The Journal of Human Resources, 15:3-20, Winter, 1979; Edward F. Denison, "Measuring the Contribution of Education and the 'Residual' to Economic Growth," Readings in the Economics of Education, Mary Jean Bowman and others, eds., (Paris, France: United Nations Educational, Scientific and Cultural Organization, 1968), pp. 315-337; Paul Taubman and Terence Wales, Higher Education and Earnings: College as an Investment and a Screening Device (New York: McGraw-Hill Book Company, 1974).

the impact is on the earnings differential. Adjustments for these factors have varied from approximately 12 to 30 percent.[47] These observations were based primarily on comparisons of college graduates to individuals below the college level; among college graduates the adjustment for ability would hardly reduce the returns at all.[48] No adjustment for ability was made on the earnings of the UTN graduates because they were all college graduates. Because the future is uncertain, accuracy of the estimation of the expected lifetime earnings depends on a knowledge of the population being studied, a comprehensive study of the available literature and the reasonableness of the basic assumptions.

III. SELECTED RESEARCH STUDIES

Although the existing studies on human capital have been concerned with the younger full-time student, they were utilized in this study for selected limited comparisons. The returns of the typical college graduates who were younger full-time students, in this study, were compared for consistency in general patterns to those found in the literature. In addition, the results from the studies in the literature indicating differences in returns to different demographic groups were used to

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[47]Becker, pp. 79-80; Edward F. Denison, pp. 315-337; Fred Hines and others, pp. 318-340; Lewis C. Solomon and Paul J. Taubman, Does College Matter? Some Evidence on the Impact of Higher Education (New York: Academic Press, 1973), p. 67.

[48]Becker, p. 84.

provide specific delimitations for this study. Each of the selected studies is reviewed separately because of the differences in data sources and methodological adjustments. A summary of the results of these profitability studies is given in Table I.

Giora Hanoch

Hanoch used 1959 U.S. Census earnings data to estimate the returns to education for males through the use of linear regression techniques which isolated the effects of 16 variables. These were mostly dummy variables including age, race, geographic region, size of place of residence, type of residence, origin, mobility, marital status, size of family, and number of children. After adjustment for various factors, but not including adjustment for growth in income, Hanoch found that private returns to investment in education diminish with additional levels of schooling. In addition, except for individuals with post-graduate degrees, his results indicated a tendency for the returns to whites to be higher in the South than to those in the North. The rates for nonwhites tended to be generally lower and relatively erratic when compared to those of whites.[49]

Thomas Johnson

Johnson developed a nonlinear regression model to predict the lifetime earnings of men with an adjustment for depreciation of human

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[49]Hanoch, pp. 190-210; Thomas Johnson, "Returns From Investment in Human Capital," The American Economic Review, 60:546-560, September, 1970; Hines and others, pp. 318-340; Eckaus, Estimating the Returns to Education; Martin Carnoy and Dieter Marenback, "The Returns to Schooling in the United States, 1939-1969," The Journal of Human Resources, 10: 312-331, Summer, 1975; Raymond and Sesnowitz, pp. 138-153.

TABLE I

INCREMENTAL INTERNAL RATES OF RETURN ON INVESTMENT FOR SELECTED STUDIES BY HIGHER AND LOWER EDUCATION LEVELS

Study	Incremental internal rates of return for higher and lower levels of education			
	1-3 Years College / 4 Years High School	4 Years College / 1-3 Years College	4 Years College / 4 Years High School	Postgraduate College / 4 Years College
G. Hanoch				
1959 Males				
Whites—North	7.1%	12.2%	9.6%	7.0%
Nonwhites—North	-5.0[a]	8.0[a]	(no solution)	23.0[a]
Whites—South	9.3	11.0	10.1	7.3
Nonwhites—South	7.0[a]	7.0[a]	6.0	5.0[a]
T. Johnson				
1959 Males				
Whites—North	17.5	13.4	15.5	10.2
Nonwhites—North	17.4	16.5	16.7	22.2
Whites—South	21.4	15.0	17.3	9.3
Nonwhites—South	7.8	16.5	13.4	5.0
F. Hines and Others				
1959 Groups				
White Males	12.1 (8.3)	15.1 (11.0)	13.6 (9.7)	
Nonwhite Males	2.2 (0.6)	10.1 (5.8)	6.0 (3.0)	
White Females	6.9 (2.3)	13.4 (5.8)	9.9 (4.2)	
Nonwhite Females	16.7 (0.2)	41.4 (16.6)	29.1 (11.0)	

TABLE I (Continued)

Study	Incremental internal rates of return for higher and lower levels of education			
	1-3 Years College / 4 Years High School	4 Years College / 1-3 Years College	4 Years College / 4 Years High School	Postgraduate College / 4 Years College
M. Carnoy and D. Marenback				
1969 Groups				
White Males			16.2% (11.0)	
Black Males			13.6 (7.7)	
White Females			14.9 (7.9)	
Black Females			19.4 (10.6)	
R. Raymond and M. Sesnowitz				
1969 White Males	14.6%[b] (13.3)[b] 11.5[c] (9.4)[c]	16.4%[d] (14.9)[d] 30.8[e] (42.6)[e]	15.7 (14.3)	
R.S. Eckaus (selected occupations)				
1959 White Males				
Accountants	13.5	8.0	12.5	Negative
Electrical Engineers	Negative	12.5	10.0	Negative
Elementary Teachers		Negative	Negative	11.0%
Secondary Teachers		Negative	Negative	9.0
All Occupations	11.0	11.0	11.5	4.0%

NOTES: Social rates of return are in parenthesis.

Returns were not computed where there are blanks.

[a]Sample was too small. [b]Higher education level was one to two years of college.

TABLE I (Continued)

[c]Higher education level was three years of college.

[d]Lower education level was one to two years of college.

[e]Lower education level was three years of college.

SOURCES: Hanoch, pp. 190-210; Thomas Johnson, "Returns From Investment in Human Capital," The American Economic Review, 60:546-560, September, 1970; Hines and others, pp. 318-340; Eckaus, Estimating the Returns to Education; Martin Carnoy and Dieter Marenback, "The Returns to Schooling in the United States, 1939-1969," The Journal of Human Resources, 10:312-331, Summer, 1975; Raymond and Sesnowitz, pp. 138-153.

resources. He used Giora Hanoch's 1959 age-earnings profiles for males in different geographic regions and races. He found that the lifetime earnings of northern male whites with four years of college were $341,856 as compared to $142,428 for northern nonwhites with four years of college; the corresponding lifetime earnings for southern men were $311,233 and $105,415, respectively. Based on his computations of lifetime earnings, Johnson also estimated internal rates of return, with and without the adjustment for depreciation, and compared these to Hanoch's findings. In all cases the estimated rates of return, without the depreciation adjustment, were higher than Hanoch's internal rates of return. Table I (p. 41) shows all "net" or adjusted rates of return to investment in education for one to three years of college, for four years of college and for postgraduate college. Nearly all of these rates were also larger than the internal rates estimated by Hanoch. Although Johnson's numbers were larger than Hanoch's, the following findings were consistent: overall diminishing returns to education; higher rates for whites in the South than for whites in the North; higher rates for nonwhites in the North than for nonwhites in the South. The one striking difference between the results of Johnson and Hanoch was that Johnson found no advantage to completing the fourth year of college, except in the case of a southern nonwhite.[50]

Fred Hines, Luther Tweeten, and Martin Redfern

Social and private rates of return were computed by Hines and others for white and nonwhite males and females with different levels

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[50]Johnson, pp. 546-560.

of education through the use of 1959 U.S. Census earnings data. The results indicated that for one to two years of college and for four years of college, returns were highest to nonwhite females. Social and private rates of return for white males were higher than for nonwhite males; however, the reverse was true for females. Schooling was found to be marginally less attractive to nonwhite males than to any other group. The research also indicated that the incremental returns to white men decreased with the level of education but the reverse was true for the other demographic groups. These researchers also computed unadjusted aggregate social rates of return in which all levels of education were combined for each of the demographic groups. These aggregated social rates, which are not shown in Table I (p. 41), were 15.1, 10.2, 6.4 and 10.3 percent for white males, nonwhite males, white females and nonwhite females, respectively. In addition, unadjusted aggregate social rates for all men and women combined, in each of four U.S. Census geographic regions, were computed. Their results (not shown) indicated that the South, with the lowest level of education per student, incurred the highest social rate (14.6 percent); the West, with the highest expenditures per pupil, received the lowest social rate (11.0 percent.)[51]

Martin Carnoy and Dieter Marenbach

The private and social rates of return to investment in education in four U.S. Census years (1939-1969) for white and nonwhite men

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[51]Hines and others, pp. 318-340.

and women were computed by Carnoy and Marenbach. Table I (p. 41) shows the rates of return for 1969 only. These researchers found that although private rates fluctuated by as much as five percentage points for all demographic groups in different years during the 30-year period, they were lower in 1969 than in 1939. Social rates for each group did not fluctuate as much as the private rates and they were higher in 1969 than in 1939. The findings indicated that four years of college for black men (13.6 percent) was less profitable than for white men (16.6 percent) and that the reverse was true for women in the same education level (19.4 percent and 14.9 percent for black and white women, respectively). This was consistent with the research of Hines and others.[52]

Richard Raymond and Michael Sesnowitz

Raymond and Sesnowitz used 1970 U.S. Census income data to estimate the social and private rates of return to investment in education of white males. Major assumptions for the study included: (1) full-time college students work only in the summer; (2) part-time college students work full time during the summer and three-fourths time during the year. The students in this study graduated from high school between the ages of 18 and 19 and from college between the ages of 22 and 24 indicating that the part-time students were in school for a maximum of six years. The results indicated that the adjustment for the earnings of the part-time students who had smaller amounts of foregone earnings tended to raise the returns. These researchers also found that the

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[52]Carnoy and Marenbach, pp. 312-331.

marginal return for completing one to two years of college (14.6 percent) was higher than that for completing three years of college (11.5 percent).[53]

Richard S. Eckaus

The private rates of return on investment in education were estimated by Richard Eckaus through the use of an occupationnaly disaggregated approach. Eckaus made use of three income concepts: (1) unadjusted reported income; (2) income adjusted to a 2,000 hour annual basis, for mortality, unemployment and taxes; and (3) income with growth adjustment. Using the first income concept, Eckaus found that the internal rates of return were comparable to those found in other studies. When he adjusted the earnings for the variables in the second income concept, he found that because there was a tendency for annual hours of work to increase with the level of education; the rates increased or decreased accordingly and the gap in returns between education levels decreased. The third income concept slightly reduced the rates for all levels. The restuls also indicated that the returns were very different depending on the occupation. Table I (p. 41) shows the returns for a few selected occupations which might be similar to those of the UTN graduates. The results indicated that for accountants and engineers the incremental returns decreased as the level of education increased. However, the reverse was true for teachers. Their returns were negative for investing in four years of college but they were over 9.0 percent for investing in postgraduate work.[54]

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[53]Raymond and Sesnowitz, pp. 130-153.

[54]Eckaus, Estimating the Returns to Education.

Although the above studies and others in the literature cannot be directly compared to the UTN graduates because of the differences in the type of student, in adjustments, in methodology, and in earnings data used, the general patterns in earnings were used to set general guidelines for the present study. These and other studies[55] pointed out the discrepancy in the mean average wages and returns between men and women, therefore this study dealt with them separately in each degree program. The studies also pointed out the discrepancies in mean average wages and returns between whites and nonwhites. Hanoch indicated that returns for nonwhites were relatively erratic. This may have been due to the fact that U.S. Census data on earnings for all nonwhite groups have been based on samples which were small. This study dealt with white graduates only because the proportion of nonwhite to white graduates was very small and the literature indicated that groups of different racial backgrounds should be dealt with separately. In addition, the results of Hanoch, Johnson and Hines, and others pointed out the discrepancies in returns to individuals in different geographic regions, therefore, this study provided income adjustments for the middle Tennessee area. The methodology of the research by Raymond and Sesnowitz allowed adjustments for part-time students who were in college for a maximum of six years. Although

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[55]Randall B. Brown, Marilyn Moon, and Barbara S. Zoloth, "Incorporating Occupational Attainment in Studies of Male-Female Earnings Differentials," The Journal of Human Resources, 15:1-28, Winter, 1980; Mary Corcoran and Greg J. Duncan, "Work History, Labor Force Attachment, and Earnings Differences Between the Races and Sexes," The Journal of Human Resources, 14:1-20, Winter, 1979.

some of the older working adults in this study were in school slightly longer than that period, the six year period was used as the cutoff period for costs of the four-year degree programs. The costs of books and supplies for this study were also based on the Raymond and Sesnowitz study. Other parameters for the study, e.g., foregone earnings, were based on available U.S. Census and other statistical data because of lack of specific data on the working adult.

CHAPTER III

METHODOLOGY

The purpose of this chapter is to discuss the UTN graduates and present the procedures used for estimating the current degree costs, the present value of costs and earnings and the internal rate of return. A detailed account of data sources and preparation of computer data storage files is found in Appendix A. Appendix B provides a documentation for the original computer program which was used for the mathematical computations.

The design of the study necessitated the collection and processing of monetary costs and benefits of six degree programs at The University of Tennessee at Nashville (UTN). Specifically, this study involved the following research and survey activities:

1. Working closely with UTN officials to identify the participants.

2. Developing a questionnaire designed to collect data on education, income, employment and to secure permission to examine individual transcripts of graduates for purposes of costing coursework.

3. Testing the validity of the sample.

4. Collecting data and preparing storage files for computer programs.

5. Designing an original computer program to process input files, compute coursework costs based on a graduation year of 1977 and perform calculations.

6. Calculating annual degree costs of UTN graduates.

7. Calculating the present value of degree costs and lifetime earnings of the UTN graduates.

8. Calculating the ratios of benefits to costs of the degrees of UTN graduates.

9. Calculating the internal rate of return on investment in the degree programs of the UTN graduates.

10. Analysis of the internal rates of return and the benefit-cost ratios.

I. THE UTN GRADUATES

The Sample

The sample included 373 white graduates from The University of Tennessee at Nashville (UTN) in the five-year period between Spring 1973 and Spring 1977 with Associates degrees in Nursing, Bachelors degrees in Arts and Science, Bachelors degrees in Business, Bachelors degrees in Education, Bachelors degrees in Engineering, and Masters degrees in Business Administration (MBA); only men were included in the MBA and Engineering degrees. This study focused on the white graduates because most of the graduates, or 88 percent of total graduates within the specified time period, were white. The remaining 12 percent were black, Oriental, Spanish or foreign and were not evenly distributed among degree programs or through the years.[1] Because of the small and erratic

[1]See the computer-generated match reports of the Tennessee Higher Education Commission, Student Information System and Academic Inventory for Graduates (Nashville: Tennessee Higher Education Commission, various years 1973 through 1977). (The Commission is hereafter referred to as THEC).

number of nonwhite graduates in different years and because the literature indicates that earnings streams are different for whites and nonwhites,[2] the nonwhite graduates were not combined with whites and were therefore not included. In addition, the study dealt with men only in the Bachelors degrees in Engineering and the MBA degrees because there were no female graduates in these degrees for several years and because 96 percent of the graduates in these two degree programs, during the five-year period studied, were men.[3] As was the case for the nonwhites, these women graduates were not included because of the small numbers. These graduates were termed sample graduates.

An income-education-employment questionnaire along with a letter written by Dr. Willard Smith, then Director of Management Services at UTN, and a follow-up if necessary, were mailed to all graduates in the five-year period. At the time of mailout race and sex were unknown to the author. Copies of the letters and questionnaire are found in Appendix A. Out of 1,270 white graduates from the specified degrees and time period, 373 individuals responded with useful questionnaires for an overall response rate of approximately 30 percent.

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[2]See, e.g., Mary Corcoran and Greg J. Duncan, "Work History, Labor Force Attachment and Earnings Differences Between Races and Sexes," The Journal of Human Resources, 14:3-20, Winter, 1980; Giora Hanoch, "An Economic Analysis of Earnings and Schooling," Investment in Human Capital, ed. B.F. Kiker (Columbia: University of South Carolina Press, 1971), pp. 190-210; Fred Hines and others, "Social and Private Rates of Return to Investment in Schooling by Race-Sex Groups and Regions," The Journal of Human Resources, 5:318-340, Summer, 1970.

[3]THEC, Student Information System and Academic Inventory for Graduates, various years, 1973 through 1977.

Questionnaires were not considered useful if:

1. They were not signed to allow permission to examine student transcripts;

2. Income data or other background information were incomplete, missing or did not appear to be reasonably accurate;

3. They were for nonwhite or foreign individuals;

4. They were for women with MBA degrees or Bachelors degrees in Engineering;

5. They indicated employment outside of Davidson County or any of the surrounding counties.

Questionnaires of individuals indicating employment outside of Davidson County or any of the surrounding counties were not considered useful because the expected lifetime earnings and alternative earnings for all graduates were based on those of average individuals in middle Tennessee.

Sample Validity

The validity of the sample was tested through the use of the statistic chi-square. The assumption for this test was that if the age and the proportion of male to female graduates of the sample was representative of the age and the proportion of male to female graduates of the population, then the sample was representative of the population. Age and sex proportions were tested separately; the graduates with Engineering degrees and with MBA degrees were not tested for sex proportions.

To test the age group proportions, observed frequencies of graduates from the sample and the population were listed in specific U.S. Census age brackets to develop contingency tables for each degree studied. The following age groups are used by the U.S. Bureau of the Census in computing mean earnings for individuals: 20-24; 25-34; 35-44; 45-54 and 55-65.

None of the computed chi-squares for each of the degree programs indicated a significant departure from the null hypothesis at the .05 level of significance as shown in Table II. For the graduates with Associates degrees in Nursing, the obtained chi-square was 4.746 as compared to the required value of 7.815, with three degrees of freedom. The required chi-square for graduates with Bachelors degrees in Arts and Science, Business and Education, with three degrees of freedom , is 7.815 and the obtained values were 2.781, 1.418 and 5.840, respectively. For the graduates with Engineering degrees the computed and required chi-square values, with one degree of freedom, were .040 and 3.84, respectively. The computed chi-square for the graduates with MBA degrees was .910 as compared to the required value of 3.84 with one degree of freedom. The difference in the degrees of freedom between the degree programs was due to the collapsing of the cells where values were smaller than five. The results indicated that the null hypothesis should not be rejected. The usable sample was not different from the population on the characteristic of age.

With respect to the appropriateness of the proportions of males to females in each degree, observed frequencies for the number of male

TABLE II

OBTAINED AND REQUIRED CHI-SQUARE FOR SIGNIFICANT DIFFERENCES IN AGE

Academic Degree	Chi Square		Degrees of Freedom
	Obtained	Required[a]	
Associates :			
Nursing	4.764	7.815	3
Bachelors :			
Arts/Science	2.781	7.815	3
Business	1.418	7.815	3
Education	5.840	7.815	3
Engineering	.040	3.840	1
Masters :			
Business Administration	.910	3.841	1

[a]For significance at the .05 level.

and female graduates from the sample and the population with Bachelors degrees in Arts and Science, Business, and Education and with Associates degrees in Nursing were listed in two by two contingency tables.

The required chi-square for significance at the .05 level, with one degree of freedom, is 3.841, but none of the obtained chi-squares were significant, as is shown in Table III. For the graduates with Associates degrees in Nursing, the obtained value was 1.561. The obtained values for graduates with Bachelors degrees in Arts and Science, Business and Education were .063, .010, and .000, respectively. The results indicated that the null hypothesis should not be rejected. The usable sample was not different from the population on the characteristic of sex.

TABLE III

OBTAINED AND REQUIRED CHI-SQUARE FOR SIGNIFICANT DIFFERENCE IN SEX

Academic Degrees	Chi-Square		Degrees of Freedom
	Obtained	Required[a]	
Associates:			
Nursing	1.561	3.841	1
Bachelors:			
Arts/Science	.063	3.841	1
Business	.010	3.841	1
Education	.000	3.841	1

[a]For significance at the .05 level.

The computed values of chi-square in testing for differences in age and in male and female proportions between the sample and the population, for the individual degrees, were all found not significant at the .05 level. Therefore, the null hypothesis in each case was not rejected and the sample was considered representative of the population.

Other Graduates

To compare returns to investment in education in alternative ways of attending college, the investment criteria methodology of this dissertation was applied to two sets of typical college graduates in addition to the sample graduates. The typical college graduates included: (1) the part-time graduates or those who were assumed to have completed their degrees on a part-time basis, who were gainfully employed while attending school and who had no foregone earnings; and (2) the full-time graduates or those who were assumed to have completed their degrees on a full-time basis and who were unemployed while in school. The complete set of assumptions for each of the three types of UTN graduates including the sample graduates, the part-time graduates, and the full-time graduates, are given in Chapter I.

II. PROCEDURES FOR CALCULATING CURRENT DEGREE COSTS

Current degree costs were computed through the use of a basic computer program which costed the graduates' coursework based on a graduation year of 1977 and computed foregone earnings. The year 1977 was used as the graduation year for all graduates because consistent annual cost data were available to cost the coursework for years after

1970. Costs will be discussed in terms of how they were computed, as well as, by whom the costs were borne. Documentation for original computer program is found in Appendix B.

Mean average current degree costs were calculated for men and women in each of the six degree programs for each year of costs. Costs for the sample UTN graduates in each degree program were computed by first determining the difference between the actual graduation year, which ranged from 1973 through 1977, and 1977. The graduates in the different terms during the academic year 1973-1974 were considered to be graduates in 1974; all terms in each academic year were collapsed in the same manner. The difference was added to each of the years in which coursework was taken so as to move each year of coursework forward and produce a "new" year of coursework. The appropriate cost data were then used to estimate costs for each of the "new" years of coursework. For example, if a student graduated in 1974, the difference between 1977 and 1974 is three years. If this same student was enrolled in coursework in 1972, 1973 and 1974, three years would be added to each of these coursework years. The appropriate cost data for each year would then be used to compute the coursework costs and foregone earnings as if they had been incurred in 1975, 1976, and 1977, respectively, and the student had graduated in 1977 instead of 1974. In the case of the typical college graduates and those sample graduates who graduated in 1977, the difference was zero and the years of coursework were adjusted forward by zero number of years. This methodology allowed the coursework costs of all students to fall between 1972 and 1977. In the case of

students who graduated prior to 1977 and who listed their foregone earnings in the questionnaire, an adjustment to the foregone earnings by the Consumer Price Index (CPI) was required for the number of years in the difference between the actual graduation year and 1977. This adjustment was necessary so that all dollars would be in 1977 dollars. All costs were based on the assumptions given in Chapter I.

Not to have included costs for coursework taken at other institutions would have seriously underestimated total private or individual degree costs and social degree costs. This being the case, current degree costs were computed for coursework taken at UTN and at all other institutions. Three types of basic costs were computed: (1) total instruction; (2) books and supplies; and (3) foregone earnings. Total instruction costs, as defined in Chapter I, referred to the total institutional costs of delivery of the education. Because of the large numbers of students taking part-time coursework loads, it was necessary to compute costs of total instruction, books and supplies on a per credit hour basis. Approximately 50 credit hours were costed for the Masters degrees, 200 credit hours for the Bachelors degrees and 100 credit hours for the Associates degrees. Direct instruction costs at UTN were computed with course cost data from the Tennessee Higher Education Commission for specific taxonomy and student level.[4] The three types of costs were computed in terms of who bore the costs; those bearing the costs included

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[4]THEC, An Analysis of Instructional Costs Per Credit Hour, Fall Quarter (Nashville: Tennessee Higher Education Commission, various years 1971 through 1977).

the students, state and local governments and other miscellaneous sources, e.g., the Federal government and philanthropy. The proportion of each total instructional cost per credit hour borne by each of these was assumed to have the same relationship to the proportion of revenues received from each of these sources. These costs were examined from the point of view of the individual and society; individual costs included all degree costs borne by the student and societal costs, or total costs, were a summation of all students costs, state and local government costs and costs borne by other sources. The methodology in arriving at each of these points of view is discussed below.

Student Costs

Student costs or private costs for UTN degrees included the student portion of total instruction costs plus costs for books, supplies and foregone income, if any. The percent, or the student portion, of each per credit hour total instruction cost for each year was based on a ratio of total revenues received from students (tuition) to total current operating fund revenues. Percents for students' portion of total instruction were stored in files for every year and for every institution where students may have taken coursework—UTN, other public and private institutions in Tennessee, and other public and private institutions in the United States. Methodology for computation of foregone earnings is discussed in the next section. The following formula was used to compute annual student costs for each individual student for each year student was in school, in a given degree program:

$$SDC = R_y [[\sum (UTCR_{yx1})(IC_{yx1})] + (UTCR_y)(AC_y)] + \sum R_{yi}$$

$$(OCR_{yi})(OC_{yi}) + (B_y)(UTCR_y) + \sum (B_y)(OCR_{yi}) + F_y \qquad (1)$$

Where:

SDC = Total annual student degree costs.

R_y = Percent of total instruction costs per credit hour borne by the student in year y at UTN.

$UTCR_{yx1}$ = Total number of credit hours taken at UTN in year y, taxonomy x and level 1.

IC_{yx1} = Direct instruction cost per credit hour at UTN in year y, taxonomy x and level 1.

$UTCR_y$ = Total number of credit hours taken at UTN in year y.

AC_y = Average per credit hour administration costs at UTN in year y.

R_{yi} = Percent of total instruction costs per credit hour borne by the student in year y at i other public or private institution in Tennessee or the United States.

OCR_{yi} = Total number of credit hours taken in year y at i other public or private institution in Tennessee or the United States.

OC_{yi} = Total instruction costs per credit hour in year y at i other public or private institution in Tennessee or the United States.

B_y = Average cost of books and supplies per credit hour in year y.

F_y = Amount of foregone income in year y.

With respect to per credit hour costs by taxonomy, for those sample graduates who took courses at UTN where a per credit hour cost was not available[5] and in the case of part-time and full-time graduates, where the taxonomies of courses were unknown, the average per credit hour cost of direct instruction at each level was used. The average per credit hour cost of direct instruction in each level was treated as another taxonomy. Mean average costs were computed for men and women in each degree program. Subroutines which produced mean average costs are found in Appendix B.

Foregone Earnings

Determination of foregone earnings for each year individual was in school, as stated in the assumptions in Chapter I, was based on the amount of foregone earnings listed in the questionnaire and/or the number of hours the individual worked per week while taking coursework. No foregone earnings were computed for the part-time graduates. Most of the sample graduates worked at least on a part-time basis and had small amounts or no foregone earnings. National average earnings, adjusted for average earnings of individuals in middle Tennessee (middle Tennessee adjustment), were used to compute the foregone earnings of those students who did not list an amount in the questionnaire and who worked less than 40 hours a week and in the case of the full-time

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[5]If a course is not offered in the fall term, a cost is not computed in the THEC Analysis of Instructional Costs.

graduates, who were assumed to be unemployed while taking coursework. For the full-time graduates and for the sample graduates who were working less than 40 hours a week or who were unemployed during the time they were in school and who listed no foregone earnings in the questionnaire, an amount was estimated for every year they were in school with the equation below:

$$F_y = (EARNUS_{sal})\ (PCNTUT_{sl}) - HUT/40\ (EARNUS_{sal})(PCNTUT_{sl}) \qquad (2)$$

Where:

F_y = Amount of student foregone earnings for year y.

$EARNUS_{sal}$ = National average earnings for individual of the appropriate sex s, at student age a for every year of coursework and at one education level lower l than the degree completed; e.g., high school earnings in the case of the Associates degree in Nursing.

$PCNTUT_{sl}$ = Middle Tennessee earnings adjustment for individual of the appropriate sex s and one education level lower l than degree completed.

HUT = Number of hours per week individual worked while attending UTN.

For the sample graduates who worked on a part-time basis, the second part of equation (2), which takes account of the number of hours worked each week, had the effect of subtracting the earnings that the graduate may have earned from the total amount of foregone earnings. Full-time graduates worked zero number of hours each week during the time coursework was taken; therefore, the second part of equation (2)

was equal to zero. Once the amount of foregone income was determined (whether it was zero, given in the questionnaire, or computed as indicated above), it was added to the cost of total instruction and books in formula (1).

State Costs

Direct state costs included the percentage of total instruction cost which was borne by the state and local governments for public and private institutions in Tennessee and other public and private institutions in the United States. Direct implies that indirect degree costs, e.g., police and fire department protection, were excluded. This percentage of each per credit hour cost for each institution type, for each year, was based on a ratio of total revenues received from state and local governments (appropriations) to total current operating fund revenues. With respect to costs borne by the State of Tennessee, the state's percentage of total instructional costs included costs for coursework taken at UTN and at each other institution in the state. The following formula was used to determine annual state costs for each student in a given year:

$$STDC = R_y [[\sum (UTCR_{yxl})(IC_{yxl})] + (UTCR_y)(AC_y)] + R_{yi} \sum (OCR_{yi})(OC_{yl}) \quad (3)$$

Where:

STDC = Total annual direct degree state costs.

R_y = Percent of total instruction costs per credit hour borne by the State of Tennessee in year y at UTN.

$UTCR_{yxl}$ = Total number of credit hours taken at UTN in year y, taxonomy x and level 1.

IC_{yxl} = Direct instruction cost per credit hour at UTN in year y, taxonomy x and level 1.

$UTCR_{y}$ = Total number of credit hours taken at UTN in year y.

AC_{y} = Average per credit hour administration costs at UTN in year y.

R_{yi} = Percent of total instruction costs per credit hour borne by the state in year y at i other public or private institution in Tennessee or the United States.

OCR_{yi} = Total number of credit hours taken in a year y at i other public or private institution in Tennessee or the United States.

OC_{yi} = Total instruction costs per credit hour in a year y, at i other public or private institution in Tennessee or the United States.

Typical college graduates, the part-time graduates and the full-time graduates, and the sample graduates who took coursework only at UTN had no state costs at other institutions of higher education in formula (3). Costs for each student were summed to determine mean average state costs for men and women within each degree program. Documentation for subroutines which produced state costs are found in Appendix B.

Other Costs

Other costs were the remaining portion of total instruction costs per credit hour which were not borne by the student nor by the state and local governments, but by other sources, e.g., the Federal government and philanthropy. For each institution type the percent of each per credit hour cost, which was borne by other sources, was based on a ratio of the total revenues received from other sources to total current operating fund revenues. The following formula was used to determine annual other costs for each student in a given degree:

$$ODC = R_y[[\sum (UTCR_{yxl})(IC_{yxl})] + (UTCR_y)(AC_y)] + \sum R_{yi} (OCR_{yi})(OC_{yi}) \quad (4)$$

Where:

ODC = Total annual direct degree costs borne by other sources.

R_y = Percent of total instructional costs per credit hour borne by other sources in year y at UTN.

$UTCR_{yxl}$ = Total number of credit hours taken at UTN in year y, taxonomy x and level 1.

IC_{yxl} = Direct instruction cost per credit hour at UTN in year y, in taxonomy x in level 1.

$UTCR_y$ = Total number of credit hours taken at UTN in year y.

AC_y = Average per credit hour administration costs at UTN in year y.

R_{yi} = Percent of total instruction costs per credit hour borne by other sources in year y at i other public or private institution in Tennessee or the United States.

OCR_{yi} = Total number of credit hours taken in year y at i other public and private institution in Tennessee or the United States.

OC_{yi} = Total instruction costs per credit hour in year y in i other public or private institution in Tennessee or the United States.

Typical college graduates and the sample graduates who took coursework only at UTN had no other costs at institutions other than UTN. Other costs for each student were summed and mean average other costs determined for men and women. Documentation for subeoutines which produced other costs are found in Appendix B.

Social Costs

Direct social costs or total direct costs were obtained by simple summation of student costs, state costs and other costs. For each year mean average direct social costs were computed for each of the three types of male and female UTN graduates within each of the six degree programs. The three types of UTN graduates included the sample graduates, the part-time graduates and the full-time graduates.

IV. PROCEDURES FOR CALCULATING PRESENT VALUE OF COSTS AND EARNINGS

The private and social present values of degree costs and lifetime earnings were computed for all three types of graduates in the six degree programs studied. The private present values were those from the point of view of the individual. Methodology for computing annual degree

costs, based on a graduation year of 1977, was presented in the last section. Lifetime earnings computations included estimates for gross earnings, alternative earnings, incremental earnings and net incremental earnings.

Present values of costs and earnings were determined by compounding the stream of lifetime earnings to 1977. Because these streams were considered the expected benefits, computations were performed for all individuals regardless of their employment status in 1978. The age of the graduates in 1978 and age 64 were used to determine the number of discounting periods. Ages of the part-time and full-time graduates were based on the assumptions listed in Chapter I. For computation of the present value of lifetime earnings of the sample graduates, the earnings streams were lined up beginning in 1977, the reference point, irrespective of age; earnings were then discounted back from the 64th age period of the youngest graduate in the specific degree groups.

The current yield on government securities, or riskless assets was used as the relevant rate of discount.[6] However, between 1975 and 1978 the interest rate on these riskless securities fluctuated between 10 and 15 percent. For this reason the present value compounding and discounting calculations were done at two selected interest rates,

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[6]Gary S. Becker, Human Capital: A Theoretical and Empirical Analysis, With Special Reference to Education (New York: National Bureau of Economic Research, 1964), p. 55; E.J. Mishan, Cost Benefit Analysis: An Introduction (New York: Praeger Publishers, 1971), pp. 205-209.

10 and 15 percent. Formulas for estimating the present value of costs and earnings are presented below. Because of specific differences and certain similarities in the computation procedures of the different types of earnings, the discussion below is arranged in the following order: (1) gross earnings; (2) alternative earnings; (3) incremental earnings; (4) present value of costs and earnings.

Gross Earnings

The stream of gross earnings, or the lifetime earnings without regard to costs or alternative earnings, was computed by estimating the yearly earnings beginning with the age of the graduate in 1978, one year after graduation, and ending at age 64. For each type of graduate one set of gross earnings was computed; by definition, the gross earnings of the individual were equal to the gross earnings of society. Annual gross earnings were estimated by one of the three ways listed below. Conditions one and two included the sample graduates only; condition three included the typical college graduates and the sample graduates, if applicable.

1. If in 1978 the graduate was employed full time, a ratio of his 1978 annual earnings to the average earnings of individuals in the nation of the same sex, age, and in the same education level was obtained. A percent based on the ratic was then applied to the annual average earnings of individuals in the nation of the same sex and the same education level beginning with the age of the graduate in 1978 and continuing through age 64 as illustrated in equation (5).

$$GE = \left(\frac{EARN78}{EARNUS}\right) \quad \left(EARNUS_{sla}\right) \qquad (5)$$

Where:

GE = Annual gross earnings of sample graduate who was employed full time in 1978.

EARN78 = Annual 1978 income of the sample graduate.

EARNUS = National average earnings for individual of the same sex, age and in the same education level as sample graduate in 1978.

$EARNUS_{sla}$ = National average earnings for individual of the same sex s and same education level l as sample graduate from age a at graduation to age 64.

2. If the graduate worked less than 40 hours but more than 0 hours in 1978, annual gross earnings were estimated in two steps. First, based on the graduate's 1978 annual wages and number of weekly hours worked, a ratio of his 1978 earnings to national average earnings was divided by a ratio of the number of hours worked per week to full-time hours per week. Forty hours worked per week were regarded as full-time employment. The graduate's earnings were matched with the average earnings of individuals of the same sex, age, and in the same education level. The obtained percent, based on the above ratio, was then applied to the annual national average earnings of individuals of the same sex and education level beginning with the age of the graduate in 1978 and continuing through age 64. This process is illustrated in equation (6).

$$GE = \left[\frac{EARN78}{EARNUS} \Big/ \frac{H78}{40}\right] \left[EARNUS_{sla}\right] \quad (6)$$

Where:

GE = Annual gross earnings of sample graduate who worked less than 40 hours, but more than 0 hours in 1978.

EARN78 = Annual 1978 income of the sample graduate.

H78 = Number of hours sample graduate worked per week in 1978.

EARNUS = National average earnings for individuals of the same sex, age and in the same education level as sample graduates in 1978.

$EARNUS_{sla}$ = National average earnings for individuals of the same sex s and same education level l as sample graduate from age a at graduation to age 64.

3. If the graduates' 1978 earnings were unknown or zero, annual gross earnings were estimated through the use of the middle Tennessee adjustment and average earnings for individuals in the nation of the same sex and in the same education level, beginning with the age of the graduate in 1978 and continuing through age 64, as is shown below.

$$GE = (PCNT78_{sl}) \; (EARNUS_{sla}) \quad (7)$$

Where:

GE = Annual gross earnings of graduate who had zero earnings or who had unknown earnings in 1978.

$PCNT78_{sl}$ = Middle Tennessee earnings adjustment for the earnings of individuals of same sex s and in the same education level l as graduate.

$EARNUS_{sla}$ = National average earnings for individuals of the same sex s and in the same education level l as graduate from age a at graduation to age 64.

Alternative Earnings

Alternative earnings, or lifetime earnings of the individuals after graduation had the degree not been completed, were computed by estimating the yearly earnings for individuals in a lower education level than the degree completed beginning with the age of the graduate in 1978 and ending at age 64. One set of alternative earnings was estimated; the alternative earnings of the student were considered to be equal to those of society. Annual alternative earnings were estimated through the use of the middle Tennessee adjustment and national average earnings of individuals of the same sex and in one education level lower beginning with the age of the graduate in 1978 and continuing through age 64, as is shown below.

$$AE = (PCNTUT_{sl}) (EARNUS_{sla}) \quad (8)$$

Where:

AE = Annual alternative earnings of the graduate.

$PCNTUT_{sl}$ = Middle Tennessee earnings adjustment for the earnings of individuals of the same sex s and one education level lower than the graduate l.

$EARNUS_{sla}$ = National average earnings for individuals of the same sex s, one education level lower l than the graduate from age a at graduation to age 64.

Incremental Earnings

Incremental earnings were computed by adjusting the gross annual earnings of the graduates by the alternative earnings. Two sets of incremental earnings were estimated, the incremental earnings of the graduate and the incremental earnings of the graduate from the viewpoint of society. The incremental earnings for the student were adjusted for state and federal taxes.

Annual incremental earnings of the graduate were estimated by the following equation:

$$IE = [GE - [(F_x)(GE)] - [(S_x)(GE)] - [AE - [(F_x)(AE)] - [(S_x)(GE)]]] \quad (9)$$

Where:

IE = Annual incremental earnings of the graduate.

GE = Annual gross earnings of the graduate.

F_x = Appropriate federal income tax rate.

S_x = Appropriate State of Tennessee effective tax rate.

AE = Annual alternative earnings of the graduate.

Annual incremental earnings from the point of view of society were estimated by the following equation:

$$IE = GE - AE \quad (10)$$

Where:

IE = Annual incremental earnings of the graduate from the viewpoint of society.

GE = Annual gross earnings of graduate.

AE = Annual alternative earnings of graduate.

Present Values of Degrees Costs and Earnings

For all graduates the present value of degree costs were determined by compounding annual degree costs, at 10 and 15 percent, to 1977; the present value of earnings were determined by discounting the stream of lifetime earnings at the same selected interest rates to 1977. The streams of lifetime earnings, which includes computations for gross earnings, alternative earnings and incremental earnings, were computed as described in the previous section. The present value of the graduate's net incremental earnings was determined by adjusting his incremental earnings for the degree costs. Each of these equations is given below.

The present value of degree costs compounded to 1977 for each graduate was estimated by the following equation:

$$PVDC = \sum_{t=1}^{n} \frac{C_t}{(1 + i)^{-t}} \qquad (11)$$

Where:

PVDC = Private or social present value of degree costs.

C_t = Private or societal degree costs in year t.

n = Number of years of costs.

i = Selected interest rate.

The present value of annual lifetime earnings discounted to 1977 for each graduate was estimated by the following equation:

$$PVE = \sum_{t=a}^{64} \frac{E_t}{(1 + i)^{t}} \qquad (12)$$

Where:

PVE = Private or social present value of earnings.

E_t = Earnings of the graduate or society in year t.[7]

a = Age of graduate in 1978.

i = Selected interest rate.

The present value of the net incremental earnings of each graduate was estimated with the following equation:

$$PVNIE = \sum_{t=a}^{64} \frac{IE_t}{(1+i)^t} - \sum_{t=1}^{n} \frac{C_t}{(1+i)^{-t}} \qquad (13)$$

Where:

PVNIE = Social or private present value of net incremental earnings.

IE = Incremental earnings of the graduate or society in year t.

a = Age of graduate in 1978.

i = Selected interest rate.

n = Number of years of costs.

c_t = Degree costs for the graduate or society in year t.

Evaluation of the present values of degree costs and lifetime earnings of the graduates was accomplished through the use of benefit-cost ratios. Benefit cost ratios (B/C) were computed by dividing the present value of incremental earnings derived from equation (12) by the present value of degree costs derived from equation (11). The resulting ratio indicated how many dollars were returned to the graduate or to society for every dollar invested in the degree program.

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[7]Gross (GE), alternative (AE), or incremental (IE).

IV. PROCEDURES FOR CALCULATING THE INTERNAL RATE OF RETURN

Internal rates of return were computed for men, women and for both men and women for the three types of graduates in every degree program. Rates of return were estimated for the UTN graduates and for society. These rates were based on the lifetime incremental earnings streams and annual degree costs, computed as described in the previous section. In computing the internal rates of return for any of the specific degree groups, the streams of costs and earnings were lined up beginning with year zero, or the first year of costs of the graduate who had costs in the earliest year and ending in the period when the youngest graduate was 64 years old. The rate of discount which made the entire stream of costs and earnings equal to zero was estimated through the use of the following equation:

$$\sum_{t=o}^{64} \frac{B_t - C_t}{(1 + r)^t} = 0 \qquad (14)$$

Where:

B_t = Benefits in year t.

C_t = Costs in year t.

r = Interest rate to be estimated.

o = First year of the lifetime stream of costs and benefits.

Evaluation of the internal rates of return on investment in college degrees was accomplished by comparing the computed rates of return to the required interest rates. This study utilized 10 and 15 percent as the required interest rates for evaluation.

CHAPTER IV

PRESENTATION OF RESULTS AND DISCUSSION OF DATA

The data presented in this chapter are the results of the application of the present value criterion and the internal rate of return criterion to college degree costs and benefits which were based on a survey of sample graduates of The University of Tennessee at Nashville, U.S. Census data, and a methodology which costed course-work based on a graduation year of 1977. A more thorough picture of return on investment in the UTN degrees was provided through the use of both the present value and the internal rate of return criteria. The present value criterion allowed examination of costs and lifetime earnings; analysis was accomplished through the use of benefit-cost ratios, or numbers that indicated how many dollars were returned for every dollar of outlay. Numbers greater than one indicated a satis-factory level of profitability or investment in the degrees. The inter-nal rate of return criterion provided an interest rate on the return on investment in UTN degrees. To determine the profitability of the computed internal rate of return, they were compared to the required or "cutoff" interest rates. The required interest rates were defined as 10 and 15 percent. Returns greater than these required rates indicated a satis-factory level of profitability on investment in the UTN degrees. The analysis which follows clearly involves theoretical problems. The reader is forewarned of their presence. For purposes of facility in reading this chapter will refer to the present discounted value of

lifetime gross earnings, the present discounted value of lifetime net incremental earnings and the present compounded value of costs simply as gross earnings, incremental earnings, and costs, respectively.

I. PRESENT VALUE OF COSTS

Private Costs

Private costs for all three types of graduates, compounded at 10 and 15 percent to the year 1977, are shown in Table IV. The term private was used to refer to the individual point of view. The three types of graduates included the sample graduates, the part-time graduates and the full-time graduates. The impact of the different amounts of foregone earnings for the different types of graduates became readily visible. Private costs for the graduates are presented by degree level below.

Associate degree. For the men and women sample graduates with Associates degrees in Nursing the costs, compounded at 10 percent, were $12,869 and $17,115, respectively; at 15 percent these costs were $14,121 and $18,731, respectively. For part-time graduates, the costs were $2,463 compounded at 10 percent and $2,775 at 15 percent. For full-time graduates, at 10 percent, the men's costs were $19,235 while those for the women were $16,837; at 15 percent these costs were $20,564 and $18,003, respectively.

Bachelors degrees. With respect to the sample graduates, the range of private costs for men with Bachelors degrees, compounded at

TABLE IV

MEAN AVERAGE PRESENT VALUE OF PRIVATE COSTS OF SELECTED DEGREES, THE UNIVERSITY OF TENNESSEE AT NASHVILLE, COMPOUNDED TO 1977 AT 10 AND 15 PERCENT, BY DEGREE, SEX AND TYPE OF GRADUATE

Degree	Sex	Mean Average Present Value of Private Degree Costs Per Graduate					
		Sample Graduates		Part-time Graduates		Full-time Graduates	
		10%	15%	10%	15%	10%	15%
Associates:							
Nursing	Men	$12,869	$14,121	$2,463	$2,775	$19,235	$20,564
	Women	17,115	18,731	2,463	2,775	16,837	18,003
Bachelors:							
Arts/Science	Men	10,562	12,036	4,272	5,016	40,157	44,835
	Women	12,956	14,798	4,272	5,016	34,875	38,950
Business	Men	14,074	16,133	4,699	5,516	40,571	45,301
	Women	9,171	10,349	4,699	5,516	35,289	39,416
Education	Men	8,035	9,126	4,465	5,248	40,412	45,123
	Women	15,556	17,697	4,465	5,248	35,130	39,237
Engineering	Men	6,575	7,575	4,846	5,701	40,901	45,686
Masters:							
Business	Men	5,780	6,471	1,754	1,967	26,053	27,853

10 percent, was from $6,575 for those in Engineering to $14,074 for those in Business. The men with Bachelors degrees in Business had the highest costs of the male sample graduates; the men with other Bachelors degrees had lower costs than the men with Associates degrees. The range in costs for women sample graduates with Bachelors degrees, compounded at 10 percent, was from $9,171 for those in Business to $15,556 for those in Education. Even the highest costs for the women in Education were not as high as those of the women with Associates degrees in Nursing. As a result of low foregone earnings, the women in Business had lower degree costs than the men in the same degree; all other women, including those with Associates degrees had higher costs than the men within the same degree. The use of a 15 percent interest rate on the costs of Bachelors degrees of sample graduates increased the cost amounts, but the high to low patterns for the degree costs remained the same.

For part-time graduates with Bachelors degrees, the range in costs, at 10 percent, was from $4,272 for those in Arts and Science to $4,846 for those in Engineering; the corresponding amounts at 15 percent were $5,016 and $5,701 respectively. The costs for each degree program were the same for men and women because of the absence of foregone earnings and the use of average costs for total instruction. A comparison of the part-time graduates with Associates degrees and Bachelors degrees indicated that the graduates with Bachelors degrees had the highest costs. This was due to the fact that these degrees had the largest amount of required coursework and the largest number of compounding periods.

In the case of the full-time graduates with Bachelors degrees, at 10 percent, the men's costs ranged from $40,157 for those in Arts and Science to $40,901 for those in Engineering; the women's costs ranged from $34,875 for those in Arts and Science to $35,289 for those in Business. Because men had more income to forego during the period when coursework was taken, their degree costs were higher than those of women. When the interest rate was 15 percent costs for all the degree programs of the full-time graduates increased over $4,000, but all the high and low patterns remained the same. A comparison of the full-time graduates with Associates degrees and Bachelors degrees indicated that the graduates with Bachelors degrees had the highest costs, especially the men. As might have been expected, the degrees with the smaller number of compounding periods and smallest amount of required coursework had the lowest costs.

Masters degrees. With respect to male sample graduates, the private costs of the Masters degree in Business Administration (MBA) were $5,780 compounded at 10 percent and $6,471 at 15 percent. For the sample graduates, within sex groups, private degree costs tended to be lower the higher the level of the college degree. The costs for the men at the Masters degree level at both interest rates, were lower than the costs of those with Bachelors degrees or Associates degrees. Differences in the costs of the degrees of the sample graduates were a function of their age at graduation, the amount of credit hours costed, foregone earnings and the number of periods for compounding forward to 1977.

Private costs for the part-time graduates with MBA degrees were $1,754 compounded at 10 percent and $1,967 at 15 percent. In the case of part-time graduates, who had no foregone earnings, the number of compounding periods and total instruction costs played an important role in the determination of degree costs. The larger amount of coursework hours and compounding periods resulted in higher costs for the part-time graduates with Bachelors degrees than for those with MBA degrees. Although the periods for compounding were the same for the part-time men graduates with Associates degrees and for those with MBA degrees, the amount of required credit hour coursework for the Associates degree was approximately twice the amount required for the graduate degree resulting in higher costs for the Associates degree in Nursing.

For full-time male graduates with an MBA degree, the private costs were $26,053 compounded at 10 percent and $27,853 at 15 percent. A comparison of the full-time men graduates with MBA degrees and other lower level degrees indicated that although the men graduates with MBA degrees and those with Associates degrees were processed with the same number of compounding periods, the graduates with MBA degrees had higher foregone earnings and therefore the costs were higher for the graduate degrees. Although the annual foregone earnings of the male graduates with MBA degrees were higher than the costs of the male graduates with Bachelors degrees, the Bachelors degree graduates had more years of foregone earnings resulting in higher costs for the four-year degree.

Social Costs

Social costs for all three types of graduates compounded to 1977 at 10 and 15 percent are shown in Table V. Social costs were higher than the private costs shown in Table IV (p. 79), but most of the high and low relationships were the same as those for private costs. Costs for the degrees of the three types of graduates by degree level are presented below.

Associates degrees. The social costs for the men and women sample graduates with Associates degrees, compounded at 10 percent, were $16,918 and $21,678, respectively; at 15 percent the costs were $18,581 and $23,778, respectively. For part-time men and women graduates, the social costs were the same; the costs were $6,158 compounded at 10 percent and $6,926 at 15 percent. The full-time male graduates had higher degree costs than the male sample graduates or the part-time graduates; however, the full-time female graduates had slightly lower costs than the female sample graduates. When the interest rate was 10 percent, the men and women full-time graduates had social costs of $23,079 and $20,681, respectively; at 15percent these costs were $24,670 and $22,108, respectively.

Bachelors degrees. Depending on the degree, some of the sample graduates with Bachelors degrees had higher social costs and some had lower social costs than the sample graduates with Associates degrees. The sample graduates with Bachelors degrees in Engineering had social costs, compounded at 10 percent, of $11,869 and those in Education had costs of $15,343; costs of both of these degrees were less than those for

TABLE V

MEAN AVERAGE PRESENT VALUE OF SOCIAL COSTS OF SELECTED DEGREES, THE UNIVERSITY OF TENNESSEE AT NASHVILLE, COMPOUNDED TO 1977 AT 10 AND 15 PERCENT, BY DEGREE, SEX AND TYPE OF GRADUATE

Degree	Sex	Mean Average Present Value of Social Degree Costs Per Graduate					
		Sample Graduates		Part-time Graduates		Full-time Graduates	
		10%	15%	10%	15%	10%	15%
Associates:							
Nursing	Men	$16,918	$18,581	$ 6,158	$ 6,926	$23,079	$24,670
	Women	21,678	23,778	6,158	6,916	20,681	22,108
Bachelors:							
Arts/Science	Men	17,964	20,765	10,543	12,316	46,573	51,991
	Women	17,901	20,529	10,543	12,316	41,292	46,106
Business	Men	20,802	24,048	11,595	13,545	47,627	53,174
	Women	16,152	18,652	11,595	13,545	42,345	47,289
Education	Men	15,343	17,611	11,005	12,870	47,219	52,717
	Women	22,760	26,055	11,005	12,870	41,937	46,832
Engineering	Men	11,869	13,637	11,935	13,969	48,438	54,116
Masters:							
Business	Men	8,450	9,455	4,674	5,228	28,848	30,851

the men with Associates degrees. The social costs, at 10 percent, were $17,964 for the men with Bachelors degrees in Arts and Science and $30,802 for those in Business. Costs in each of these degree programs were higher than those of the men with Associates degrees. For women sample graduates with Bachelors degrees, the range in costs, compounded at 10 percent, was from $16,152 for those in Business to $22,760 for those in Education. Only the women sample graduates in Education had higher costs than the women sample graduates with Associates degrees. In addition, the women in Education had higher social costs than the men in the same degree, but the reverse was true in the case of the women in Arts and Science and in Business. When the interest rate was 15 percent the costs increased by several thousand dollars but the high to low positions for costs of the sample graduates remained the same as those in the lower interest rate. With respect to part-time graduates with Bachelors degrees, the range in costs, compounded at an interest rate of 10 percent, was from $10,543 for the Arts and Science degree to $11,935 for the Engineering degree; at 15 percent, the costs were $12,316 and $13,969, respectively. These costs were higher than the costs of the part-time graduate with degrees in Nursing due to the larger amounts of instruction costs and compounding periods. Because of the lack of foregone earnings, however, part-time graduates had lower costs than did the sample graduates in the same Bachelors degree program.

The social costs of men full-time graduates, with Bachelors degrees, at 10 percent, ranged from $46,573 for those in Arts and Science to $48,438 for those in Engineering. For women full-time

graduates the range was from $41,292 for those in Arts and Science to $42,345 for those in Business. Although the use of a 15 percent interest rate resulted in increased social costs, the relative high and low positions remained stable. The social costs of any of the Bachelors degrees were greater than the costs of the Associates degrees. With the exception of the female sample graduates, who had slightly higher costs for the Nursing degree than other females, the full-time graduates with Bachelors or Associates degrees had the highest social costs, within degree programs. This was due to the large amoung of foregone earnings.

Masters degrees. The sample male graduates in the MBA degree program had social costs of $8,450 when the interest rate was 10 percent and costs of $9,455 when the interest rate was 15 percent. These costs were lower than the degree costs of other sample graduates in lower level degree programs. For the part-time graduates social costs, at 10 percent, were $4,674 and $5,228 at 15 percent. These costs were lower than the degree costs of part-time graduates with Bachelors degrees or Associates degrees.

The male full-time graduates with MBA degrees had social costs of $28,848 at 10 percent and $30,851 at 15 percent. These costs were greater than those of the male full-time graduates with Associates degrees and less than those of the male full-time graduates with Bachelors degrees. The costs were greater than the social costs of Associates degrees because MBA graduates had a greater amount of annual foregone earnings; however the costs were less than the social costs of Bachelors degrees because Bachelors degree gradautes had more years of foregone earnings.

II. PRESENT VALUE OF BENEFITS

Private Benefits

The mean average present values of gross lifetime earnings and net incremental earnings of the UTN graduates from the private point of view, discounted at 10 percent, are found in Table VI. The private point of view is intended to be the same as the individual. Net incremental earnings have been defined as gross earnings with adjustments for alternative earnings and degree costs. Table VII shows the same amounts discounted at 15 percent. As might have been expected, the gross earnings were higher than the incremental earnings and the use of the higher interest rate caused a decrease in the gross and incremental earnings. The present value of individuals' earnings are presented below.

Associates degrees. For the full-time and part-time graduates with Associates degrees in Nursing, the private gross and incremental earnings of the men were greater than those of women. Although the gross earnings of the male sample graduates were higher than those of the female sample graduates, the reverse was true in the case of incremental earnings. At an interest rate of 10 percent, the private gross earnings of the male sample graduates, part-time graduates and full-time graduates were $146,817, $202,197, and $160,945, respectively (Table VI). The corresponding amounts for women were $127,456, $138,768 and $127,040, respectively. After adjustments for alternative earnings

TABLE VI

MEAN AVERAGE PRESENT VALUES OF GROSS AND NET INCREMENTAL LIFETIME EARNINGS AS A RESULT OF SELECTED DEGREES, THE UNIVERSITY OF TENNESSEE AT NASHVILLE, FROM THE PRIVATE POINT OF VIEW, DISCOUNTED TO 1977 AT 10 PERCENT, BY DEGREE, SEX AND TYPE OF GRADUATE

		Mean Average Present Value of Lifetime Earnings Per Graduate					
		Sample Graduates		Part-time Graduates		Full-time Graduates	
Degree	Sex	Gross Earnings	Net Incremental Earnings	Gross Earnings	Net Incremental Earnings	Gross Earnings	Net Incremental Earnings
Associates:							
Nursing	Men	$146,817	$ 3,700	$202,197	$ 35,749	$160,945	$ 6,388
	Women	127,456	10,349	138,768	27,329	125,040	6,805
Bachelors:							
Arts/Science	Men	170,801	9,382	243,863	64,076	195,550	6,835
	Women	121,361	10,757	146,748	32,724	138,205	-3,336
Business	Men	199,467	24,383	241,819	63,179	195,550	6,741
	Women	126,492	20,951	145,349	31,770	138,205	-3,750
Education	Men	168,443	8,788	233,956	59,471	195,550	6,639
	Women	105,139	-4,431	143,689	31,306	138,205	-3,591
Engineering	Men	255,887	71,131	246,347	64,521	195,550	6,091
Masters:							
Business	Men	249,615	8,244	325,639	50,302	308,994	48,204

TABLE VII

MEAN AVERAGE PRESENT VALUES OF GROSS AND NET INCREMENTAL LIFETIME EARNINGS AS A RESULT OF SELECTED DEGREES, THE UNIVERSITY OF TENNESSEE AT NASHVILLE, FROM THE PRIVATE POINT OF VIEW, DISCOUNTED TO 1977 AT 15 PERCENT, BY DEGREE, SEX AND TYPE OF GRADUATE

		Mean Average Present Value of Lifetime Earnings Per Graduate					
		Sample Graduates		Part-time Graduates		Full-time Graduates	
Degree	Sex	Gross Earnings	Net Incremental Earnings	Gross Earnings	Net Incremental Earnings	Gross Earnings	Net Incremental Earnings
Associates:							
Nursing	Men	$103,324	$ -3,585	$141,934	$23,462	$104,880	$ -4,959
	Women	90,506	286	99,349	18,069	84,935	-2,755
Bachelors:							
Arts/Science	Men	120,305	599	172,133	42,275	127,590	-16,197
	Women	88,448	2,521	108,195	23,102	95,243	-17,704
Business	Men	139,735	9,686	169,461	41,056	127,590	-16,532
	Women	93,345	11,956	107,621	22,400	95,243	-18,170
Education	Men	116,288	1,087	161,725	37,725	127,590	-16,473
	Women	77,333	-9,444	106,821	22,303	95,243	-17,991
Engineering	Men	180,924	46,253	175,055	42,603	127,590	-17,048
Masters:							
Business	Men	179,532	3,835	231,696	35,639	213,470	28,570

taxes and costs were made, the remaining incremental earnings for the male sample graduates, part-time graduates and full-time graduates were $3,700, $35,749 and $6,388, respectively; the respective amounts for women were $10,349, $27,329 and $6,805. When the interest rate was increased to 15 percent, both the gross and net incremental earnings were reduced, but the relative high to low positions remained the same (Table VII, p. 89). Reductions were such that in the case of the male sample graduates and the full-time graduates, the incremental earnings were negative. This indicated that for these graduates their investment in the college degree was negative.

Differences in age and the discounting process resulted in higher gross earnings for the part-time graduates as compared to the full-time graduates in the Nursing degree program. These differences were narrowed when the predetermined or relevant interest rate was higher. The male sample graduates had lower lifetime gross earnings than the part-time graduates, a comparison which indicated that over a lifetime they would not be expected to earn as much as the typical male college graduates in middle Tennessee with two years of college. The female sample graduates had expected lifetime gross earnings which were comparable to those of the full-time graduates but were less than those of the part-time graduates. When the gross earnings were adjusted for costs, alternative earnings and taxes, the present value of the earnings was reduced by more than $100,000. The part-time graduates maintained the highest position in gross and incremental earnings and the earnings differences between the sample graduates and the full-time graduates were not great.

Bachelors degrees. With respect to Bachelors degrees, the private gross and incremental earnings of male sample graduates, discounted at 10 percent, ranged from $168,443 and $8,788, respectively, for the men in Education to $255,887 and $71,131, respectively, for the men in Engineering (Table VI, p. 88). The corresponding gross and incremental earnings ranges for the female sample graduates were from $105,139 and $4,431, respectively, for the women in Education to $126,492 and $20,951, respectively, for the women in Business. When the interest rate was increased to 15 percent, the gross and incremental earnings of the sample graduates were reduced, but the high to low positions remained the same; the men in Engineering and the women in Business had the highest gross and incremental earnings (Table VII, p. 89).

For the part-time graduates with Bachelors degrees, as might have been expected, the ranges in gross or incremental earnings were not too far apart. When the interest rate was 10 percent, the men's gross and incremental earnings ranged from $233,956 and $59,471, respectively, for those in Education to $246,347 and $64,521, respectively, for those in Engineering (Table VI, p. 88). For female part-time graduates, these respective gross and incremental earnings range amounts were from $143,689 and $31,306, respectively, for those in Education to $146,758 and $32,724, respectively, for those in Arts and Science. The incremental earnings of part-time male graduates were approximately twice those of the women in the corresponding degree programs. When the interest rate was 15 percent, the relative high and low patterns of the part-time graduates did not change except that the gross and incremental earnings amounts were lower (Table VII, p. 89).

For the full-time male graduates in Bachelors degrees programs, when the interest rate was 10 percent, the gross earnings were $195,550 while their incremental earnings ranged from $6,091 for those in Engineering to $6,835 for those in Arts and Science (Table VI, p. 88). The difference in incremental earnings for the men was due to the different amounts of required coursework for each degree. The full-time female graduates in all Bachelors degrees had gross earnings of $138,205, but their incremental earnings were more than $3,000 on the negative side, which indicated their profitability. When the interest rate was 15 percent, all the gross and incremental earnings were lower (Table VII, p. 89). Both full-time male and female graduates with Bachelors degrees had negative earnings when the interest rate was 15 percent. Negative earnings indicated that investment in degrees with negative earnings was not as economically profitable as the investment in another degree which had large positive incremental earnings.

Within each specific degree, the gross earnings of the sample graduates with Bachelors degrees were less than those of the part-time graduates, except for the men in Engineering. This occurrence indicated that, except for the men in Engineering, sample graduates with Bachelors degrees had lower expected lifetime incomes than the typical college graduates in middle Tennessee. A comparison, within degrees, of the gross earnings of the sample graduates to those of the full-time graduates provided a good example to show that high gross earnings which appeared financially lucrative were sometimes reduced drastically when adjustments were taken into account. Except for men in Business and in Engineering

the gross earnings of the sample graduates were less than those of the full-time graduates; however, after adjustments for costs, alternative earnings and costs were made, the incremental earnings of the full-time graduates were less than those of the sample graduates. A comparison of the gross earnings of the typical college graduates with Bachelors degrees and those with Associates degrees indicated that for both men and women, gross earnings increased with the level of education. This occurrence was also observed with the male sample graduates. However, in the case of the sample female graduates, the earnings of the women with Associates degrees were slightly higher than those with Bachelors degrees.

Masters degrees. In the case of MBA degrees when the interest rate was 10 percent, the sample graduates, the part-time graduates, and the full-time graduates had private gross earnings of $249,615, $325,639, and $308,994, respectively (Table VI, p. 88). The respective incremental earnings were $8,244, $50,302, and $48,204. When the interest rate was raised to 15 percent, the gross and incremental earnings were lower, but the relationship in positions remained the same (Table VII, p. 89). These results indicated that the expected lifetime gross earnings of the sample graduates with MBA degrees were less than those of the typical college graduates with Masters degrees in middle Tennessee.

Social Benefits

The social mean present values of gross lifetime earnings and net incremental earnings of the UTN graduates, discounted at 10 percent

and 15 percent, are found in Tables VIII and IX. The gross earnings which accrued to society as a result of UTN degrees, by definition, were equal to those of the private individual. Because these earnings were presented in the previous section under private benefits, reference will be made to net incremental earnings only.

Associates degrees. For male graduates with Associates degrees in Nursing the social incremental earnings, discounted at 10 percent, were $4,843 from the sample graduates, $43,795 from the part-time graduates and $9,859 from the full-time graduates (Table VIII). The corresponding incremental earnings for women were $12,183, $30,686 and $8,052, respectively. When the interest rate was 15 percent, the incremental earnings were reduced enough that they were negative for the sample graduates and the full-time graduates (Table IX). Only the incremental earnings of the part-time graduates remained relatively high.

Bachelors degrees. Sample graduates had varied amounts of social incremental earnings when the interest rate was 10 percent (Table VIII). For male sample graduates the range in social incremental earnings was from $6,764 for men in Education to $95,089 for the men in Engineering. The range for the women, in the same graduate type, was from $-9,300 for the women in Education to $21,015 for the women in Business. From the viewpoint of society, the highest incremental earnings were those of the men graduates in Engineering and women graduates in Business. However, the net incremental earnings of the men in Engineering were over four times as large as those of the women in Business. When the interest

TABLE VIII

MEAN AVERAGE PRESENT VALUES OF GROSS AND NET INCREMENTAL LIFETIME EARNINGS AS A RESULT OF SELECTED DEGREES, THE UNIVERSITY OF TENNESSEE AT NASHVILLE, FROM THE SOCIAL POINT OF VIEW, DISCOUNTED TO 1977 AT 10 PERCENT, BY DEGREE, SEX AND TYPE OF GRADUATE

		Mean Present Value of Lifetime Earnings Per Graduate					
		Sample Graduates		Part-time Graduates		Full-time Graduates	
Degree	Sex	Gross Earnings	Net Incremental Earnings	Gross Earnings	Net Incremental Earnings	Gross Earnings	Net Incremental Earnings
Associates:							
Nursing	Men	$146,817	$ 4,843	$202,197	$43,795	$160,945	$ 9,859
	Women	127,456	12,183	138,768	30,686	125,040	8,052
Bachelors:							
Arts/Science	Men	170,801	9,361	243,863	80,155	195,550	14,718
	Women	121,361	11,533	146,748	35,512	138,205	-2,692
Business	Men	199,467	32,254	241,819	77,980	195,550	14,037
	Women	126,492	21,015	145,349	33,773	138,205	-3,746
Education	Men	168,443	6,764	233,956	73,218	195,550	14,147
	Women	105,139	-9,300	143,689	33,460	138,205	-3,338
Engineering	Men	255,887	95,089	246,347	80,554	195,550	12,853
Masters:							
Business	Men	249,615	15,386	325,639	72,579	308,994	71,823

TABLE IX

MEAN AVERAGE PRESENT VALUES OF GROSS NET INCREMENTAL LIFETIME EARNINGS AS A RESULT OF SELECTED DEGREES, THE UNIVERSITY OF TENNESSEE AT NASHVILLE, FROM THE SOCIAL POINT OF VIEW, DISCOUNTED TO 1977 AT 15 PERCENT, BY DEGREE, SEX AND TYPE OF GRADUATE

		Mean Average Values of Lifetime Earnings Per Graduate					
		Sample Graduates		Part-time Graduates		Full-time Graduates	
Degree	Sex	Gross Earnings	Net Incremental Earnings	Gross Earnings	Net Incremental Earnings	Gross Earnings	Net Incremental Earnings
Associates:							
Nursing	Men	$103,324	$-4,818	$141,934	$26,952	$104,880	$- 4,898
	Women	90,506	- 386	99,349	18,832	84,935	3,656
Bachelors:							
Arts/Science	Men	120,305	-3,430	172,133	50,507	127,590	-14,889
	Women	88,448	954	108,195	22,773	95,243	-20,262
Business	Men	139,735	11,550	169,461	47,861	127,590	-15,920
	Women	93,345	8,832	107,621	21,275	85,243	-21,446
Education	Men	116,288	-4,178	161,725	43,740	127,590	-15,600
	Women	77,333	-16,063	106,821	21,472	95,243	-20,988
Engineering	Men	180,924	60,080	175,055	50,669	127,590	-17,014
Masters:							
Business	Men	179,532	7,945	231,696	48,777	213,470	44,137

rate was 15 percent, the incremental earnings were decreased but the relative high and low positions remained unchanged (Table IX, p. 96). At 15 percent, in addition to the women with Bachelors degrees in Education, the men with Bachelors degrees in Arts and Science and in Education also had negative social incremental earnings.

Part-time graduates with Bachelors degrees did not have as large a range in social incremental earnings as did the sample graduates (Table VIII, p. 95). For the male part-time graduates with Bachelors degrees, the range in social incremental earnings was from $73,218 for those in Education to $80,554 for those in Engineering. For the women the range was from $33,460 for those in Education to $35,512 for those in Arts and Science. From the viewpoint of society, the men had higher incremental earnings than did the women. When the interest rate was 15 percent the social incremental earnings were decreased, but the high and low positions remained the same (Table IX, p. 96).

Many of the social incremental earnings for the full-time graduates with Bachelors degrees were negative. When the interest rate was 10 percent, the range for the men was from $12,853 for the men in Engineering to $14,718 for the men in Arts and Science (Table VIII, p. 95). The women in all degrees had negative earnings. At 15 percent the social incremental earnings for men and women in all degree programs was negative (Table IX, p. 96).

Masters degrees. When the interest rate was 10 percent, the male graduates with MBA degrees had social incremental earnings of $15,386 for the sample graduates, $72,579 for the part-time graduates

and $71,823 for the full-time graduates (Table VIII, p. 95). When the interest rate was 15 percent, the corresponding social incremental earnings were $7,945, $48,777 and $44,137, respectively (Table IX, p. 96).

III. BENEFIT-COST RATIOS

To determine whether or not the computed present value of costs and benefits of the UTN degrees were considered profitable, comparisons of the present values were made through the use of benefit-cost ratios. Benefit-cost ratios were computed by dividing the present value of benefits by the present value of costs (B/C). Degrees with benefit-cost ratios greater than one were considered profitable. Both the private and the social benefit-cost ratios are discussed.

Private Benefit-Cost Ratios

The private benefit-cost ratios for the degrees of the three types of graduates, were estimated through the use of the present value of costs and the present value of incremental earnings without adjustments for costs. These are shown in Table X. The present value of costs and benefits were determined by using a 10 and 15 percent interest; ratios using the present values from both interest rates are shown.

Associates degrees. With respect to Associate degrees, when a 10 percent interest rate was used to determine the present value of costs and benefits, the benefit-cost ratios for the male sample graduates, the male part-time graduates and the male full-time graduates were 1.28, 15.51 and 1.32, respectively. For women these ratios were 1.60, 12.11 and 1.40, respectively.

TABLE X

PRIVATE BENEFIT-COST RATIOS FOR SELECTED DEGREES, THE UNIVERSITY OF TENNESSEE AT NASHVILLE, COMPUTED WITH PRESENT VALUES AT 10 AND 15 PERCENT, BY DEGREE, SEX AND TYPE OF GRADUATE

Degree	Sex	Benefit-Cost Ratios					
		Present Values at 10 Percent			Present Values at 15 Percent		
		Sample Graduates	Part-Time Graduates	Full-Time Graduates	Sample Graduates	Part-Time Graduates	Full-Time Graduates
Associates:							
Nursing	Men	1.28	15.51	1.32	0.75	9.45	0.76
	Women	1.60	12.11	1.40	1.02	7.51	0.99
Bachelors:							
Arts/Science	Men	1.89	14.99	1.17	1.05	9.43	0.64
	Women	1.83	8.66	0.90	1.17	5.61	0.55
Business	Men	2.73	14.44	1.17	1.60	8.44	0.64
	Women	3.28	7.76	0.89	2.16	5.06	0.54
Education	Men	2.09	14.32	1.16	1.12	8.19	0.64
	Women	0.71	8.01	0.90	0.47	5.25	0.54
Engineering	Men	11.82	14.31	1.15	7.11	8.47	0.63
Masters:							
Business	Men	2.43	29.68	2.85	1.59	19.12	2.03

When the interest rate was 15 percent, the benefit-cost ratios for the male sample graduates, the part-time graduates and the full-time graduates were 0.75, 9.45 and 0.76, respectively. For women these ratios were 1.02, 7.51 and 0.99, respectively. Ratios for the male sample graduates and for the male and female full-time graduates were less than 1.00 which indicated their profitability.

Bachelors degrees. When the interest rate was 10 percent, the ratios for the graduates in the different Bachelors degrees programs varied by over 14 points, in some cases. With respect to the Arts and Science degrees, the sample, part-time and full-time male graduates had ratios of 1.89, 14.99 and 1.17, respectively; the women graduates, in the same degree program, had ratios of 1.83, 8.66 and 0.90, respectively. The male graduates with Business degrees, in the same respective graduate type order, had ratios of 2.73, 14.44 and 1.17; for the women these ratios were 3.28, 7.76 and 0.89, respectively. For the Bachelors degrees in Education the ratios were 2.09 for the male sample graduates, 14.32 for the male part-time graduates and 1.16 for the male full-time graduates; the females had ratios of 0.71, 8.01 and 0.90, respectively. In the Engineering degree programs, the ratios were 11.82 for the male sample graduates, 14.31 for the part-time male graduates and 1.15 for the full-time male graduates.

When the interest rate was 15 percent, a number of private benefit-cost ratios, which had been greater than 1.00 at 10 percent, were determined to be less than 1.00. For the Arts and Science degrees, the ratios were 1.05 for the male sample graduates, 9.43 for the

part-time male graduates and 0.64 for the full-time male graduates; for the women the ratios were 1.17, 5.61 and 0.55, respectively. For the male graduates with Business degrees, the ratios were 1.60, 8.44 and 0.64 for the sample, part-time and full-time graduates, respectively; for the female graduates the ratios were 2.16, 5.06 and 0.54, respectively. In Education the sample, part-time and full-time male graduates had ratios of 1.12, 8.19 and 0.64, respectively; the women graduates had ratios of 0.47, 5.25 and 0.54, respectively. In the Engineering degree programs, the ratios were 7.11 for the male sample graduates, 8.47 for the part-time male graduates and 0.63 for the full-time male graduates. When the interest rate was 15 percent, the full-time graduates with Bachelors degrees and the female sample graduates with Bachelors degrees in Education had ratios less than 1.00

Masters degrees. When the interest rate to compute the present values was 10 percent, the private benefit-cost ratios for MBA degrees were 2.43 for the male sample graduates, 29.68 for the part-time male graduates and 2.85 for the full-time male graduates. When the interest was 15 percent, the ratios were 1.59 for the male sample graduates, 19.12 for the part-time male graduates and 2.03 for the full-time male graduates.

Social Benefit-Cost Ratios

The social benefit-cost ratios for the degrees of the three types of graduates, using the present value estimates computed with interest rates of 10 and 15 percent, are shown in Table XI. The social

TABLE XI

SOCIAL BENEFIT-COST RATIOS FOR SELECTED DEGREES, THE UNIVERSITY OF TENNESSEE AT NASHVILLE, COMPUTED WITH PRESENT VALUES AT 10 AND 15 PERCENT, BY DEGREE, SEX AND TYPE OF GRADUATE

Degree	Sex	Benefit-Cost Ratios					
		Present Values at 10 Percent			Present Values at 15 Percent		
		Sample Graduates	Part-Time Graduates	Full-Time Graduates	Sample Graduates	Part-Time Graduates	Full-Time Graduates
Associates:							
Nursing	Men	1.29	8.11	1.43	0.74	4.89	0.80
	Women	1.56	5.98	1.39	0.98	3.72	0.84
Bachelors:							
Arts/Science	Men	1.52	8.00	1.32	1.17	4.87	0.71
	Women	1.64	4.37	0.94	1.05	2.85	0.56
Business	Men	2.55	7.73	1.29	1.48	4.53	0.70
	Women	2.30	3.91	0.91	1.47	2.57	0.55
Education	Men	1.44	7.65	1.23	0.76	4.40	0.70
	Women	0.59	4.04	0.92	0.38	2.67	0.55
Engineering	Men	9.01	7.75	1.27	5.41	4.63	0.69
Masters:							
Business	Men	2.82	16.53	3.49	1.84	10.33	2.43

benefit-cost ratios were estimated through the use of degree costs and the graduates' earnings, from the viewpoint of society.

Associates degrees. In the Associates degree Nursing programs, when a 10 percent interest rate was used to determine the present value of costs and benefits, the social benefit-cost ratios were 1.29, 8.11 and 1.43 for the sample, part-time and full-time male graduates, respectively; for the women, the ratios were 1.56, 5.98 and 1.39, respectively. When the interest rate was 15 percent, the benefit-cost ratios for the male sample graduates, the part-time male graduates and the full-time male graduates were 0.74, 4.89 and 0.80, respectively. For women these ratios were 0.98, 3.72 and 0.84, respectively.

Bachelors degrees. When the interest rate was 10 percent, the social ratios for the graduates in the different Bachelors degree programs varied by almost seven points in some degrees. The male graduates with Bachelors degrees in Arts and Science had ratios of 1.52, 8.00 and 1.32 for the sample, part-time and full-time graduates, respectively; the ratios for the female graduates were 1.64, 4.37 and 0.94, respectively. For the Business degrees, the ratios were 2.55 for the male sample graduates, 7.73 for the part-time male graduates and 1.29 for the full-time male graduates; for women graduates, these ratios were 2.30, 3.91 and 0.91, respectively. In Education, the sample, part-time and full-time male graduates had ratios of 1.44, 7.65 and 1.23, respectively; for women these ratios were 0.59, 4.04 and 0.92, respectively. The men

with Engineering degrees had ratios of 9.01, 7.75 and 1.27 for the sample graduates, the part-time graduates and the full-time graduates, respectively. The female full-time graduates with Bachelors degrees and the female sample graduates with Bachelors degrees in Education had ratios less than 1.00.

When the interest rate of 15 percent was used to compute the present value of costs and benefits, the social benefit-cost ratios for the Bachelors degrees were lower than those at 10 percent. For the Arts and Science degrees, ratios were 1.17, 4.87 and 0.71 for the sample, part-time and full-time male graduates, respectively. For the female graduates, these ratios were 1.05, 2.85 and 0.56, respectively. The sample, part-time and full-time male graduates with Business degrees had ratios of 1.48, 4.53 and 0.70, respectively. Female graduates in the same degree had ratios of 1.47, 2.57 and 0.55, respectively. In Education the ratios were 0.76 for the male sample graduates, 4.40 for the part-time male graduates and 0.70 for the full-time male graduates; for the female graduates the ratios were 0.38, 2.67 and 0.55, respectively. The men with Engineering degrees had ratios of 5.41 for the sample graduates, 4.63 for the part-time graduates and 0.69 for the full-time graduates. The full-time male and female graduates in all Bachelors degrees and the male and female sample graduates with Education degrees had ratios less than 1.00.

Masters degrees. When the interest rate to compute the present value of costs and benefits was 10 percent, the social benefit-cost ratios

for MBA degrees were 2.82 for the male sample graduates, 16.53 for the part-time male graduates and 3.49 for the full-time male graduates. When the interest rate was 15 percent, the benefit-cost ratios were 1.84, 10.34 and 2.43, respectively.

IV. INTERNAL RATES OF RETURN

The internal rate of return was the second criterion used to determine the economic value of the UTN degrees. The first, or the present value criterion, was presented in the previous three sections. To determine whether or not the computed internal rates of return were considered profitable they were compared to two sets of required interest rates, 10 percent and 15 percent. Both private and social internal rates of return are discussed. For the purpose of facility of reading the internal rates of return are referred to simply as returns.

Private Internal Rates of Return

The private internal rates of return on investment in degrees at The University of Tennessee at Nashville (UTN) for all three types of graduates studied are given in Table XII. In each degree program, returns were computed for men, women and for the men and women combined. Returns are presented by level of the degree.

Associates degrees. The male sample graduates with Associates degrees in Nursing had a return of 11.9 percent while the women had a return of 15.4 percent. The combined return for both men and women was 14.8 percent. These rates indicated that it was more economically

TABLE XII

PRIVATE INTERNAL RATES OF RETURN ON INVESTMENT IN SELECTED DEGREES, THE UNIVERSITY OF TENNESSEE AT NASHVILLE, BY DEGREE, SEX AND TYPE OF GRADUATE

Degree	Sex	Private Internal Rates of Return on Investment Per Graduate		
		Sample Graduates	Part-Time Graduates	Full-Time Graduates
Associates:				
Nursing	Men	11.9%	63.8%	12.3%
	Women	15.4	57.5	13.2
	Men and Women	14.8	60.8	12.7
Bachelors:				
Arts/Science	Men	13.8	52.9	11.1
	Women	18.0	45.4	9.1
	Men and Women	15.5	49.4	10.3
Business	Men	19.3	50.0	11.1
	Women	26.6	43.7	9.0
	Men and Women	19.7	47.1	10.3
Education	Men	16.6	48.4	11.1
	Women	4.9	44.9	9.0
	Men and Women	8.0	46.8	10.3
Engineering	Men	70.2	50.2	11.0
Masters:				
Business	Men	25.8	106.9	32.1

profitable for women than men to attain the degree. The reverse was true for part-time graduates. In the case of part-time graduates, the return to men was 63.8 percent; for women the return was 57.5 percent. The return to both men and women part-time graduates was 60.8 percent. There was not a great deal of difference in the returns to the sample graduates and those to the full-time graduates. The returns to the full-time graduates were 12.3 percent to the males, 13.2 percent to the females and a combined return of 12.7 percent to both males and females.

Bachelors degrees. Private returns to the sample graduates with Bachelors degrees in the different programs varied by more than 50 percentage points. The male sample graduates in Arts and Science had a return to 13.8 percent and the return of women was 18.0 percent. The combined return to both men and women was 15.5 percent. For the sample graduates with Business degrees, the return to men was 19.3 percent while that to women was 16.6 percent. The combined return for men and women for this degree was 19.7 percent. The men with Education degrees, in the same graduate type, had a return of 16.6 percent and the women had a return of 4.9 percent. The combined return for the degree was 8.0 percent. The low overall combined return in Education degrees was due to the low returns to the women. The men in Engineering had a return of 70.2 percent.

With respect to the highest returns to male and female sample graduates, a comparison of all Bachelors degrees indicated that men with Engineering degrees and the women with Business degrees had the highest returns; the returns to the men in Engineering however, were more than

twice those of the women with Business degrees. The literature indicated that returns for women are expected to be lower than those for men. This was not the case for the female sample graduates in Arts and Science and in Business. These women had higher returns due to their relatively low foregone earnings and higher than average expected incremental earnings. A comparison of the returns to the sample graduates with Bachelors degrees and those with Associates degrees indicated that the choice to have invested in a four-year degree program over a two-year degree program brought higher returns depending on the discipline of the degree. The returns to men in any of the four-year degree programs, especially to those with Engineering degrees, were higher than those of the graduates with Associates degrees. The returns to women with Bachelors degrees in Arts and Science and in Business were higher than to those graduates with Associates degrees in Nursing. However, the returns to females with Associates degrees were over three times greater than the returns to those with Bachelors degrees in Education.

In the case of the part-time graduates, as might have been expected, because of the absence of foregone earnings and the use of average costs for total instruction, the range in the returns to all men and women with Bachelors degrees was not large. For the men this range in returns was from 48.4 percent for those with Education degrees to 52.9 percent for those graduates with Arts and Science degrees. In the case of female part-time graduates, the range in the returns was from 43.7 percent for those with Business degrees to 45.4 for those with Arts and Science degrees.

These small differences in the returns of the degrees of the part-time graduates were due to differences in the amount of coursework required in each degree program and to the discounting process which depends on discounting periods; discounting periods were different for part-time graduates because of the difference in the average age of the individuals in different degree programs. The facts that the differences in returns between degrees were small and that the returns for all degrees were over 40 percent indicated that investment in any Bachelors degree program, as a part-time graduate, provided relatively high returns. The returns to the part-time graduates with Bachelors degrees were higher than to those with Associates degrees. This indicated that for the typical individual it was more economically profitable to have invested in two years of college than in four years.

The full-time graduates with Bachelors degrees had much lower returns than the part-time graduates and than most of the sample graduates. For men in all degree programs, the return was approximately 11 percent and the return for women was approximately 9.0 percent. The combined return for both men and women in all the degree programs, where there were men and women, was 10.3 percent.

The large amount of foregone earnings of the full-time graduates was the reason for lower returns than those of the part-time graduates and sample graduates. The only exception to this was in the case of women in Education. The female sample graduates in Education had lower returns than those of the full-time graduates as a result of the lower expected lifetime earnings and high degree costs. A comparison of the returns to the full-time graduates with Bachelors degrees and those with

Associates degrees indicated that the returns from the Nursing degrees were higher, especially for women. This indicated that for the typical individual, as a full-time graduate, it was economically more profitable to have invested in two years of college than in four years.

Masters degrees. The private returns to the three types of male graduates with MBA degrees were 25.8 percent to the sample graduates, 106.9 percent to the part-time graduates and 32.1 percent to the full-time graduates. As might have been expected, the part-time graduates had the highest returns, the sample graduates the lowest. Even the lowest returns of the sample graduates, however, were relatively high as compared to other lower level degrees. For the three types of men graduates, investment in the MBA degree yielded a higher return than the returns to graduates with Associates degrees or Bachelors degrees. The one exception was in the case of the sample graduates with Engineering degrees. The sample graduates with Bachelors degrees in Engineering had returns which were more than twice those of the sample graduates with an MBA degree. In addition, the female sample graduates with Business degrees had slightly higher returns than those of the male sample graduates with MBA degrees.

Required interest rates. To determine whether the private internal rates of return on investment in UTN degrees, shown in Table XII, p. 106, were considered profitable, they were compared to required interest rates of 10 and 15 percent. When the required interest rate was 10 percent, the part-time graduates in all degree levels, the female full-time graduates with Nursing degrees, the male full-time graduates in

all degree programs, and the sample male and female graduates in all degree programs, except the females with Bachelors degrees in Education, had returns in excess of the required amount. The female actual graduates with Education degrees and the female full-time graduates with Bachelors degrees had returns lower than 10 percent.

When the required rate was 15 percent, the graduates who had returns higher than 10 percent but lower than 15 percent were included (Table XII, p. 106). The graduates who had internal rates of return equal to or greater than 15 percent, were the part-time graduates in all degree programs, the male full-time graduates with MBA degrees, the female sample graduates with Nursing, Arts and Science, and Business degrees and the male sample graduates with Business, Education and MBA degrees. All the undergraduates, full-time graduates, female sample graduates with Education degrees and male sample graduates with Nursing and Arts and Science degrees were excluded.

Social Internal Rates of Return

The social internal rates of return on investment in degrees at UTN from all three types of graduates studied are given in Table XIII. The social internal rates of return are referred to as social returns. The social returns, although lower than the private returns, tended to follow the same basic patterns as private returns.

Associates Degrees. For the Associates degrees in Nursing, the social return from male sample graduates was 11.9 percent while that for women was 15.0 percent. The combined return for both was 14.4 percent.

TABLE XIII

SOCIAL INTERNAL RATES OF RETURN ON INVESTMENT IN SELECTED DEGREES, THE UNIVERSITY OF TENNESSEE AT NASHVILLE, BY DEGREE, SEX AND TYPE OF GRADUATE

Degree	Sex	Private Internal Rates of Return on Investment Per Graduate		
		Sample Graduates	Part-Time Graduates	Full-Time Graduates
Associates:				
Nursing	Men	11.9%	43.5%	12.9%
	Women	15.0	38.0	13.0
	Men and Women	14.4	40.8	12.9
Bachelors:				
Arts/Science	Men	12.2	39.9	11.9
	Women	16.4	31.8	9.4
	Men and Women	13.7	36.3	10.9
Business	Men	18.6	37.1	11.9
	Women	19.2	30.2	9.2
	Men and Women	18.6	34.1	10.8
Education	Men	13.0	36.0	11.9
	Women	3.3	31.1	9.2
	Men and Women	6.4	33.8	10.9
Engineering	Men	55.2	38.1	11.7
Masters:				
Business	Men	28.4	74.1	37.7

For male part-time graduates, the return was 43.5 percent and for women it was 38.0 percent. The combined social return from the part-time graduates was 40.8 percent. The returns from the full-time graduates were 12.9 percent from the men, 13.0 percent from the women and a combined return of 12.9 percent from both men and women. These results indicated that from the point of view of society the full-time graduates had the highest returns. The female sample graduates had higher social returns than the full-time female graduates and the male sample graduates had slightly lower social returns than the full-time male graduates.

Bachelors degrees. The returns to society from sample graduates with Bachelors degrees varied with the discipline of the degree. The social return from male sample graduates with Arts and Science degrees was 12.2 percent while that from the women was 16.4 percent. The combined social return for the degree was 13.7 percent. The return from the men and women with Business degrees was 18.6 and 19.2 percent respectively; the combined return for the degree was 18.6 percent. For sample male graduates with Education degrees, the social return was 13.0 percent while that from women was 3.3 percent. The combined return from both men and women was 6.4 percent. The low combined return for the Education degree was due to the low returns from women. The social return from the men with Engineering degrees was 55.2 percent.

The social returns from the sample graduates followed the same patterns as the private returns. The highest social returns from the sample graduates were from the men with Engineering degrees and from the

women with Business degrees; however, the social returns from the men were more than twice those of the women. The social returns from the female sample graduates with Bachelors degrees in Arts and Science and in Business were higher than those from men in the respective degree programs. A comparison of the social returns from sample graduates with Bachelors degrees and those from sample graduates with Associates degrees indicated that the social returns from graduates with Bachelors degrees were higher, except in the case of the females in Education. Social returns from these women were the lowest for all degrees of the sample graduates.

The returns to society from the part-time graduates with Bachelors degrees were between 30.0 and 39.0 percent. For the male part-time graduates with Bachelors degrees in Arts and Science the social return was 39.9 percent; the return for women was 31.8 percent. The combined social return for the degree was 36.3 percent. The social returns from the men and women with Business degrees were 37.1 percent and 30.2 percent, respectively; the combined return for the degree was 34.1 percent. The return from part-time male graduates with Education degrees was 36.0 percent while that for women was 31.1 percent. The combined social return for the Education degree was 33.8 percent. For the male part-time graduates in Engineering, the social return was 38.1 percent. From the viewpoint of society all the Bachelors degrees of the part-time graduates were relatively higher as compared to those of the other graduates. A comparison of the part-time graduates with Bachelors degrees and those with Associates degrees indicated that social returns from those with

Associates degrees were higher. This was also observed in the case of women part-time graduates.

The returns to society from all the male full-time graduates with Bachelors degrees were almost 12.0 percent. For the women these returns were slightly more than 9.0 percent. A comparison of the full-time graduates with Bachelors degrees and those with Associates degrees indicated that from the viewpoint of society the returns were less from the individuals with the four-year degrees.

Masters degrees. The social returns from the three types of male graduates with MBA degrees were 28.4 percent from the sample graduates, 74.1 percent from the part-time graduates and 37.7 percent from the full-time graduates. As was the case with private returns for all the men within each graduate type, the social returns from the graduates with MBA egrees were higher than the returns from the graduates with Associates degrees or with Bachelors degrees. The one exception was in the case of the sample graduates with Engineering degrees. The social returns from the sample graduates with Engineering degrees were the highest for all degrees of the sample graduates and almost twice those from the sample graduates with MBA degrees.

Required interest rates. To determine whether the social internal rates of return on investment in UTN degrees, shown in Table XIII, p. 112, were considered profitable, they were compared to required interest rates of 10 and 15 percent. When the required rate was 10 percent, the part-time graduates in all degree levels, the female full-time

graduates with Nursing Associates degrees, male full-time graduates in all degree levels and the sample graduates in all degree levels, except the females in Education degrees, had higher returns than the required amount. The female sample graduates with Bachelors degrees in Education and the full-time female graduates with Bachelors degrees had returns lower than 10 percent.

When the required interest rate was raised to 15 percent, the graduates who had returns greater than 10 percent but lower than 15 percent were excluded. The graduates which had returns in excess of 15 percent included the part-time graduates in all degree programs, the full-time male graduates with MBA degrees, the female sample graduates with Associates degrees, Arts and Science degrees, the men and women sample graduates with Business degrees and the male sample graduates with Education, Engineering and MBA degrees. The graduates who had social returns below the 15 percent benchmark included all the undergraduate full-time graduates, the male sample graduates with Associates degrees, Bachelors degrees in Arts and Science and in Education and the female sample graduates with Bachelors degrees in Education.

V. DISCUSSION OF DATA

Several of the questions to be answered in an effort to address the problem of this study related to the comparability of the profitability of the degrees of the sample UTN graduates who were working adults and those of the typical college graduates in middle Tennessee.

Therefore, the discussion presented here is in terms of comparisons. Degree costs, lifetime earnings and rank of the degrees through the use of the computed internal rates of return and the benefit-cost ratios are presented.

Degree Costs

Degree costs from the point of view of society were higher than those from the point of view of the individual (Table IV and V pp. 79, 84). The same high to low relationships occurred with the social and individual or private costs. Therefore, when costs are discussed it is intended as a reference to both social and private degree costs. The graduates with the highest foregone earnings incurred the highest degree costs. The full-time graduates had the highest costs; their costs were almost nine times those of the part-time graduates. The costs of the sample graduates were lower than the costs of the full-time graduates and higher than those of the part-time graduates. Depending on the degree, the costs of the sample graduates were approximately 16 to 60 percent of the costs of the full-time graduates. Considering the time frame and the amount of coursework required, the sample graduates with Associates degrees had relatively high costs as compared to the costs of the sample graduates in other degree levels. This indicated that the foregone earnings for the Nursing degree graduates were relatively high as compared to those of the other sample graduates. In addition, the costs of the female sample graduates with Nursing degrees were slightly higher than those of the full-time graduates which indicated that the degree costs

of part-time graduates could be equal to or more than the costs of full-time graduates, depending on the amount of foregone earnings and the number of years of foregone earnings of the part-time graduates.

Lifetime Earnings

The lifetime gross earnings of the individual were defined to be equal to those that accrue to society. When lifetime gross earnings are discussed in this section it is intended as reference to both. The gross earnings did not necessarily have all the same highest to lowest relationships that the benefit-cost ratios or the internal rates of return had. In addition, individuals with the highest gross earnings did not necessarily have the highest net incremental earnings. Both the gross and the net incremental lifetime earnings are presented.

Gross earnings. For the three types of graduates studied, the lifetime gross earnings were highest for the graduates with MBA degrees and lowest for those with Associates degrees (Tables VI, VII, VIII and IX, pp. 88, 89, 95, 96). Exceptions to this occurred within the group of sample graduates; the men with Bachelors degrees in Engineering had the highest gross earnings of sample graduates and the female sample graduates with Associates degrees in Nursing had slightly higher gross earnings than women with Bachelors degrees. In addition, the female sample graduates in Education had the lowest gross earnings. For the three types of graduates and within degree category, men had greater gross earnings than women. Of the three types of graduates studied and within each degree, the sample graduates had the lowest lifetime

earnings and the part-time graduates had the highest. This indicated that the sample graduates had lower expected lifetime earnings than the typical college graduates in middle Tennesse. Exceptions to this occurrence were with the male sample graduates with Bachelors degrees in Business and Engineering. The males with Bachelors degrees in Business had slightly higher lifetime gross earnings than the full-time graduates and the men in Engineering had the highest lifetime gross earnings of the three types of graduates with Bachelors degrees.

Incremental earnings. The lifetime incremental earnings or the earnings obtained after adjustments for alternative earnings and costs were lower than the gross earnings (Tables VI, VII, VIII AND IX, pp. 88, 89, 95, 96). Although the private incremental eranings of the graduates were either higher or lower than the social incremental earnings of the graduates in the respective degrees, sex and graduate type, both private and social incremental earnings were observed to have the same highest to lowest relationships. Therefore, reference made to the private incremental earnings, will imply reference to the social incremental earnings also.

At the Masters degree level the part-time graduates had the highest incremental earnings and the sample graduates the lowest. Of the three types of graduates at the Bachelors degree level, the male sample graduates with Engineering degrees had the highest incremental earnings; the female sample graduates with Education degrees and the full-time graduates had negative incremental earnings when the interest rate was 15 percent. This indicated that when the interest rate was 15 percent, the costs were greater than the benefits. The incremental

earnings of the typical female college graduates were less than those of the males in the respective degree; the reverse was observed with the sample graduates. The exception was the case of the female sample graduates with Education degrees; these women had the lowest incremental earnings of the sample graduates. At the Associates degree level the part-time graduates were expected to have the highest incremental earnings.

Rank of Degrees

The rank of the six degree programs of the three types of graduates studied provided by the computed internal rates of return and the benefit-cost ratios were consistent in most cases (Tables X, XI, XII and XIII, pp. 99, 102, 106, 112). Where there were inconsistencies between the ranking provided by both criteria, the rankings provided by the present value criterion were used. Although the internal rate of return criterion provided convenient investment percentages, the three problem areas discussed in Chapter II weakened its reliability. The three types of graduates included the sample graduates of working adults, the full-time graduates and the part-time graduates.

The social internal rates of return on investment in college degrees for the three types of graduates were less than the respective private or individual internal rates of return. The only exception to this generalization was in the case of the full-time graduates who had slightly higher social rates of return than their private internal rates of return. This was because the largest portion of the degree costs

were attributed to foregone earnings. This study considered all degree costs, which were mostly foregone earnings in the case of the full-time students, investment rather than partly consumption; therefore, private costs may have been overstated. The magnitude of the foregone earnings was such that it caused slightly lower returns to the individual. The highest to lowest ranking by the computed internal rates of return of the different degrees, however, were the same for society and for the individual. With respect to the above generalizations, the benefit-cost ratios followed the same patterns; the social ratios were less than the private ratios except in the case of the full-time graduates. In addition, the highest to lowest ranking of the social and private ratios were the same. Because the high to low ranking from the private and the social point of view was the same through the use of both criteria, when reference is made to the internal rate of return it is intended to mean both private and social and when reference is made to the benefit-cost ratio it is intended to mean both the private and social unless specified otherwise.

Rank by graduate type. The returns to the typical college graduates, the full-time and the part-time graduates, were highest at the Masters degree level and lowest at the Bachelors degree level (Tables X, XI, XII, and XIII, pp. 99, 102, 106, 112). The full-time and the part-time graduates were termed the typical college graduates because average education costs and average earnings were used to estimate the lifetime stream of costs and benefits. The rankings of the degrees provided by the benefit-cost ratios of the full-time graduates were consistent with

the rankings provided by the internal rates of return; the ratios were highest at the Masters degree level and lowest at the Bachelors degree level. In the case of the part-time graduates, if males were compared to males and females compared to females, the rankings provided by both criteria were consistent. However, the rank by both criteria of the female part-time graduates with Associates degrees in Nursing and the male part-time graduates with Bachelors degrees was not consistent. The computed internal rate of return was higher for part-time female graduates than those of the males with Bachelors degrees. The benefit-cost ratio of the female part-time graduate was not higher than those of the part-time male graduates with Bachelors degrees. The discrepancy was not severe because the ratios for the part-time female graduates in Nursing were high even if no other comparison was made. The discrepancy indicated, however, that the computed internal rate of return in that situation was not reliable and that the ranking of the female part-time graduates was not as high as the return indicated.

In the case of the sample graduates, returns were highest for the men at the Masters degree level and lowest at the Associates degree level; the exception to this was the case of the men who had Engineering degrees and who had the highest returns of the sample graduates. For the female sample graduates, returns were highest at the Bachelors degree level and lowest at the Associates degree level; the one exception was the case of the women who had Education degrees and who had considerably lower returns than those of the graduates at the Associates degree level. The rankings provided by the benefit-cost ratios indicated that the highest and lowest

ratios for men and women sample graduates were consistent with the rankings provided by the computed internal rates of return. There were, however, some discrepancies within the range and it was in those discrepancies when only the benefit-cost ratio was used. For example, the sample male graduates with Bachelors degrees in Business had a slightly higher benefit-cost ratio than the ratio for those with MBA degrees; ranking by the computed internal rates of return indicated the reverse. A second situation where the computed internal rate of return and the benefit-cost ratios indicated conflicting results was the case of the female sample graduates with Nursing degrees; their ratio was less than the ratio for the males with Bachelors degrees in Arts and Science. The computed return, however, indicated a higher rank for the female sample graduates with Nursing degrees than the males with Bachelors degrees in Arts and Science. The ranking used in this situation was that provided by the benefit-cost ratio. The ratio of the female sample graduates was greater than 1.00 and considered profitable; therefore, the discrepancy was not considered severe.

Rank by degree. Except for the relative high returns to the male sample graduates with Bachelors degrees in Engineering, within each degree program, the part-time graduates had higher returns than the sample graduates (Tables X and XI, pp. 99, 102). The sample graduates had higher returns than the full-time graduates. However, the male full-time graduates with MBA degrees and with Associates degrees had slightly higher returns than their respective male sample graduate counterparts. In the case of the typical individuals, the part-time and full-time

graduates, and within the same degree, the returns were higher to the men than to the women; the female full-time graduates with degrees in Nursing, however, had higher returns than did the men. The male sample graduates, on the other hand, had lower returns than the women, within the same degree; the exception was the case of the women with Bachelors degrees in Education who had the lowest returns of the sample graduates.

The rankings by degree, provided by the benefit-cost ratio were consistent with the rankings provided by the computed internal rate of return. The part-time graduates had higher ratios than the sample graduates who, in turn, had higher ratios than the full-time graduates. The only inconsistency between the rankings of both criteria occurred with the sample male graduates with Engineering degrees. The ratios for the sample male graduates with Engineering degrees were lower than those of the male part-time graduates in the same discipline. The ranking by the computed internal rate of return indicated the reverse. In this situation, the ranking by the benefit-cost ratio was used; the computed internal rate of return, because of the problem areas discussed in Chapter II was overstated. The discrepancy was not considered severe because the ratios were several points higher than 1.00.

Other rankings by degree were consistent when both criteria were used. The male full-time graduates with MBA degrees and with Associate degrees had slightly higher ratios than their respective male sample graduate counterparts. In the case of the typical college graduates, the ratios were higher for the men than for the women. With respect to the ratios of degrees for men and women sample graduates, there

was one discrepancy in rankings by both criteria. The female sample graduates with Associates degrees and with Business degrees had higher ratios than the men in the respective degree; the women with degrees in Education and in Arts and Science, on the other hand, had ratios lower than those of the men in the respective degree. The ranking by the computed internal rates of return, however, indicated that the women sample graduates with degrees in Arts and Science had higher returns than the men in the same degree. The computed return was considered to be overstated and ranking was done by the benefit-cost ratio. Although the benefit-cost ratio for the female sample graduates with Bachelors degrees in Arts and Science was less than those of the men in the same degree, it was greater than 1.00 and the difference in the ratios between the degrees of the men and women differed by only 0.03 points. Therefore, this discrepancy was not considered severe.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

I. SUMMARY

Purposes of the Study

The purposes of this study were to: (1) design a methodology to measure the direct economic costs and benefits of degrees of college graduates who were primarily part-time students and working adults; (2) determine and evaluate the present value of the costs and benefits of the degrees at predetermined interest rates; (3) determine and evaluate the internal rate of return on investment in the degrees from the point of view of the individual and society; and (4) compare the economic costs and benefits of the degrees of the working adults to those of typical college graduates.

The college graduates who were working adults specifically included 373 white graduates from The University of Tennessee at Nashville (UTN) in the five-year period between Spring 1973 and Spring 1977 and with Associates degrees in Nursing, Bachelors degrees in Arts and Science, Bachelors degrees in Business Administration, Bachelors degrees in Education, Bachelors degrees in Engineering and Masters degrees in Business Administration (MBA); only the male graduates were considered in the MBA degrees and the Engineering degrees. For comparison purposes, the college graduates also included two sets of typical middle Tennessee college graduates with average costs and average earnings. These included

the part-time graduates who were assumed to have attended college on a part-time basis and the full-time graduates who were assumed to have attended college on a full-time basis.

Procedures Used in the Study

The procedures involved a number of research and survey activities including a survey of selected literature. The sample UTN graduates were surveyed for education, income and employment information and their transcripts were examined to cost coursework. The sample of useful returned questionnaires was found to be representative of the population through the use of the statistic chi-square. The private and social economic costs and benefits of the degrees were determined through the use of the results of the survey, coursework cost data, 1972 and 1975 Current Population Survey income data on earnings with income adjustments for middle Tennessee, and two investment criteria. The two investment criteria included the present value and the internal rate of return. Costs and benefits were determined for the sample UTN graduates, as well as, for the middle Tennessee typical college graduates. For each type of graduate, costs and benefits were estimated for men and women in each individual degree program.

Three basic types of costs were estimated for every year graduates were in school: (1) total instruction; (2) books and supplies; and (3) foregone earnings. National average earnings, adjusted for middle Tennessee, were used when foregone earnings were unknown. For sample UTN graduates actual instruction cost data, based on a graduation year of 1977, were used to cost the coursework. Average instruction costs

were used for the typical college graduates. The year 1977 was used as the reference point for estimating the present value of costs.

The streams of lifetime earnings of the graduates were used to compute the present value of benefits. The year 1977 was used as the reference point for estimating the present value of benefits. To obtain the present value of net incremental earnings the lifetime gross earnings were adjusted for costs, alternative earnings and taxes, in the case of private benefits. U.S. Census income data on typical college graduates were used to estimate the streams of alternative earnings and the gross earnings when the 1978 annual wages were unknown.

The streams of costs and lifetime earnings were used to compute the social and private benefit-cost ratios and the social and private internal rates of return on investment. The benefit-cost ratios were used to evaluate the present value of costs and benefits; the computed internal rates of return were evaluated by comparing them to the required interest rates of 10 and 15 percent.

Findings

The results from this study indicated that the computed internal rates of return to the typical full-time college graduates were comparable to those found in the literature. In addition, the results indicated that the returns to the sample UTN graduates differed from those to the middle Tennessee typical college graduates in some areas. Researchers have normally used the internal rate of return criterion in studies dealing with the economic value of college degrees; this study utilized both

the internal rate of return criterion and the present value criterion. The highest and lowest rankings provided by the computed internal rates of return and the benefit-cost ratios were consistent. There were a few discrepancies in the mid-range of the rankings provided by both criteria and in these situations reliance was placed upon the benefit-cost ratios. The ratios in these situations, however, were above one and because the profitability of the degrees was considered in the acceptability range, the discrepancies were considered minor.

The findings from this study can be grouped into those concerning four areas: (1) degree costs, (2) lifetime earnings; (3) ratios and returns; and (4) profitability. The findings are presented below. Unless otherwise specified the private and social internal rates of return are referred to as returns and the social and private benefit-cost ratios are referred to as ratios.

Degree costs. The results of this study with respect to degree costs indicated the following findings:

1. The largest portion of degree costs were the foregone earnings.

2. Degree costs were found to be highest for those graduates with the highest amount of foregone earnings.

3. For the typical middle Tennessee full-time graduates, the degree costs of the men were greater than those of the women, within the same degree level.

4. For the sample UTN graduates, the degree costs of the women were greater than those of the men, within the same degree.

Lifetime earnings. The results of this study with respect to lifetime earnings indicated the following findings:

1. For the typical middle Tennessee college graduates, lifetime earnings were found to increase with the level of the college degree.

2. For sample UTN graduates, higher gross lifetime earnings depended on the discipline of the degree rather than the level of the degree.

3. The lifetime earnings of the men were found to be greater than those of the women, within the same degree.

4. The lifetime earnings of the sample graduates of UTN were found to be less than those of the typical middle Tennessee college graduates.

Ratios and returns. The findings of this study, with respect to the computed ratios and returns indicated that:

1. The ratios and returns were higher when the foregone earnings were lower.

2. For typical middle Tennessee college graduates, ratios and returns for a two-year degree program were higher than ratios and returns for a four-year degree program.

3. For typical middle Tennessee college graduates, ratios and returns for a graduate degree program were higher than for either a two-year or four-year degree program.

4. For typical middle Tennessee college graduates, ratios and returns were higher for men than for women.

5. For the sample UTN graduates higher ratios and returns depended on the discipline of the degree rather than the level of the degree or the sex of the graduate.

6. The highest of the private and social computed internal rates of return of the male sample UTN graduates were 70.2 and 55.2 percent, respectively, for those with Bachelors degrees in Engineering.

7. When present values computed at an interest rate of 10 percent were used, the highest of the private and social benefit-cost ratios of the male sample UTN graduates were 11.82 and 9.02, respectively, for those with Bachelors degrees in Engineering.

8. When the present values computed at an interest rate of 15 percent were used, the highest of the private and social benefit-cost ratios of the male sample UTN graduates were 7.11 and 5.41, respectively, for those with Bachelors degrees in Engineering.

9. The lowest of the private and social internal rates of return of the male sample UTN graduates were 11.9 percent for both private and social points of view of those with Associates degrees in Nursing.

10. When present values computed at an interest rate of 10 percent were used, the lowest of the private and social benefit-cost ratios of the male sample UTN graduates were 1.28 and 1.29, respectively, for those with Associates degrees in Nursing.

11. When present values computed at an interest rate of 15 percent were used, the lowest of the private and social benefit-cost ratios of the male sample UTN graduates were 0.75 and 0.74, respectively, for those with Associates degrees in Nursing.

12. The highest of the private and social internal rates of return of the female sample UTN graduates were 26.6 and 19.2 percent, respectively, for those with Bachelors degrees in Business.

13. When present values computed at an interest rate of 10 percent were used, the highest of the private and social benefit-cost ratios of the female sample UTN graduates were 2.43 and 2.30, respectively, for those with Bachelors degrees in Business.

14. When present values computed at an interest rate of 15 percent were used, the highest of the private and social benefit-cost ratios of the female sample UTN graduates were 2.16 and 1.47, respectively, for those with Bachelors degrees in Business.

15. The lowest of the private and social internal rates of return of the female sample UTN graduates were 4.9 and 3.3 percent, respectively, for those with Bachelors degrees in Education.

16. When present values computed at an interest rate of 10 percent were used, the lowest of the private and social benefit-cost ratios of the female sample UTN graduates were 0.71 and 0.59, respectively, for those with Bachelors degrees in Education.

17. When present values computed at an interest rate of 15 percent were used, the lowest of the private and social benefit-cost ratios of the female sample UTN graduates were 0.75 and 0.74, respectively, for those with Bachelors degrees in Education.

Profitability. The computed returns were evaluated by comparing them to the required interest rates, 10 and 15 percent. Benefit-cost

ratios greater than 1.00 were considered profitable. Profitability evaluation of the returns and the ratios of the UTN degrees indicated the following findings:

1. The returns for the part-time graduates with degrees at all levels were found to be above the required interest rates of either 10 percent or at 15 percent.

2. When present values computed at an interest rate of either 10 or 15 percent were used, the ratios for the part-time graduates with degrees at all levels were above 1.00.

3. For the middle Tennessee typical full-time graduates, only the returns of the male full-time graduates with graduate degrees were found to be above the required interest rate when a 15 percent interest rate was used.

4. When present values compouted at an interest rate of 15 percent were used in the case of the middle Tennessee typical full-time graduates, only the ratios for the male full-time graduates with graduate degrees were found to be above 1.00.

5. For the middle Tennessee typical full-time graduates, only the returns for the female full-time graduates with four-year degrees were found to be below the profitability interest rate when a 10 percent interest rate was used.

6. When present values computed at an interest rate of 10 percent were used in the case of the middle Tennessee typical full-time graduates, the ratios for the female full-time graduates with four-year degrees were found to be below 1.00.

7. For the sample UTN graduates, the returns for the males with Associates degrees in Nursing, Bachelors degrees in Arts and Science, the females with Bachelors degrees in Education and the social returns for the males with Bachelors degrees in Education were found to be below the required interest rate of 15 percent.

8. When the present values computed at an interest rate of 15 percent in the case of the sample UTN graduates, the ratios for the males with Associates degrees in Nursing, the females with Bachelors degrees in Education, the social ratios for the males with Bachelors degrees in Education and the social ratios for the females with Associate degrees in Nursing were found to be below 1.00. There were two inconsistencies between the returns and the ratios in finding seven and eight; the ratios for the men with Bachelors degrees in Arts and Science were higher than 1.00 and the social ratio for the females with Associate degrees was less than 1.00, while the computed returns indicated the reverse profitability. The computed returns, in these conflicting situations, were considered unreliable and the ratios were considered the superior ranking.

9. For the sample UTN graduates, only the returns for the females with Bachelors degrees in Education were found to be below the required interest rate of 10 percent.

10. When the present values computed at an interest rate of 10 percent in the case of the sample UTN graduates, the ratios for the females with Bachelors degrees in Education were found to be below 1.00.

II. CONCLUSIONS

The most important outcome of this study was the availability of data to fill the void with respect to the economic value of college degrees of individuals who were mainly working adults and who completed their coursework on a part-time basis. However, the results need to be interpreted cautiously. Some cautions which need to be considered are discussed, as well as, the research data.

Some Cautions

Judgments on the value of a college degree and interpretation of research on the effects of education on earnings need to be done cautiously for three basic reasons. First, the economic value is but a small portion of the total value of an education. Some individuals would prefer to value an education based on the utility or satisfaction of the education. The importance of the economic value of college degrees needs to be considered in the proper proportion to the total value of the education. Second, the differences between physical capital and human capital make it imperative that liberties be taken with the theoretical and analytical framework in the estimation and evaluation procedures of human capital. In considering physical capital, financial managers attempt to make investment decisions or alternative projects for the purpose of increasing the wealth of the stockholders. With respect to college degrees and human capital research, the investment has already been made and the research data is available to help explain the investment from the point of view of the individual or society. In other words, with human capital the

decision rule is not whether or not the project is acceptable for investment, but whether or not the investment has been profitable. One final reason for caution in the interpretation of human capital research has to do with the discounting process. The results from the discounting process, which is used by both the present value criterion and the internal rate of return criterion, are very sensitive to the interest rate used. The relevant interest rate used in the estimation of human capital is dependent on market conditions. The relevant interest rates for this study were appropriate for 1977. In the event of extreme fluctuations of market conditions, generalizations for the future or the past would be inappropriate.

Research Data

With respect to the college degrees of working adults, this study provided information that served four major functions. First, for the individual graduate and for the citizens of Tennessee, it provided data to cost and test the expected feasibility of having given up extra income or leisure time to return to college on a part-time basis for retraining or job advancement. This study did not quantify the leisure time which was given up by the graduates to return to the classroom. The largest degree costs were the foregone earnings and the smaller the amount of foregone earnings the lower the total degree costs; therefore the graduates with the least amount of foregone earnings had the highest internal return rates and benefit-cost ratios.

Second, data were available for comparisons of alternative ways to pursue a college education. The benefit-cost ratios and computed

internal rates of return on investment in degrees of the working adults were compared to those of typical college graduates. Because foregone earnings were the largest portion of degree costs, the full-time graduates or those with the largest amount of foregone earnings had the lowest computed internal rates of return and benefit-cost ratios. The individual student may not have been in a position to choose the method of attending college. However, for those who had a choice the method which brought the highest computed internal rates of return and benefit-cost ratios was to have attended as a part-time student and to have the least amount of foregone earnings.

Third, this study provided data to check the economic implications and feasibility of special policy decisions with respect to night programs geared toward part-time students and working adults. The results of this study indicated that, from the viewpoint of the individual and society, the computed internal rates of return and benefit-cost ratios were higher for the individuals who were employed full time and who attended school in the evening on a part-time basis. The intent was to show the economic advantage of smaller amounts of foregone earnings and not to discredit the daytime programs for typical students who, because of lack of choice or because of preference, attend typical institutions on a full-time basis. The proportion of full-time graduates to part-time graduates has been and continues to be large; daytime typical degree programs are, therefore, vital in institutions of higher education.

Fourth, data were avilable to determine and evaluate a satisfactory level of economic performance of degree programs at minimal costs.

The benefit-cost ratios were used to evaluate the present value of costs and benefits; the computed internal rates of return were compared to the relevant interest rates, 10 and 15 percent. The ratios and returns of the degrees of all the working adults, except for women with Education degrees, were found to be within the satisfactory range. If market conditions in the future remain as they were in 1977, the present for this study, the females in education will have paid a higher premium for the utility of acquiring the degree and derived less monetary benefits over a lifetime than other graduates.

Fluctuations in market conditions in the future would make the profitability ranking of these female graduates, as well as other graduates, inappropriate. It should be emphasized that this study does not provide data for what will happen in the future, but data for what can reasonably be expected based on the present. In addition, individuals must exercise careful judgement in making educational decisions about the value of education. There are numerous factors and variables that should be considered in making a decision on the value of an education. The investment criteria, however, are additional tools which may be employed in the attempt to assess and evaluate the monetary benefits of college degrees.

III. RECOMMENDATIONS

Recommendations for Further Applications of the Methodology and Procedures Developed in This Study

One important outcome of this study was the development of a methodology which was computerized to conveniently perform all calculations

to measure the economic costs and benefits of degrees of college graduates who were part-time students during the completion of coursework. The procedures within the computer programming are such that the methodology can accommodate the full-time students, as well as the part-time students. By updating the inputs for current data on earnings, costs and adjustments the methodology could be used by those interested in the economics of education, i.e., state agencies or even by individual institutions here in Tennessee or other states.

Consequently a recommendation of high importance is that the methodology and accompanying computer programs be made available for use in research, especially that having to do with working adults. The results could provide information to aid in the economic evaluation of existing degree programs or in the justification of new proposals.

Recommendations for Further Research

As more working adults return to the college classroom to work on degrees on a part-time basis more areas of research and questions to be answered begin to surface. Two areas of research which were not addressed by this study and which have not been adequately dealt with in the literature are those with respect to the effects of consumption and related working experience on the monetary returns of education. Methodologies and procedures that will precisely account for and measure the consumption aspect of acquiring an education have not been developed. Questions such as the following remain unanswered:

1. Why do working adults enroll in degree programs which have been found to have low returns on investment?

2. What nonmonetary expectations do the working adults have from a conferred degree?

In addition, the working experience which the working adult has accumulated may explain part of the incremental differential in earnings. Questions such as the following need to be explored:

1. How much of the incremental differential in earnings of the working adult college graduate is explained by related working experience?

2. Is the related working experience a result of the education or is the education a result of the working experience?

These questions provide a basis for further research on the economics of education with respect to the working adult. Consequently a recommendation of high importance is that more studies be conducted to explain more fully the monetary and nonmonetary contributions of the working adult.

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APPENDIXES

APPENDIX A

DATA SOURCES AND PREPARATION OF COMPUTER FILES

The volume of data from the different sources made it necessary to prepare files that could be merged, manipulated by the computer in computing degree costs and benefits, and producing output tables. There were four major types of files created: (1) student data; (2) cost data; (3) earnings data; and (4) tax adjustments. Data for all files were collected, coded, key punched and each file was stored separately. The purpose of this appendix is to identify all the data used in this study and clarify, in detail, adjustments which were stored in the computer files.

I. STUDENT DATA

The primary sources of student data on the sample graduates were the questionnaires and the individual student transcripts. The questionnaires requested information on income and demographic data and permission to examine transcripts (Figures 2, 3, 4). There was one transcript to match every questionnaire as unsigned questionnaires were discarded. One separate file was created for questionnaire data and another for transcript data. Data for the part-time graduates and full-time graduates were based on the assumptions listed in Chapter I. Two student data files were created, QUEST and TRANS; each is discussed below.

Dear UTN Graduates:

Enclosed you will find a short series of questions about you, your background, and profession. These are part of a dissertation study being conducted by Irma Perry. The questions are designed to ascertain the costs and financial benefits of college degrees earned by working adults.

The questions may seem unusual but all are related to the needs of the study. The numbers code is to make sure we do not send a followup to those who have already responded. In no way will you as an individual be identified by the study.

Irma Perry is working toward her doctorate in Educational Administration at The University of Tennessee at Knoxville. She has worked very closely with UTN in the development of her study. Results of her work will be available through the Office of Management Services. We at UTN would greatly appreciate you taking a few minutes to respond to the questions and return it in the mailer provided.

The administration of UTN would like to thank you for your fine support. If UTN could be of further service please let us know.

Respectfully,

Dr. Willard A. Smith
Director for Management Services

Figure 2. Cover Letter for First Mailing of Questionnaire.

Dear Graduate:

Approximately two weeks age you received a questionnaire requesting educational and occupational information, which would enable Irma Perry to continue a research project in conjunction with her doctorate in Educational Administration at The University of Tennessee at Knoxville.

This letter is to again request your assistance, and to repeat that every response will be confidential. Irma Perry and I would appreciate any information you can provide and our thanks to you if you have already mailed your response.

I am enclosing a copy of the questionnaire and a prepaid envelope for your convenience, in case you did not receive our first letter.

Also, if The University of Tennessee at Nashville could be of further service to you, please let us know.

Sincerely,

Dr. Willard A. Smith, Director

Enclosure

Figure 3. Cover Letter for Second Mailing of Questionnaire.

SURVEY OF GRADUATES OF THE UNIVERSITY OF TENNESSEE AT NASHVILLE

INSTRUCTIONS: (1) Place a check mark or enter requested data for each question that applies
(2) After completing questionnaire, place in the enclosed postage prepaid envelope, and mail.

BACKGROUND 1. Indicate highest educational level of parent/guardian

Mother	Father	
( )	( )	less than high school
( )	( )	high school
( )	( )	1-3 years college
( )	( )	4 years college
( )	( )	some graduate or professional work
( )	( )	Master's Degree
( )	( )	Doctoral Degree or professional (M.D., LL.B., or J.D.)

2. Indicate your date of birth _____

3. Indicate your marital status, race, and sex

( ) single	( ) white	( ) male
( ) married	( ) black	( ) female
( ) divorced	( ) other	
( ) widower		
( ) other		

4. Indicate number of children _____

5. Indicate the state of your general health

( ) Excellent
( ) Good
( ) Fair
( ) Poor

EDUCATION 6. Indicate high school graduation date _____

7. For last degree at UTN indicate

Degree _____ Total Credit Hours _____
Major _____ Grade Point Average _____
Beginning Date month year
Ending Date month year

Figure 4. Questionnaire Mailed to UTN Graduates.

8. Indicate degrees received besides last degree at UTN. Check all that apply

( ) Associates
( ) Bachelors
( ) Masters
( ) Specialist
( ) Doctorate
( ) Professional
( ) None

OCCUPATION

9. Indicate average number of hours worked per week.

White Attending UTN		At Present Job
( )	Not employed	( )
( )	1 - 10 hours	( )
( )	11 - 20 hours	( )
( )	21 - 30 hours	( )
( )	31 - 39 hours	( )
( )	40 or more hours	( )

10. For the following, indicate salary, occupation, and experience. Write in 0 if not working.

	Annual Salary	Occupation	Years of Working Experience
After high school			
White attending UTN	_____	_____	_____
At first full-time job	_____	_____	_____
At current job	_____	_____	_____
	_____	_____	_____

11. Indicate the amount of yearly income you gave up as a result of attending UTN. Write 0 if none.

_____ Number of years _____

12. Indicate location of current job.

( ) Middle Tennessee (Cheatham, Davidson, Robertson, Rutherford, Sumner, Williamson, Wilson Counties)
( ) Rest of Tennessee
( ) Out of State

Figure 4. (Continued)

13. For purposes of costing all your coursework only, do you consent to allow the researcher of this study to examine your transcript?

( ) Yes Please sign _____

Social Security Number _____

( ) No

Figure 4. (Continued)

QUEST. The questionnaire collected 13 elements of information; however, the data on education were not used since specific course data and dates when courses were taken were taken directly from the transcripts. Location of the graduates' job in 1978 and other socio-economic data were used to eliminate questionnaires which were not useful. The elements coded include: (1) student code number; (2) birth year; (3) sex; (4) number of hours worked per week while attending The University of Tennessee at Nashville (UTN) and the number of hours worker per week in 1978; and (6) foregone income and number of years of foregone income.

In cases where students worked different numbers of hours per week in different years with different salary amounts during the period they took coursework, they were credited with the smaller number of hours worked per week and the smaller amount of salary. This was done to insure that foregone earnings were not underestimated and benefits over-estimated. This information was stored in the file, QUEST.

TRANS. The file, TRANS, contains coursework information obtained from the students' individual transcripts. Each student record in this file was coded for the following elements: (1) student code number; (2) type of institution; (3) birth year; (4) sex; (5) degree; (6) year of UTN graduation; and (7) coursework. Each course that every graduate took at UTN was coded for the year the course was taken, taxonomy, level and number of credit hours. Coursework taken at all other public and private institutions in Tennessee and the rest of the United States were coded for year the coursework was taken and total number of credit hours taken that year.

II. COST DATA

Cost data included total instruction costs for education at UTN, total instruction costs for education at other institutions, percent of total instruction costs borne by student, state and local governments and by other sources and costs of books and supplies. These costs will be discussed below in terms of file storage.

COSTUT. Total instruction costs for education at UTN included separate costs for direct instruction and administration. The primary sources of data for direct instruction were the Tennessee Higher Education Commission (THEC), An Analysis of Instructional Costs Per Credit Hour, Fall Quarter, Fall 1971 through Fall 1977 (Hereafter referred to as THEC Cost Study) and the UTN Office of Institutional Research. For direct instruction for each year, the per credit hour cost rates from the THEC Cost Study for each taxonomy in each level were used and costs for the in-between years were linearly interpolated. Cost studies are conducted by THEC every two years in the fall (Tables XIV, XV, and XVI). Average per credit hour costs for total instruction were used there were no computed costs for a given taxonomy (no costs are computed in the THEC Cost Study if the course is not offered in the Fall term) and for the coursework of the full-time graduates and part-time graduates. These costs were stored in the file, COSTUT.

OCOST. The primary source for administration costs at UTN was the UTN Office of Institutional Research. These costs were estimated by first subtracting the direct instruction costs from the total current

TABLE XIV

DIRECT INSTRUCTIONAL COST PER STUDENT CREDIT HOUR, LEVEL ONE, UNIVERSITY OF TENNESSEE AT NASHVILLE, BY TAXONOMY AND YEAR: 1971-1977

Taxonomy	1971	1973	1975	1977
Biological Sciences	$12.86	$14.43	$23.25	$25.12
Business/Management	10.53	12.99	13.32	18.26
Communications	12.66	15.15	12.52	24.97
Computer Sciences	—	26.37	18.15	25.71
Education	20.32	20.35	32.14	46.25
Engineering	21.54	37.22	23.24	35.86
Fine/Applied Arts	9.44	13.95	17.96	23.03
Foreign Language	9.99	18.77	20.84	20.15
Letters	10.51	16.21	15.84	22.37
Library Science	—	—	—	—
Mathematics	13.89	18.03	20.62	22.31
Physical Science	14.46	17.13	21.82	17.74
Psychology	5.64	10.01	11.51	19.59
Public Affairs/Services	—	—	—	—
Social Sciences	6.91	12.53	13.93	19.27
Health Services/Paramedical	41.01	49.50	28.18	46.55
Public Service Related Tech	— —	25.35	— —	55.59
Continuing Education	—	—	—	—
Theology	—	—	—	—

TABLE XIV (Continued)

Taxonomy	1971	1973	1975	1977
Interdisciplinary Studies	—	—	$13.34	—
Health Professions	—	—		—
TOTAL AVERAGE	$13.49	$18.72	$18.46	$23.88

SOURCE: Tennessee Higher Education Commission, An Analysis of Instructional Costs, Fall Quarter (Nashville: Tennessee Higher Education Commission), various years, 1971 through 1977. (Tennessee Higher Education Commission will hereafter be referred to THEC).

TABLE XV

DIRECT INSTRUCTIONAL COST PER STUDENT CREDIT HOUR, LEVEL TWO, UNIVERSITY OF TENNESSEE AT NASHVILLE, BY TAXONOMY AND YEAR: 1971-1977

Taxonomy	1971	1973	1975	1977
Biological Sciences	$35.84	$28.99	$36.02	$26.21
Business Management	14.53	16.79	18.14	23.18
Communications	23.36	15.15	20.19	31.68
Computer Sciences	—	35.57	25.29	36.13
Education	17.98	21.53	37.07	40.52
Engineering	30.05	39.28	33.48	57.28
Fine/Applied Arts	37.52	15.50	32.96	31.58
Foreign Languages	22.76	—	—	—
Letters	25.86	23.77	26.79	32.68
Library Science	34.83	40.01	27.02	23.74
Mathematics	42.77	47.80	43.51	40.89
Physical Science	21.60	25.56	37.25	34.79
Psychology	8.60	21.05	21.35	25.26
Public Affairs/Service	—	—	—	—
Social Sciences	16.05	18.41	19.43	36.31
Health Services/Paramedical	—	—	—	—
Public Service Related Technologies	—	—	—	—
Continuing Education	—	—	—	—
Theology	24.42	—	—	—

TABLE XV (Continued)

Taxonomy	1971	1973	1975	1977
Interdisciplinary Studies	—	—	$ 90.70	—
Health Professions	—	—	181.93	$115.31
TOTAL AVERAGE	$18.27	$20.64	24.60	32.44

SOURCE: THEC, An Analysis of Instructional Costs, Fall Quarter, various years, 1971 through 1977.

TABLE XVI

DIRECT INSTRUCTIONAL COST PER STUDENT CREDIT HOUR, LEVELS THREE AND FIVE, UNIVERSITY OF TENNESSEE AT NASHVILLE, BY TAXONOMY AND YEAR: 1971-1977

Taxonomy	1971	1973	1975	1977
Biological Sciences	—	—	—	—
Business/Management	$21.76	$36.40	$35.99	$ 35.06
Communications	—	—	—	—
Computer Sciences	—	4.82	31.56	—
Education	21.48	22.87	—	—
Engineering	74.53	48.41	91.58	118.02
Fine/Applied Arts	—	—	—	—
Foreign Languages	—	—	—	—
Letters	—	—	—	—
Library Science	—	—	—	—
Mathematics	45.06	—	—	—
Physical Science	—	—	—	—
Psychology	20.91	42.53	52.94	—
Public Affairs/Service	33.60	53.34	—	31.89
Social Sciences	—	—	—	—
Health Services/Paramedical	—	—	—	—
Public Service Related Technologies	—	—	—	—
Continuing Education	—	—	—	—
Theology	—	—	—	—

TABLE XVI (Continued)

Taxonomy	1971	1973	1975	1977
Interdisciplinary Studies	—	—	—	—
Health Professions	—	—	—	—
TOTAL AVERAGE	$25.35	$30.59	$42.38	$ 39.91

SOURCE: THEC, An Analysis of Instructional Costs, Fall Quarter, various years, 1971 through 1977.

fund educational and general expenditures per year to obtain administration costs. The amount obtained was adjusted by the number of credit hours generated in the respective year. Continuing education units generated in the Spring quarter of 1973 were included (Table XVII). UTN administration costs were stored in the file, OCOST.

COSTNU. Other institutions included all other public and private institutions both in the State of Tennessee and in the rest of the United States. No attempt was made to measure costs at institutions outside the U.S. The source of data for average per credit hour costs for total instruction at other institutions was the National Center for Education Statistics (NCES). For each type of institution, annual per pupil expenditures were estimated by adjusting the total current operating fund expenditures by the full-time equivalent fall enrollment, for the respective year, in institutions of higher education (Tables XVIII and XIX). Annual per pupil expenditures were then converetd into per credit hour costs; a full-time load was defined as 45 quarter hours per year. Expenditures data for a fiscal year ending in July were processed with enrollment data for the preceding Fall. The average per credit hour costs for total instruction at other institutions included both direct instruction and administration costs. The costs were stored in the file, COSTNU.

COSTPD. Total instruction costs were borne partly by the student, by state and local governments and by other sources. Some students attended institutions in other states. Other sources included federal government appropriations, gifts, grants, etc. Sources of data were the

TABLE XVII

TOTAL STUDENT CREDIT HOURS GENERATED, CURRENT FUND EDUCATIONAL AND GENERAL EXPENDITURES, AND ADMINISTRATION COSTS PER CREDIT HOUR, UNIVERSITY OF TENNESSEE AT NASHVILLE, BY YEAR: 1972-1977

Year	Total Credit Hours (1)	Educational and General Expenditures			Administration Costs Per Credit Hour (5)
		Total (2)	Instruction/ Research (3)	Administration (4)	
1972	75,823.00	$2,280	$1,228	$1,052	$13.87
1973	97,507.00	3,199	1,765	1,434	14.71
1974	123,487.00	4,546	2,523	2,023	16.38
1975	150,410.20	5,663	2,851	2,812	18.70
1976	151,066.90	5,611	2,893	2,718	17.99
1977	143,889.50	6,672	3,218	3,454	24.00

NOTE: Columns (2), (3), (4) are in thousands of dollars; Column (4) = Column (2) - Column (3); Column (5) = Column (4) ÷ Column (1).

SOURCE: Derived from The University of Tennessee at Nashville, Institutional Budget, (Nashville: Office of Institutional Research, The University of Tennessee at Nashville, various years, 1972 through 1977).

TABLE XVIII

CURRENT FUND EXPENDITURES OF INSTITUTIONS OF HIGHER EDUCATION, UNITED STATES AND TENNESSEE, BY FISCAL YEAR AND TYPE OF INSTITUTION 1972-1977

Fiscal Year	Current Fund Expenditures			
	United States		Tennessee	
	Public	Private	Public	Private
1972	$16,484,325	$ 9,075,235	$250,185	$198,756
1973	18,203,746	9,751,877	281,534	222,835
1974	20,336,284	10,377,297	312,398	222,516
1975	23,489.981	11,567,582	364,942	255,080
1976	26,183,956	12,719,221	401,732	284,380
1977	28,634,846	13,964,969	450,149	140,922

NOTE: Dollar amounts are in current dollars and in thousands.

SOURCE: Derived from U.S. Department of Health Education and Welfare, National Center for Education Statistics, Financial Statistics of Institutions of Higher Education: Current Fund Revenues and Expenditures, tables in various years, 1972, Table 1, pp. 16, 17, 94, 95; 1973, Table 1, pp. 14, 15, 92, 93; 1974, Table B, p. 6, Tabld D, pp. 10, 11; 1975, Table 1, pp. 6, 7, 84, 85; 1976, Table 1, pp. 6, 7, 84, 85; 1977, Table 1, pp. 6, 7, 84, 85.

TABLE XIX

FULL-TIME EQUIVALENT FALL ENROLLMENT IN INSTITUTIONS OF HIGHER EDUCATION, UNITED STATES AND TENNESSEE, BY YEAR AND TYPE OF INSTITUTION 1971-1976

Fall Term	Full-Time Equivalent Fall Enrollment			
	United States		Tennessee	
	Public	Private	Public	Private
1971	5,146,823	1,794,568	86,831	34,566
1972	5,452,848	1,800,891	92,868	35,550
1973	5,629,555	1,823,893	94,133	35,621
1974	5,944,804	1,860,649	100,203	38,044
1975	6,522,310	1,957,375	107,690	39,547
1976	6,402,537	2,005,248	111,411	41,776

SOURCE: Derived from U.S. Department of Health Education and Welfare, National Center for Education Statistics, Fall Enrollment in Institutions of Higher Education, Tables in various years, 1971, Table 11E, p. 216, Table 11J, p. 226; 1972, Table 7E, pp. 32, 33, Table 7-J, pp. 42, 43; 1973, Table 9E, pp. 38, 39, Table 9J, pp. 48,49; 1974, Table 10E, pp. 24,25, Table 10J, pp. 34, 35; 1975, Table 8E, pp. 42, 43; Table 8J, pp. 52, 53; 1976, Table 5, pp. 28, 29; Table 6, pp. 30, 31; Table 12, p. 56; Table 13, p. 58.

Office of Institutional Research at UTN and NCES. The percentages of total expenditures borne by student, state, and by other sources were based on ratios of total revenues received from each of these sources to total current operating fund revenues for each year (Tables XX and XXI). These percents were then used to determine the portion of per credit hour cost for total insturction borne by the student, state and local governments and by other sources. These percents, for every year, for every type institution were stored in the file, COSTPD.

BOOKS. The primary source for data on costs of books and supplied was Raymond and Sesnowitz.[1] According to these researchers, students spent $150.00 in 1969 for books and supplies. This figure was converted into per credit hour costs for books and supplies. Through the application of the Consumer Price Index (CPI), costs for individual years were estimated beginning with 1971 through 1977. This information was stored in file, BOOKS.

III. EARNINGS DATA AND ADJUSTMENTS

The primary source for the earnings data of the sample UTN graduates while they were in school and after graduation was their questionnaires. Lifetime earnings streams of the sample graduates were based on their 1978 earnings. The U.S. Bureau of the Census was the source for the earnings data on the typical college graduates. The

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[1]Richard Raymond and Michael Sesnowitz, "The Returns to Investment in Higher Education, Some New Evidence," The Journal of Human Resources, 10:138-153, 1975.

TABLE XX

TOTAL CURRENT FUND EDUCATIONAL AND GENERAL REVENUE RECEIVED FROM STUDENTS, STATE, AND OTHER SOURCES, THE UNIVERSITY OF TENNESSEE AT NASHVILLE, BY YEAR: 1972-1977

Year	Current Fund Educational and General Revenue Received From		
	Students	State	Other[a]
1972	$ 918	$1,441	$105
1973	1,293	2,392	62
1974	1,786	3,169	182
1975	1,673	3,572	238
1976	1,942	3,891	118
1977	1,955	4,660	219

[a]Includes endowment income, gifts and grants, sponsored research, other separate budgeted research, other sponsored programs, recovery of indirect costs, sales and service of education departments, organized education activities, Federal government appropriations and other sources.

NOTE: Dollar amounts are in thousands.

SOURCE: Derived from The University of Tennessee at Nashville, Institutional Budget Document (Nashville: Bureau of Institutional Research, The University of Tennessee at Nashville, various years, 1972 through 1977).

TABLE XXI

TOTAL CURRENT FUND REVENUES OF INSTITUTIONS OF HIGHER EDUCATION RECEIVED FROM STUDENTS, STATE AND LOCAL GOVERNMENTS, AND OTHER SOURCES, UNITED STATES AND TENNESSEE, BY FISCAL YEAR, SOURCE AND TYPE OF INSTITUTION: 1972-1977

Fiscal Year	Source	Current Fund Revenues			
		United States		Tennessee	
		Public	Private	Public	Private
1972	Total	$17,079,870	$ 9,154,389	$258,000	$202,424
	Students	2,332,535	3,261,560	40,615	51,832
	State/Local	7,688,055	128,402	114,303	553
	Other	7,059,280	5,764,427	103,082	150,039
1973	Total	18,785,178	9,821,037	291,967	227,562
	Students	2,519,019	3,491,907	44,598	57,595
	State/Local	8,570,043	144,322	130,187	203
	Other	7,696,116	6,184,808	117,182	169,764
1974	Total	21,206,491	10,505,962	327,172	231,217
	Students	2,734,731	3,765,370	48,908	63,093
	State/Local	9,879,769	197,203	147,871	210
	Other	8,591,991	6,543,389	130,393	167,914
1975	Total	24,004,864	11,682,035	367,747	258,643
	Students	3,078,506	4,154,402	53,219	68,592
	State/Local	11,436,572	158,943	165,556	245
	Other	9,489,786	7,368,690	148,972	189,806
1976	Total	26,834,898	12,868,268	412,047	283,694
	Students	3,477,566	4,694,376	61,128	77,362
	State/Local	12,985,655	174,886	177,400	265
	Other	10,371,677	7,999,006	173,519	206,067
1977	Total	29,255,333	14,181,494	457,475	303,933
	Students	3,854,192	5,170,740	66,290	84,650
	State/Local	14,502,638	409,954	204,372	305
	Other	10,898,503	8,600,800	186,813	218,978

SOURCE: Derived from U.S. Department of Health, Education and Welfare, National Center for Education Statistics, Financial Statistics of Institutions of Higher Education: Current Fund Revenues and Expenditures, various years, 1972, Table 1, pp. 16, 17, 94, 95; 1973, Table 1, pp. 14, 15, 92, 93; 1974, Table B, p. 6, Table D, pp. 10, 11; 1975 Table 1, pp. 6, 7, 84, 85; 1976, Table 1, pp. 6, 7, 84, 85; 1977, Table 1, pp. 6, 7, 84, 85.

NOTE: Dollar amounts are in current dollars and in thousands.

data were used to create three files[2] which in turn were used to calculate foregone earnings when they were unknown, alternative earnings and gross lifetime earnings when 1978 earnings were unknown or zero (Tables XXII and XXIII).

EARNUS. The Current Population Survey Income data and the CPI were used to estimate annual mean earnings for men and women for 1970 through 1978 for ages 18 through 64 and for four education levels completed. These four levels included: (1) four years of high school; (2) one to three years of college; (3) four years of college; and (4) five years of college. The men's earnings were based on the 1972 annual mean income of men by education level and the women's earnings were estimated by using 1975 age grouped data on mean annual income by education level. The earnings were those of year-round full-time workers. These earnings were stored in the file, EARNUS. These earnings were adjusted for the earnings of the average individual in middle Tennessee through the use of the middle Tennessee adjustment described in the next two sections.

PCNTUT. The file, PCNTUT, contains percents based on ratios of the mean average earnings of individuals in the Nashville—Davidson County Standard Metropolitan Statistical Area (SMSA) to the average earnings of individuals in the nation. These percents were derived from ratios using the 1970 U.S. Census average earnings for year-round

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[2]EARNUS, PCNTUT, PCNT78.

TABLE XXII

ESTIMATED MEAN INCOME FOR MALE YEAR-ROUND FULL-TIME WORKERS 18 to 64 YEARS OLD WITH INCOME IN 1972 BY AGE AND YEARS OF SCHOOL COMPLETED

Present Age	High School 4 Year	College 1-3 Year	College 4 Year	College 5 Year or More
18	$ 5,834	$ 5,585	$ 4,980	$15,804
19	6,259	6,144	5,613	15,891
20	6,670	6,688	6,680	15,983
21	7,068	7,216	7,493	16,081
22	7,453	7,729	8,280	16,183
23	7,824	8,227	9,041	16,291
24	8,181	8,709	9,778	16,404
25	8,525	9,176	10,489	16,522
26	8,856	9,627	11,175	16,646
27	9,173	10,064	11,836	16,774
28	9,477	10,484	12,471	16,908
29	9,767	10,890	13,081	17,046
30	10,044	11,280	13,666	17,190
31	10,308	11,654	14,225	17,339
32	10,558	12,014	14,759	17,494
33	10,794	12,357	15,268	17,653
34	11,017	12,686	15,752	17,818
35	11,227	12,999	16,210	17,987
36	11,423	13,297	16,643	18,162
37	11,606	13,579	17,051	18,342
38	11,776	13,846	17,433	18,527
39	11,932	14,098	17,791	18,718
40	12,074	14,334	18,122	18,913
41	12,203	14,555	18,429	19,114
42	12,319	14,760	18,710	19,320
43	12,421	12,950	18,966	19,531
44	12,510	15,125	19,197	19,747
45	12,585	15,284	19,402	19,968
46	12,647	15,428	19,583	20,194
47	12,695	15,557	19,737	20,426
48	12,730	15,670	19,867	20,663
49	12,752	15,768	19,971	20,905
50	12,760	15,850	20,050	21,152
51	12,755	15,917	20,104	21,404
52	12,736	15,969	20,132	21,661
53	12,704	16,005	20,135	21,924
54	12,658	16,026	20,113	22,192
55	12,599	16,031	20,066	22,464

TABLE XXII (Continued)

Present Age	High School 4 Year	College 1-3 Year	College 4 Year	College 5 Year or More
56	$12,527	$16,022	$19,993	$22,743
57	12,441	15,996	19,895	23,026
58	12,341	15,956	19,772	23,314
59	12,229	15,900	19,623	23,608
60	12,102	15,828	19,449	23,906
61	11,963	15,742	19,250	24,210
62	11,809	15,639	19,026	24,519
63	11,643	15,522	18,776	24,833
64	11,463	15,389	18,501	25,152

SOURCE: Derived from U.S. Bureau of the Census, Current Population Reports: 1972, Series P-60, no. 92, "Annual Mean Income, Lifetime Income and Educational Attainment of Men in the U.S., for Selected Years, 1956-1972" (Washington, D.C.: U.S. Government Printing Office, 1974), Table 23, pp. 81-83.

TABLE XXIII

ESTIMATED MEAN INCOME FOR FEMALE YEAR-ROUND, FULL-TIME WORKERS 18-64 YEARS OLD WITH INCOME IN 1972 BY AGE AND YEARS OF SCHOOL COMPLETED

Present Age	High School 4 Year	College 1-3 Year	College 4 Year
18	$4,287	$ 4,434	$ 4,273
19	4,582	4,853	4,830
20	4,836	5,216	5,617
21	5,082	5,570	6,189
22	5,314	5,897	6,715
23	5,539	6,203	7,205
24	5,743	6,488	7,646
25	5,933	6,762	8,055
26	6,110	7,008	8,437
27	6,274	7,246	8,770
28	6,434	7,444	9,078
29	6,573	7,655	9,352
30	6,739	7,884	9,730
31	6,762	8,018	9,929
32	6,728	8,121	10,109
33	6,779	8,217	10,260
34	6,764	8,283	10,396
35	6,747	8,345	10,487
36	6,716	8,390	10,568
37	6,673	8,432	10,623
38	6,618	8,446	10,668
39	6,562	8,458	10,674
40	6,604	8,600	11,199
41	6,626	8,514	10,873
42	6,639	8,413	10,533
43	6,632	8,312	10,184
44	6,630	8,197	9,848
45	6,619	8,085	9,506
46	6,601	7,960	9,164
47	6,576	7,825	8,822
48	6,543	7,678	8,463
49	6,503	7,537	8,128
50	6,571	7,608	8,300
51	6,632	7,687	8,443
52	6,686	7,744	8,596
53	6,733	7,810	8,738
54	6,772	7,952	8,869
55	6,803	7,903	8,989
56	6,827	7,930	9,116

TABLE XXIII (Continued)

Present Age	High School 4 Year	College 1-3 Year	College 4 Year
57	$6,854	$ 7,966	$ 9,211
58	6,861	7,970	9,292
59	6,836	7,981	9,281
60	6,825	8,578	9,685
61	6,794	9,224	10,106
62	6,766	9,899	10,521
63	6,729	10,601	10,946
64	6,671	10,772	11,156

SOURCE: Derived from U.S. Bureau of the Census, Current Population Reports, Series P-60, No. 105, "Money Income in 1975 of Families and Persons in the U.S." (Washington, D.C.: U.S. Government Printing Office, 1977), Table 48, pp. 204-212; U.S. Bureau of the Census, Current Population Reports, Series P-60, No. 92, "Annual Mean Incomes, Lifetime Income and Educational Attainment of Men in the U.S., For Selected Years, 1956-1972" (Washington, D.C.: U.S. Government Printing Office, 1974).

full-time workers in the nation and the average earnings for year-round full-time workers in the Nashville—Davidson County SMSA, and the Consumer Price Index. These percents were used to estimate the foregone earnings of the sample graduates who did not list the information in the questionnaires, the foregone earnings of the full-time graduates and part-time graduates, and the alternative earnings streams of all graduates. The percents, which were estimated for men and women in every education level, were stored in the file, PCNTUT.

PCNT78. The file, PCNT78, contains percents based on ratios of the 1970 U.S. Census mean average earnings of persons in the Nashville—Davidson County SMSA to the mean average earnings of persons in the nation. Percents were estimated for men and women in every education level and stored in the file, PCNT78. The difference between the data in the file, PCNT78, and the data in the file, PCNTUT, is the education level; the earnings in the file, PCNT 78 were for a higher education level. These percents were used to estimate the lifetime earnings streams of all graduates who had unknown or zero earnings in 1978.

IV. TAX ADJUSTMENTS

The primary source of data for federal tax rates was the U.S. Department of the Treasury and the primary source for the State of Tennessee effective tax rates was the Urban Observatory of Metropolitan Nashville. Federal tax rates were calculated by using the taxable income and income tax paid by Tennesseans on all returns by size of

adjusted gross income in 1974 (Tables XXIV and XXV). Federal tax information was stored in the file, FDTX and the State of Tennessee tax information was stored in the file, STTX.

TABLE XXIV

TOTAL ADJUSTED GROSS INCOME AND FEDERAL INCOME TAX ITEMS FOR TENNESSEE BY SIZE OF ADJUSTED GROSS INCOME: 1974

Size of Adjusted Gross Income	Adjusted Gross Income Less Deficit (1)	Total Income Tax (2)	Income Tax Rate (3)
Under $2,000			0.000
$ 2,000 to $ 2,999	$ 244,654	$ 3,760	0.015
3,000 to 3,999	348,606	14,858	0.043
4,000 to 4,999	438,743	27,825	0.063
5,000 to 5,999	676,291	45,216	0.067
6,000 to 6,999	599,119	45,130	0.075
7,000 to 7,999	739,278	67,868	0.092
8,000 to 8,999	531,557	55,401	0.104
9,000 to 9,999	747,730	76,336	0.102
10,000 to 10,999	643,194	62,984	0.098
11,000 to 11,999	758,018	78,730	0.104
12,000 to 12,999	587,911	62,382	0.106
13,000 to 13,999	876,345	102,749	0.117
14,000 to 14,999	563,715	64,863	0.115
15,000 to 19,999	2,663,977	341,301	0.128
20,000 to 14,999	1,508,189	222,106	0.147
25,000 to 29,999	880,461	144,316	0.164
30,000 to 49,999	761,758	160,227	0.210
50,000 to 100,000	735,104	212,027	0.288

NOTE: Money amounts are in thousands of dollars. Column (3) = Column (2) ÷ Column (1).

SOURCE: Derived from U.S. Department of the Treasury, Internal Revenue Service, Statistics of Income—1974: Individual Income Tax Returns (Washington, D.C.: U.S. Government Printing Office, 1977), Table 5.5, p. 214.

TABLE XXV

AVERAGE TAX AND TAX AS PERCENT OF MEAN INCOME BY INCOME CLASS FOR TENNESSEE: 1970

Income Class	Average Tax	Tax Rate
$ 000 to $ 2,999	$ 221,72	0.1960
3,000 to 3,999	508.30	0.1469
4,000 to 4,999	584.36	0.1286
5,000 to 5,999	654.77	0.1192
6,000 to 6,999	730.16	0.1115
7,000 to 7,999	814.58	0.1085
8,000 to 8,999	868.33	0.1019
9,000 to 9,999	939.10	0.0986
10,000 to 11,999	1,039,98	0.0946
12,000 to 14,999	1,140.43	0.0858
15,000 to 24,999	1,397.18	0.0752
25,000 and over	2,117.65	0.0518

SOURCE: Urban Observatory of Metropolitan Nashville, The Impact of State Assumption of Selected Metropolitan Nashville Expenditure Programs (Nashville: The Urban Observatory of Metropolitan Nashville, University Centers), Table 3-E, col. 7, p. 35.

APPENDIX B

LISTING OF ORIGINAL PROGRAM, SUBROUTINES AND INPUTS

APPENDIX B

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      DOUBLE PRECISION SSN1,SSN2,A
       DIMENSION COSTUT(3,22,11), OCOSTU(11),COSTPD(3,5,11),COSTNU(11,
     15), INST(80),NYR(80),NCR(80), NTXOMY(80), NLEVEL(80),
     2 OUTPUT(6,17,4),BOOKS(11)
     3,FORGON(2 ,7),NHRSUT( 2),NHRS78( 2),EARNUT(2 ),EARN78(2 )
     4 ,IBORNY( 2)
C                    X                                  X
C                    X                                  X
C                    X   PROPERTY OF:                   X
C                    X                                  X
C                    X              IRMA D PERRY        X
C                    X                                  X
C                    X              5025 HILLSBORO      X
C                    X                                  X
C                    X              NASHVILLE, TN       X
C                    X                                  X
C                    X                   292-8571       X
C                    X                                  X
C                    X                                  X
C                    X                                  X
C                    X                                  X
C                    X                                  X
CXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
CXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
C
C     VARIABLES DEFINED IN THIS PROGRAM
C
C     COSTUT(I,J,K) IS COST OF COURSES PER CR HR AT UTN EXCLUDING OTHER
C                   COSTS WHERE I=COSTLEVEL(1,2,3), J = CODED TAXONOMY (
C                   30), K= CODED YEAR (BEFORE 1968 = 1, 1968=2....1977=11
C     OCOST(I)     ISOTHER UTN COSTS PER CREDIT HOUR PER YEAR(I)
C     COSTPD(I,J,K) IS THE PERCENT PAID BY STUDENTS (I=1),THE STATE (I=2
C                   OTHERS (I=3), BY YEAR (BEFORE 1969 K=1....1977= 9),B
C                   INSTITUTION (J) (1=UTN,2= PUBLIC TN NOT UTN, 3= PAIU
C                   4= PRIVATE OUT OF TN, 5= PUBLIC OUT OF TN)
C
C     COSTNU (I,J)  IS COSTS PER YEAR (J) BY TYPE OF INSTITUTION (I) (1=
C                   APPLICABLE BECAUSE UTN.FOR OTHER VALUES SEE DEF OF K
C                   COSTPD(I,J,K))  AND BY YEAR (J) (SEE K DEFINITION OF
C     FORGON(400,7) IS FORGONE EARNINGS FROM PROGRAM FORGONE.
C                   400 IS TOTAL MAXIMUN NUMBER OF CASES.
C      7             IS SSN AND AN AMOUNT FOR 1963 THOUGH 1977
C
C
C     BOOKS(11)      IS COST OF BOOKS BY YEAR(1=BEFORE 68,11=77)
C
C     IDEGRE         IS DEGREE CODE. EACH OUTPUT RUN WILL BE FOR ONLY THI
C                    ALSO ICODE AND ILIST THAT CONTROL OUTPUT.
C
C     NHSYR          IS YR GRADUATED FROM  H.S.
C
C     NUTYR1          IS YR GRADUATED FROM U.T.N.
C
C     NUTYR         NUTYR IS STORAGE CLOMUN IN OUTPUT. DIF DETERINES IT
C
C      DIF          IS 1977 MINUS NUTYR.
C
C     GPA            UTN GPA
C
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C      NCARDS          IS NO OF ADDITIONAL DATA CARDS WITH SAME SSNO.
C
C      INSTCD          IS INSTITUTION CODE.
C
C      NTOTHR          IS NO OF TOTAL HRS FOR GRADUATION.
C
C      SSN,SSN1,SSN2 IS STUDENT SOC. SEC NO. USE TO CHECK CARD ORDER.
C
C      INSTCD          IS INSTITUTION CODE.
C
C      NYR(80)         PART OF 8 CHARACTER TAXONOMY RECORD FOR 1 SSN. IS YR
C      NCR(80)         PART OF 8 CHARACTER TAXONOMY RECORD FOR 1 SSN. IS HR
C      NTXOMY(80)      PART OF 8 CHARACTER TAXONOMY RECORD FOR 1 SSN. IS TA
C      NLEVEL(80)      PART OF 8 CHARACTER TAXONOMY RECORD FOR 1 SSN. IS CO
C      INST(80)        PART OF 8 CHARACTER TAXONOMY RECORD FOR 1 SSN. IS IN
C
C      ILIST           MEANS LIST ALL INPUT DATA IF POSITIVE.
C
C      ICODE           MEANS DEGREE SELECTED FOR OUTPUT.
C
C      IOVER           MEANS ANOTHER DEGREE IS READ FOR ADDITIONAL RUN.
C
C      IFORGO          MEANS READ  DATA FROM PROGRAM FORGONE IF NOT ZERO
C
C       ITEST          IS NUMBER OF STUDENT RECORDS TO BE READ FROM DATA
C                      PROGRAM PRINTS TABLES WHEN ITEST=ITEST1
C                      ITEST1 IS THE PROGRAM COUNTER.
C
C      COST            IS COST OF A COURSE OR GROUP OF COURSES AT UTN.
C                      (COST = COSTTN + COSTST + COSTO)
C      COSTTN          IS COST TO TN.
C
C      COSTST          IS COST TO STUDENT.
C
C      COSTO           IS COST TO OTHERS
C
C      ISEX            IS SEX OF GRADUATE (1=MALE,2=FEMALE,3=M+F,4=INDIV).
C
C      IFEMAL          IS NO OF FEMALE GRADUATES.
C
C      IMALE           IS NO OF   MALE GRADUATES.
C
C      OUTPUT(I,J,K) IS OUTPUT TABLES.(I=COL  OF COST IN TABLE, J=ROWS
C                      GRADUATED FROM UTN(1-9) AND K =SEX(1=M,2=F,3=M+F,4=S
C
C       J              ISUSED TO CONTROL NUMBER OF TAXOMY RECORDS FOR A
C                      FOR A STUDENT WITH MULTIPLE CARDS.
C      IGOT            IS THE SUBSCRIPT FOR THE STUDENT DATA HELD IN STUDEN
C      FORGON          IS INPUT FROM FORGONE. CONTAINS 7 NUMBERSFOR EACH
C                    FOR EACH STUDENT.  NUMBERS ARE SSN AND FORGONE EARNING
C                      FOR 6 YEARS.
C
C
C                     NURSUT, HHRS78,EARNUT, EARN78 AND IBORNY ARE FROM FOR
C      NDONE            CONTROLS PROGRAM EXIT AFTER ALL TABLES ARE WRITTEN
C                       EXIT WHEN NDONE IS 1.
C
C
C
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C
CXXX
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  540 FORMAT(  4X,'OTHER INSTITUTIONS'            ,14X ,6F11.2)
  541 FORMAT  (4X,'BOOKS AND SUPPLIES (UTN)'    ,8X,6F11.2)
  542 FORMAT( 4X,'FORGONE EARNINGS AT UTN'    ,9X,6F11.2     )
  544 FORMAT(4X,'FORGONE EARNINGS NOT AT UTN',5X,6F11.2,/)
  550 FORMAT( 10X,'TOTAL STUDENT COSTS',             7X,6F11.2,//)
  560 FORMAT(  1X,'STATE OF TN COSTS' )
  570 FORMAT(  4X,'UTN INSTRUCTIONAL AND ADMIN'    ,5X,6F11.2)
  580 FORMAT(  4X,'PUBLIC TN INSTITUTIONS'        ,10X ,6F11.2,/)
  590 FORMAT( 10X,'TOTAL STATE OF TN COSTS'        , 3X,6F11.2,//)
  600 FORMAT(  1X,'FEDERAL AND OTHER COSTS')
  610 FORMAT( 15X,'GRAND TOTAL'                     ,10X,6F11.2,/)
  620 FORMAT( 15X,'(UTN TOTAL)',10X                    ,6F11.2,//)
  630 FORMAT(1X,'GPA',12X,F4.1/ 1X,'SEX IS' ,6X,I4/1X,'SSN',4X,F10.0)
  601 FORMAT(4X,'UTN FEDERAL COSTS',15X,6F11.2)
  602 FORMAT(4X,'NON UTN FEDERAL COSTS', 11X,6F11.2)
  603 FORMAT( 4X,'NON UTN OTHER COSTS',13X,6F11.2,/)
  604 FORMAT( 10X,'TOTAL FED. AND OTHER COSTS', 6F11.2,//)
  543 FORMAT(4X,'BOOKS AND SUPPLIES (NON-UTN)', 4X,6F11.2)
  545 FORMAT(1X,'NO RECORD FOUND FOR SSN  ',F11.0)
      IN =1
      IX =3
C     INITIALIZE ARRAYS FOR DATA FROM FORGONE.
      ISAVE = 1
      NTAPE =0
      MAX =2
      DO 14 I=1,2
      NHRSUT(I) = 0
      NHRS78(I) = 0
      EARNUT(I) =0.
      EARN78(I) =0
      IBORNY(I)=0
      DO 15 J=1,7
      FORGON(I,J) =0.
   15 CONTINUE
   14 CONTINUE
C
CXXXXXZERO ARRAYS AND VARIABLES
C
  993 DO 5 I=1,6
      DO 5 J=1,17
      DO 5 K=1,4
    5 OUTPUT(I,J,K)=0.00
      COST=0.00
      IFEMAL=0
      IMALE =0
      SSN1=1.
      SSN2=1.
      NUMBER=0
      NDONE=0
      ITEST1=-1
C
CXXXXXREAD THE DEGREE CODE AND INPUT WRITE CODE. OUTPUT FOR 1 DEGREE PER
C
      READ(IN,902) ICODE, ILIST, IOVER,ITEST,IFORGO
C
C     READ ALL COST DATA AND WRITE IF DESIRED.ILIST SUPRESSES WRITE IF P
C
      IF(ILIST.NE.0) WRITE(IX,400)
      IF (ILIST.NE.0) WRITE(IX,902) ICODE,ILIST, IOVER,ITEST,IFORGO
```

```
      IF(ILIST.NE.0) WRITE(IX,401)
      DO 1 IYR=1,11
      READ(IN,900)((COSTUT(LEV,ITX,IYR),LEV=1,3),ITX=1,22)
      IF(ILIST.NE.0) WRITE(IX,908)
     1((COSTUT(LEV,ITX,IYR),LEV=1,3),ITX=1,22)
    1 CONTINUE
      READ(IN,900)(OCOSTU(I),I=1,11)
      IF(ILIST.NE.0) WRITE(IX,402)
      IF(ILIST.NE.0) WRITE (IX,908)(OCOSTU(I),I=1,11)
      READ(IN,909)(((COSTPD(I,J,K),I=1, 3),J=1,5),K=1,11)
      IF(ILIST.NE.0) WRITE(IX,403)
      IF (ILIST.NE.0) WRITE (IX,910)(((COSTPD(I,J,K),I=1,3),J=1,5),K=1,
     1 11)
    3 CONTINUE
      IF(ILIST.NE.0) WRITE(IX,404)
      DO 4 I=1,11
      READ(IN,900) ( COSTNU (I,J ),J=1,5)
      IF (ILIST.NE.0) WRITE(IX,908)  (COSTNU (I,J),J=1,5)
    4 CONTINUE
C
      READ(IN,900)(BOOKS(I), I= 1,11)
      IF(ILIST.NE.0) WRITE(IX,405)
      IF(ILIST.NE.0)WRITE(IX,908) (BOOKS(I),I=1,11)
C
CXXXXXINITIALIZE THE ARRAYS USED FOR CALCULATING COSTS. PROGRAM RETURNS
C               WHEN EVER A NEW STUDENT RECORD IS TO BE PROCESSED.
   20 DO 30 I= 1,80
      INST(I)=  80
      NYR(I)=0
      NCR(I)=0
      NTXOMY(I)=0
   30 NLEVEL(I)=0
C     INITIALIZE STUDENT OUTPUT PORTION OF TABLE TO ZERO.
      DO 31 I= 1,6
      DO 31 I2= 1,17
      OUTPUT(I,I2,4) = 0.0
   31 CONTINUE
C
CXXXXXREAD A STUDENT RECORD
C
      SSN1=1
      ITEST1= ITEST1+1
      READ (IN,903) SSN1,INSTCD,NHSYR,NUTYR1,IDEGRE ,NTOTHR ,GPA,ISEX,
     1              NCARDS,((NYR(I),NCR(I),NTXOMY(I),NLEVEL(I)),I=1,6)
C     IF NEW SSN ON 1ST CARD NOT DIFFERENT FROM OLDCARD(SSN2) GO TO ENDO
CT    WRITE(IX,916) SSN1
      IISEX=ISEX
      IF(SSN1.EQ.0) GO TO 500
      NOO=2
      IF (SSN1.EQ.SSN2) GO TO 999
      SSN2=2.
C
C
CX    IF (ILIST) 301,300,301
C     WRITE THE INPUT RECORD IF ILIST NOT EQ ZERO.
CX301 IF(ILIST.NE.0.AND.IDEGRE.EQ.ICODE)WRITE(IX,407)
CX    IF(ILIST.NE.0.AND.IDEGRE.EQ.ICODE)
      WRITE(IX,912)SSN1,INSTCD,NHSYR,NUTYR1,IDEGRE ,NTOTHR ,GPA,ISEX,
     2NCARDS, ((NYR(I),NCR(I),NTXOMY(I),NLEVEL(I)),I=1,6)
```

```
      NOO=3
C
CXXXXXEDIT INCOMING DATA ON FIRST CARD.
C
  300 IF(SSN2.EQ.0)       GO TO 999
      IF(INSTCD.GT.5)     GO TO 999
      IF(INSTCD.LT.1)     GO TO 999
      IF(IDEGRE .GT.9)    GO TO 999
      IF(IDEGRE .LT.1)    GO TO 999
      IF(IDEGRE .EQ.6)    GO TO 999
      IF(NUTYR1.GT.77)     GO TO 999
      IF(IDEGRE.EQ.5) IDEGRE=2
      IF(NUTYR1.LT.73)     GO TO 999
      IF(ISEX.LT.1)       GO TO 999
      IF(ISEX.GT.2)       GO TO 999
      IF(NCARDS.GT.10)    GO TO 999
      IF(SSN1.EQ.SSN2)    GO TO 999
C
C     ADD INSTCD TO INST ARRAY AND EDIT MULTIPLE 8 CHAR TAXONOMY RECORDS
C
C     IF THIS J PLUS REMAINING ARE ZERO DO NOT EDIT
CT    NO=1
CT    IF(ILIST.NE.0) WRITE(IX,902)NO
      DO201J=1,6
      NN =NYR(J) + NCR(J) + NTXOMY(J) + NLEVEL(J)
      NOO=4
      IF (NN) 999,204,202
  204 J= J-1
      GO TO 203
C
C
C     PERFORM EDITS AND STORE INST CODE
  202 INST(J)=INSTCD
      NOO=5
      IF(NLEVEL(J).GT.3 )     GO TO 999
      IF(NLEVEL(J).LT.1 )     GO TO 999
      IF(   NYR(J).GT.77)     GO TO 999
      IF(   NYR(J).LE.0 )     GO TO 999
       IF(NTXOMY(J).GT.22)    GO TO 999
      IF(NTXOMY(J).LT.1)      NTXOMY(J) =22
      IF (NCR(J).LE.0)        GO TO 999
  201 CONTINUE
CT    NO=2
CT    IF(ILIST.NE.0) WRITE(IX,902)NO
C     SKIP EDITS OF REMAINING 8 CHAR RECORDS BECAUSE ALL ARE ZERO.
  203 CONTINUE
C     J  IS  NUMBER OF COMPLETE 8 CHAR REC. ON THE FIRST CARD.
      IF(NCARDS.EQ.0) GO TO 35
C
CXXXXXCHECK TO SEE IF LAST CARD WAS READ (SSN1= 0 IS THE CHECK).IF LC PR
C
      IF(SSN1.EQ.0) GO TO 500
C
C     READ NCARDS ADDITIONAL CARDS FOR THIS SSN.
C
      J1= J+1
      J2=J+8
CT    NO=3
CT    IF(ILIST.NE.0) WRITE(IX,902)NO
```

```
CT    IF(ILIST.NE.0) WRITE(IX,902) J
      DO 10 I=1,NCARDS
C     WRITE(IX,902) J1,J2
      READ (IN,904)SSN2,INSTCD,((NYR(J),NCR(J),NTXOMY(J),NLEVEL(J)),
     1             J=J1,J2)
C
C     WRITE THE INPUT RECORD IF ILIST  NOT EQ ZERO.
C
      IF(ILIST.NE.0.AND.IDEGRE.EQ.ICODE)
     1WRITE (IX,906) SSN2,INSTCD, ((NYR(J),NCR(J),NTXOMY(J),NLEVEL(J)),
     1                J=J1,J2)
C     TEST TO SEE IF SECONDCARD IS READ AND EDIT COMMON DATA.
    8 A=SSN1-SSN2
      NOO=6
      IF(A.NE.0)          GO TO 999
      IF(INSTCD.GT.5)     GO TO 999
      IF(INSTCD.LT.1)     GO TO 999
C
C     PLACE INSTCD IN ARRAY FOR CONVENIENT PROCESSING WITH INDEX IGOT
C
C     EDIT RECORDS FOR SECOND TYPE CARDS STOPPING WHEN ALL TAXONOMY RECO
C     TO ZERO.
      DO210 J=J1,J2
      NN= NYR(J)+NCR(J) + NTXOMY(J) + NLEVEL(J)
      NOO=7
CT    NO=4
CT    IF(ILIST.NE.0) WRITE(IX,902)NO
      IF(NN)999,12,7
    7 IF(NTXOMY(J).GT.30)GO TO 999
      NOO=8
      INST(J) = INSTCD
      IF(NTXOMY(J).LT.1) NTXOMY(J)=22
      IF(NTXOMY(J).GT.22)  GO TO 999
      IF(NLEVEL(J).GT.3) GO TO 999
      IF(NLEVEL(J).LT.1) NLEVEL(J)=1
      IF(NYR(J).GT.77)    GO TO 999
      IF(NYR(J).LE.0)     GO TO 999
      IF(NCR(J).LE.0)     GO TO 999
  210 CONTINUE
C     J IS NUMBER OF 8 CHAR RECORDS ON A NUMBER OF CARDS FOR 1 SSN.
C
C     ALL 8 TAXONOMY RECORDS ON THE CARD ARE USED. IF 'NCARDS' CARDS
C      HAVE BEEN READ GO TO 35 ELSE INCREASE J1 AND J2 AND READ ANOTHER
C     CARD.
      IF(I.EQ.NCARDS) GO TO 35
      J1=J + 1
      J2=J +8
      GO TO 10
C     J IS TOTAL NUMBER OF 8 CHARACTER RECORDS FOR THIS SSN.
C
C     LESS THAN 8 TAXONOMY RECORDS ON THE CARD . IF 'NCARDS' CARDS
C     HAVE BEEN READ GO TO 35 ELSE INCREASE J1 AND J2 AND READ ANOTHER
C     CARD.
C
   12 J= J-1
      IF(I.EQ.NCARDS) GO TO 35
      J1=J+1
      J2=J+8
   10 CONTINUE
```

```
C
CXXXXXREAD TWO DATA CARDS FOROM PROGRAM FORGONE
C      NOTE:PRORAM CHANGES NEVER USES DOUBLE DIMENSION OF FORGON.
C
   35 READ(IN,917)FORGON(1,7),FORGON(1,1),FORGON(1,2),FORGON(1,3),
     1FORGON(1,4),FORGON(1,5),FORGON(1,6),NHRSUT(1),NHRS78(1),
     2 EARNUT(1),EARN78(1), IBORNY(1)
      IF(ILIST.NE.0.AND.IDEGRE.EQ.ICODE)WRITE(IX,914)FORGON(1,7),
     1 FORGON(1,1),
     1FORGON(1,2),FORGON(1,3),FORGON(1,4),FORGON(1,5),FORGON(1,6),
     2NHRSUT(1),NHRS78(1),EARNUT(1),EARN78(1),IBORNY(1)
CXXXXXDETERMINE IF STUDENT NEEDED FOR THIS RUN
      IF(ICODE.EQ.IDEGRE ) GO TO 40
      GO TO  20
   40 CONTINUE
C
C      UPDATE COUNTERSFOR NUMBER OF STUDENTS BY SEX FOR THIS DEGREE.
      IF(ISEX.EQ.2) IFEMAL= IFEMAL+1
      IF(ISEX.EQ.1) IMALE= IMALE+1
CT     NO=5
CT     IF(ILIST.NE.0) WRITE(IX,902)NO
CT     IF(ILIST.NE.0) WRITE(IX,902) J
CT     DO 1200 I=1,J
CT     WRITE(IX,398) INST(I)  ,NCR(I)
CT    1              ,NTXOMY(I),NLEVEL(I),NYR(I)
CT200 CONTINUE
C
C
CXXXXXMAKE CALCULATIONS AND STORE FOR OUTPUT FOR J NUMBER OF 8 CHARACTER
C          TAXONOMY RECORDS. SUBSCRIPT IS 'IGOT'.
C
C
CXXXXXCALCULATE YEAR TAKEN CODE.
C
      JJ=J
      DO 81 IGOT = 1,J
      DIF1= NUTYR1 -NYR(IGOT)
      DIF =77-NUTYR1
      IF(NYR(IGOT).LT.68) NYR(IGOT)=1+DIF
      IF(NYR(IGOT).EQ.68) NYR(IGOT)=2+DIF
      IF(NYR(IGOT).EQ.69) NYR(IGOT)=3+DIF
      IF(NYR(IGOT).EQ.70) NYR(IGOT)=4+DIF
      IF(NYR(IGOT).EQ.71) NYR(IGOT)=5+DIF
      IF(NYR(IGOT).EQ.72) NYR(IGOT)=6+DIF
      IF(NYR(IGOT).EQ.73) NYR(IGOT)=7+DIF
      IF(NYR(IGOT).EQ.74) NYR(IGOT)=8+DIF
      IF(NYR(IGOT).EQ.75) NYR(IGOT)=9+DIF
      IF(NYR(IGOT).EQ.76) NYR(IGOT)=10+DIF
      IF(NYR(IGOT).EQ.77) NYR(IGOT)=11+DIF
CT    WRITE(IX,902) NYR(IGOT),J  ,IGOT
      IF(NYR(IGOT).GT.77) GO TO 999
C
      ISAVE =1
C
C     EXECUTE NEXT STATEMENT    ONLY IF IGOT = J(WHEN IGOT NE J GO TO 59)
C
      IF(IGOT.NE.J) GO TO 59
C
C     DETERMINE IF FORGONE EARNINGS WERE AT UTN OR OTHER INST. AND STORE.
```

```
C
C     UTN FORGON EARNINGS FOR EVERY YEAR I IN  THE LAST 6 YEARS (I=6THROUGH
C 11)  THAT A STUDENT WAS AT UTN ALLOW FORGONE EARNINGS BY PUTTING THE FORGON
C E    EARNINGS  COMPUTED  IN FORGONE IN UTN EARNINGS(ROW 6) OF OUTPUT.
C
C     MORE SPECIFICALLY THE STATEMENT AFTER THE SECOND DO 1205 MEANS :
C     IF A STUDENT IS IN SCHOOL IN YEAR I (FOR ESAMPLE I=6) AND THE STUDENT
C WAS  IN SCHOOL AT UTN (INST=0) AND THERE HAS BEEN NO FORGONE EARNINGS PLACE
C D IN OTPUT(K=1, LINE 6) ADD THE FORGONE EARNINGS TO OUTPUT(FOR YEAR I,ROWN
C 6)
C
C
      K=0
      DO 1205 I=6,11
      K= K+1
      DO 1205 KGOT = 1,JJ
      IF(NYR(KGOT).EQ.I.AND.INST(KGOT).EQ.1 .AND.OUTPUT(K,6,4    ).EQ.0)
     1 OUTPUT(K,6,IISEX)= FORGON(ISAVE,K)  +OUTPUT(K,6,IISEX)
      IF(NYR(KGOT).EQ.I.AND.INST(KGOT).EQ.1)OUTPUT(K,6,4)=FORGON(ISAVE,K
     1    )
 1205 CONTINUE
C
C     NON UTN FORGONE EARNINGS
C     FOR EVERY YEAR I IN THE LAST 6 ( 6 THROUGH 11) THAT A STUDENT WAS
C     AT UTN ALLOW FORGONE EARNINGS COMPUTED IN FORGONE IN NON-UTN
C     FORGONE EARNINGS ( ROW 7) OF OUTPUT ONLY IF THERE ARE NOT ALREADY
C     FORGONE EARNINGS FOR THE SAME YEAR FOR UTN(ROW 6). THE EFFECT
C     OF THIS RULE IS TO CREDIT FORGONE EARNINGS TO UTN (ROW 5) IF TWO
C     SCHOOLS WERE ATTENDED IN THE SAME YEAR>
C
C     MORE SPECIFICALLY THE STATEMENT AFTER THE SECOND DO 1206 MEANS
C     IF A  STUDENT   WAS IN SCHOOL IN YEAR I(EXAMPLE I=6) AND THE STUDENT
C NOT AT UTN(INST. NE 1) AND THERE IS NO FORGONE EARNINGS ALREADY ADDED AT
C UTN IN OUTPUT OF THE STUDENT TABLE(K=1, LINE 6,IISEX=4) AND NO FORGONE
C     EARNINGS ARE AG NON UTN SCHOOLS(K=1,ROW 7,IISEX=4) ADD FORGONE EARN
C INGS TO OUTPUT(YEAR=1,ROW 7) FOR THE PROPER IISEX(1 OR 2).
C
      K=0
      DO 1206 I=6,11
      K=K+1
      DO 1206 KGOT= 1,JJ
      IF(NYR(KGOT).EQ.I.AND.INST(KGOT).NE.1.AND.OUTPUT(K,6,4    ).EQ.0
     1.AND.OUTPUT(K,7,4    ).EQ.0)
     1    OUTPUT(K,7,IISEX)=OUTPUT(K,7,IISEX)+ FORGON(ISAVE,K)
      IF(NYR(KGOT).EQ.I.AND.INST(KGOT).NE.1.AND.OUTPUT(K,6,4    ).EQ.0
     1.AND.OUTPUT(K,7,4).EQ.0)
     1  OUTPUT(K,7,4) = FORGON(ISAVE,K)
 1206 CONTINUE
 1204 CONTINUE
C
C     DISALLOW ALL FORGONE EARNINGS OVE FOUR YEARS OLD FOR DEGREES 1 AND
C  8. FOR THE SEX OF THIS CASE(1 OR 2) SUBTRACT OUT FORGONE THAT MIGHT
C     HAVE BEEN ADDED.  ZERO YEARS IN FORGON FOR IISEX =4.
      IF(IDEGRE.EQ.1.OR.IDEGRE.EQ.8) GO TO 58
      GO TO 59
   58 IF(OUTPUT(1,6,4).GT.0)OUTPUT(1,6,IISEX)=OUTPUT(1,6,IISEX)
     1   -FORGON(ISAVE,1)
      IF(OUTPUT(1,7,4).GT.0)OUTPUT(1,7,IISEX)= OUTPUT(1,7,IISEX)
     1 -FORGON(ISAVE,1)
```

```
      IF(OUTPUT(2,6,4).GT.0)OUTPUT(2,6,IISEX)= OUTPUT(2,6,IISEX)
     1 -FORGON(ISAVE,2)
      IF(OUTPUT(2,7,4).GT.0)OUTPUT(2,7,IISEX)=OUTPUT(2,7,IISEX)
     1 -FORGON(ISAVE,2)
      OUTPUT(1,6,4)=0.
      OUTPUT(1,7,4)=0.
      OUTPUT(2,6,4)=0.
      OUTPUT(2,7,4)=0.
   59 CONTINUE
C
CXXXXXCALCULATE NUTYR(STORAGE COLUMN FOR OUTPUT TABLE).
C
      IF(DIF1.EQ.0)   NUTYR=6
      IF(DIF1.EQ.1)   NUTYR =5
      IF(DIF1.EQ.2)   NUTYR=4
      IF(DIF1.EQ.3)   NUTYR=3
       IF(DIF1.EQ.4)   NUTYR=2
      IF(DIF1.EQ.5)   NUTYR= 1
      IF(DIF1.GT.5)   NUTYR = 7
C
C     DISALLOW (JUMP TO 81 TO DISALLOW CALCULATIONS AND STORAGE)
C     ALL COSTS OVER 4 YRS OLD FOR DEGREES 1 AND 8. DISALLOW (JUMP
C     TO 81) COSTS 6 YEARS OLD FOR ALL OTHER DEGREES.
C
      IF(DIF1.GT.3.AND.IDEGRE.EQ.1) GO TO 81
      IF(DIF1.GT.3.AND.IDEGRE.EQ.8) GO TO 81
      IF(DIF1.GT.5) GO TO 81
C
CXXXXXCALCULATE OUTPUT DATA AND STORE IN OUTPUT TABLE.
C
   60 IF(INST(IGOT).NE.1)     GO TO 61
CT    NO=6
CT    IF(ILIST.NE.0) WRITE(IX,902)NO
CT    IF (ILIST.NE.0) WRITE(IX,902) IGOT
CT    WRITE(IX,902)NCR(IGOT),NYR(IGOT) ,J
CT    WRITE(IX,908) COST,            COSTUT(NLEVEL(IGOT),NTXOMY(IGOT)
CT   1,NYR(IGOT)),OCOSTU(NYR(IGOT))
C     CALCULATE COST FOR UTN(INSTITUTION=1)
C
      COST =(NCR(IGOT) * COSTUT(NLEVEL(IGOT),NTXOMY(IGOT),NYR(IGOT))) +
     1       (NCR(IGOT) *OCOSTU(NYR(IGOT)))
      OUTPUT(NUTYR,4,ISEX) = OUTPUT(NUTYR,4,ISEX) +(NCR(IGOT) *
     1 BOOKS(NYR(IGOT)))
      OUTPUT(NUTYR,4,4) = OUTPUT(NUTYR,4,4) + (NCR(IGOT) *
     1 BOOKS(NYR(IGOT)))
CT    WRITE(IX,908) COST, (COSTPD(I ,INST(IGOT),NYR(IGOT)),I=1,3)
      GO TO 62
C     CALCULATE COSTS FOR OTHER INSTITUTIONS(INSTITUTION NOT EQUAL TO 1)
C
   61 COST = (NCR(IGOT) * COSTNU(NYR(IGOT),INST(IGOT)))
      OUTPUT(NUTYR,5,ISEX)= OUTPUT(NUTYR,5,ISEX) +(NCR(IGOT) *
     1BOOKS(NYR(IGOT)))
      OUTPUT(NUTYR,5,4)  = OUTPUT(NUTYR,5,4) +  (NCR(IGOT) *
     1 BOOKS(NYR(IGOT)))
C
C     DISTRIBUTE COSTS TO STUDENT, STATE OF TENNESSEE AND OTHER.
C     DISTRIBUTE COSTS TO STUDENT, STATE OF TENNESSEE AND OTHER.
C
C     WRITE(IX,908) COST, (COSTPD(I ,INST(IGOT),NYR(IGOT)),I=1,3)
```

```
      IF(OUTPUT(2,6,4).GT.0)OUTPUT(2,6,IISEX)= OUTPUT(2,6,IISEX)
     1 -FORGON(ISAVE,2)
      IF(OUTPUT(2,7,4).GT.0)OUTPUT(2,7,IISEX)=OUTPUT(2,7,IISEX)
     1 -FORGON(ISAVE,2)
      OUTPUT(1,6,4)=0.
      OUTPUT(1,7,4)=0.
      OUTPUT(2,6,4)=0.
      OUTPUT(2,7,4)=0.
   59 CONTINUE
C
CXXXXXCALCULATE NUTYR(STORAGE COLUMN FOR OUTPUT TABLE).
C
      IF(DIF1.EQ.0)    NUTYR=6
      IF(DIF1.EQ.1)    NUTYR =5
      IF(DIF1.EQ.2)    NUTYR=4
      IF(DIF1.EQ.3)    NUTYR=3
       IF(DIF1.EQ.4)    NUTYR=2
      IF(DIF1.EQ.5)    NUTYR= 1
      IF(DIF1.GT.5)    NUTYR = 7
C
C     DISALLOW (JUMP TO 81 TO DISALLOW CALCULATIONS AND STORAGE)
C     ALL COSTS OVER 4 YRS OLD FOR DEGREES 1 AND 8. DISALLOW (JUMP
C     TO 81) COSTS 6 YEARS OLD FOR ALL OTHER DEGREES.
C
      IF(DIF1.GT.3.AND.IDEGRE.EQ.1) GO TO 81
      IF(DIF1.GT.3.AND.IDEGRE.EQ.8) GO TO 81
      IF(DIF1.GT.5) GO TO 81
C
CXXXXXCALCULATE OUTPUT DATA AND STORE IN OUTPUT TABLE.
C
   60 IF(INST(IGOT).NE.1)     GO TO 61
CT    NO=6
CT    IF(ILIST.NE.0) WRITE(IX,902)NO
CT    IF (ILIST.NE.0) WRITE(IX,902) IGOT
CT    WRITE(IX,902)NCR(IGOT),NYR(IGOT) ,J
CT    WRITE(IX,908) COST,              COSTUT(NLEVEL(IGOT),NTXOMY(IGOT)
CT   1,NYR(IGOT)),OCOSTU(NYR(IGOT))
C     CALCULATE COST FOR UTN(INSTITUTION=1)
C
      COST =(NCR(IGOT) * COSTUT(NLEVEL(IGOT),NTXOMY(IGOT),NYR(IGOT))) +
     1       (NCR(IGOT) *OCOSTU(NYR(IGOT)))
      OUTPUT(NUTYR,4,ISEX) = OUTPUT(NUTYR,4,ISEX) +(NCR(IGOT) *
     1 BOOKS(NYR(IGOT)))
      OUTPUT(NUTYR,4,4) = OUTPUT(NUTYR,4,4) + (NCR(IGOT) *
     1 BOOKS(NYR(IGOT)))
CT    WRITE(IX,908) COST, (COSTPD(I ,INST(IGOT),NYR(IGOT)),I=1,3)
      GO TO 62
C     CALCULATE COSTS FOR OTHER INSTITUTIONS(INSTITUTION NOT EQUAL TO 1)
C
   61 COST = (NCR(IGOT) * COSTNU(NYR(IGOT),INST(IGOT)))
      OUTPUT(NUTYR,5,ISEX)= OUTPUT(NUTYR,5,ISEX) +(NCR(IGOT) *
     1BOOKS(NYR(IGOT)))
      OUTPUT(NUTYR,5,4)  = OUTPUT(NUTYR,5,4) +  (NCR(IGOT) *
     1 BOOKS(NYR(IGOT)))
C
C     DISTRIBUTE COSTS TO STUDENT, STATE OF TENNESSEE AND OTHER.
C     DISTRIBUTE COSTS TO STUDENT, STATE OF TENNESSEE AND OTHER.
C
C     WRITE(IX,908) COST, (COSTPD(I ,INST(IGOT),NYR(IGOT)),I=1,3)
```

```
   62 CONTINUE
CT    NO=7
CT    IF(ILIST.NE.0) WRITE(IX,902)NO
      COSTST = COST * COSTPD(1,INST(IGOT),NYR(IGOT))
      COSTTN = COST * COSTPD(2,INST(IGOT),NYR(IGOT))
      COSTO  = COST * COSTPD(3,INST(IGOT),NYR(IGOT))
CT    WRITE(IX,908) COSTST, COSTTN,COSTO
C     PLACE DISTRIBUTED COSTS IN THE OUTPUT TABLE
C
      IF (INST(IGOT).LT.3)    GO TO 63
C
C       IF INSTITUTION
C     EQUALS 5 OR 4 OR 3 .STORE DATA FOR NOT TENNESSEE OR UTN.
C
      OUTPUT(NUTYR,3,ISEX) =OUTPUT(NUTYR,3,ISEX) + COSTST
      OUTPUT(NUTYR,3,4    ) = OUTPUT(NUTYR,3,4    ) + COSTST
      OUTPUT(NUTYR,13,ISEX) =OUTPUT(NUTYR,13,ISEX)   +COSTO
      OUTPUT(NUTYR,13,4    ) = OUTPUT(NUTYR,13,4    )   + COSTO
      OUTPUT(NUTYR,14,ISEX)= OUTPUT(NUTYR,14,ISEX) + COSTTN
      OUTPUT(NUTYR,14,    4)= OUTPUT(NUTYR,14,  4) + COSTTN
      GO TO 81
   63 IF(INST(IGOT).LT.2)     GO TO 64
CT    NO=8
CT    IF(ILIST.NE.0) WRITE(IX,902)NO
C     EQUALS 2. PUT TENNESSEE INSTITUTIONS IN THE OUTPUT TABLE.
C
      OUTPUT(NUTYR,2,ISEX) = OUTPUT(NUTYR,2,ISEX) + COSTST
      OUTPUT(NUTYR,2,4    ) = OUTPUT(NUTYR,2,4    ) + COSTST
      OUTPUT(NUTYR,10,4    )  = OUTPUT(NUTYR,10,4    ) + COSTTN
      OUTPUT(NUTYR,10,ISEX) = OUTPUT(NUTYR,10,ISEX) + COSTTN
      OUTPUT(NUTYR,13,ISEX) = OUTPUT(NUTYR,13,ISEX) + COSTO
      OUTPUT(NUTYR,13,4    ) = OUTPUT(NUTYR,13,4    ) + COSTO
      GO TO 81
C     EQUALS 1. PUT UTN INFORMATION IN THE OUTPUT TABLE.
C
   64 OUTPUT(NUTYR,1,ISEX) = OUTPUT(NUTYR,1,ISEX) + COSTST
      OUTPUT(NUTYR,1,4    ) = OUTPUT(NUTYR,1,4    ) +COSTST
CT    NO=9
CT    IF(ILIST.NE.0) WRITE(IX,902)NO,J,IGOT,NUTYR
      OUTPUT(NUTYR,9,ISEX) = OUTPUT(NUTYR,9,ISEX) + COSTTN
      OUTPUT(NUTYR,9,4    ) = OUTPUT(NUTYR ,9,4    ) + COSTTN
      OUTPUT(NUTYR,12,ISEX) = OUTPUT(NUTYR,12,ISEX) + COSTO
      OUTPUT(NUTYR,12,4    ) = OUTPUT(NUTYR,12,4    ) + COSTO
   81 CONTINUE
CT    NO=10
CT    IF(ILIST.NE.0) WRITE(IX,902)NO
C     COMPUTE THE SUBTOTALS FOR THE INDIVIDUAL TABLE(ISEX=4)
C
C
      DO 84 I=1,6
       OUTPUT(I,8,4) = OUTPUT(I,1,4) + OUTPUT(I,2,4) + OUTPUT(I,3,4)+
     1OUTPUT(I,4,4) +OUTPUT(I,5,4) +OUTPUT(I,6,4)  +OUTPUT(I,7,4)
      OUTPUT(I,11,4) = OUTPUT(I,10,4) + OUTPUT(I,9,4)
      OUTPUT(I,15,4) = OUTPUT(I,14,4) + OUTPUT(I,12,4) + OUTPUT(I,13,4)
      OUTPUT(I,16,4)= OUTPUT(I,8,4) +OUTPUT(I,11,4)+OUTPUT(I,15,4)
   84 OUTPUT(I,17,4) = OUTPUT(I,1,4) + OUTPUT(I,4,4)+OUTPUT(I,6,4) + OUT
     1PUT(I,9,4) + OUTPUT(I,12,4)
      ISEX = 4
C
```

```
C       THE FOLLOWING STATEMENT IS TO CREATE RECORDS FOR PROGRAM PV ON
C       ON TAPE UTN002. NOW IT JUST PRINTS.
        IF(IDEGRE.EQ.ICODE)NTAPE=NTAPE +1
        IF(                IDEGRE.EQ.ICODE) GO TO 86
        GO TO 82
   86   DO 85 I=1,6
        WRITE(IX,911)(SSN1,I ,OUTPUT(I,1,4),OUTPUT(I,2,4),OUTPUT(I,3,4),
       2OUTPUT(I,4,4),OUTPUT(I,5,4),OUTPUT(I,6,4),OUTPUT(I,7,4),
       3OUTPUT(I, 9,4) )
        WRITE(IX,915)SSN1,I,OUTPUT(I,10,4),OUTPUT(I,12,4),OUTPUT(I,13,4),
       1  OUTPUT(I,14,4)
   85   CONTINUE
        WRITE (IX,916)SSN1,I,IBORNY(ISAVE),IISEX,IDEGRE,NUTYR1 ,NHRS78(ISA
       1VE), EARNUT(ISAVE),EARN78(ISAVE)
C
C       PRINT CONTROL. IF TAPE WRITTEN GO TO 83,ELSE TO 86 TO WRITE TAPE.
C
        IF(IX.EQ.7) GO TO 83
         IX=7
        GO TO 86
   83   IX=3
        IF(ITEST.EQ.ITEST1) GO TO 500
C
C       GO PRINT THE INDIVIDUAL TABLE AND RETURN HERE(STATEMENT 82)
        IF(ILIST.NE.0.AND.IDEGRE.EQ.ICODE)GO TO 501
   82   CONTINUE
C
C       GO GET ANOTHER STUDENT RECORD AT 20.
C
        GO TO 20
C
C
C       CALCULATE SUBTOTALS FOR OUTPUT TABLE(EXCLUDES ISEX=4)
C
  500   DO 103 I=1,2
CT      NO=11
CT      IF(ILIST.NE.0) WRITE(IX,902)NO
        DO 103 J=1,6
        OUTPUT(J,8,I) = OUTPUT(J,1,I ) + OUTPUT(J,2,I ) + OUTPUT(J,3,I) +
       1 OUTPUT(J,4,I) + OUTPUT(J,5,I)+ OUTPUT(J,6,I)   +OUTPUT(J,7,I)
        OUTPUT(J,11,I)= OUTPUT(J,9,I ) + OUTPUT(J,10,I )
        OUTPUT(J,15,I)= OUTPUT( J,14,I)+ OUTPUT(J,12,I) + OUTPUT(J,13,I)
        OUTPUT(J,16,I)=OUTPUT(J,8,I)+OUTPUT(J,11,I)+OUTPUT(J,15,I)
  103   OUTPUT(J,17,I)= OUTPUT(J,1,I ) + OUTPUT(J,4,I)+OUTPUT(J,6,I)+
       1 OUTPUT(J,9,I) + OUTPUT(J,12,I)
C
C       PRINT OUT TABLE HEADINGS
C
  505   NUMBER =IMALE
        ISEX=1
  501   IF(NDONE.EQ.0)WRITE(IX,510)  ISEX,ICODE, NUMBER
        IF(NDONE.EQ.1) WRITE(IX,512) ISEX,ICODE, NUMBER
C
C
C       PRINT OUT REST OF TABLE
C
C       THE FOLLOWING STATEMENT CONTROLS PRINTING OF INDIVIDUAL TABLE
        WRITE (IX,520) (OUTPUT(I, 1,ISEX),I=1,6)
        WRITE (IX,530) (OUTPUT(I, 2,ISEX),I=1,6)
```

```
      WRITE (IX,540) (OUTPUT(I, 3,ISEX),I=1,6)
      WRITE(IX,541)(OUTPUT(I,4,ISEX),I=1,6)
      WRITE(IX,543)(OUTPUT(I,5,ISEX),I=1,6)
      WRITE(IX,542)(OUTPUT(I,6,ISEX),I=1,6)
      WRITE(IX,544)(OUTPUT(I,7,ISEX),I=1,6)
      WRITE (IX,550) (OUTPUT(I, 8,ISEX),I=1,6)
      WRITE(IX,560)
      WRITE(IX,570) (OUTPUT(I,9,ISEX),I=1,6)
      WRITE(IX,580) (OUTPUT(I,10,ISEX),I=1,6)
      WRITE(IX,590)(OUTPUT(I,11,ISEX),I=1,6)
      WRITE(IX,600)
      WRITE(IX,601)(OUTPUT(I,12,ISEX),I=1,6)
       WRITE(IX,602)(OUTPUT(I,13,ISEX),I=1,6)
      WRITE(IX,603)(OUTPUT(I,14,ISEX),I=1,6)
      WRITE(IX,604)(OUTPUT(I,15,ISEX),I=1,6)
      WRITE(IX,610)(OUTPUT(I,16,ISEX),I=1,6)
      WRITE(IX,620)(OUTPUT(I,17 ,ISEX),I=1,6)
C
C
C
      IF(ISEX.EQ.4) WRITE(IX,630)GPA,IISEX,SSN1
C
C     IF A STUDENT TABLE WAS PRINTED (ISEX=4) RETURN TO 82.
      IF(ISEX.EQ.4) GO TO 82
      ISEX = ISEX + 1
      IF(ISEX.EQ.2) NUMBER = IFEMAL
      IF(ISEX.EQ.3) NUMBER = IMALE + IFEMAL
      IF(ISEX.LE.2) GO TO 501
      IF(NDONE.EQ.1.AND.ISEX.EQ.3) GO TO 501
      IF(NDONE.GT.0.AND.ISEX.GT.3) GO TO 995
      IF(ISEX.GT.3) GO TO 503
      IF (NDONE.GT.0) GO TO 995
C     SUM MALE AND FEMALE TABLES WHEN ISEX = 3
C
      DO 650 ILINE=1,6
      DO 650     I=1, 17
  650 OUTPUT(ILINE,I,3) = OUTPUT(ILINE,I,1) + OUTPUT(ILINE,I,2)
      GO TO 501
  503 CONTINUE
C
      DO 504 I=1,6
      DO 504 I1 =1,17
      IF(IMALE.NE.0)
     1OUTPUT(I,I1,1) = OUTPUT(I,I1,1) /IMALE
      IF(IFEMAL.NE.0)
     1OUTPUT(I,I1,2) = OUTPUT(I,I1,2) / IFEMAL
      OUTPUT(I,I1,3) = OUTPUT(I,I1,3)/(IMALE + IFEMAL)
      NDONE = 1
  504 CONTINUE
      GO TO 505
C
C     COMPUTE MEANS FOR TABLES(ISEX =1 TO 3) THEN GO TO PRINT TABLES.
C
C
CXXXXXERRORS EXECUTE THE FOLLOWING STATEMENT
C
  999 WRITE(IX,905)SSN1,SSN2     ,NOO
  995 IF(IOVER) 993,994,993
  994 CONTINUE
```

```
C     WRITE AN ENDOF FILE RECORD(SSN1=0) ON UTN002.UTN002 IS READ BY PROGRAM
  PV. SSN1=0.
      WRITE(7,911) SSN1,I,OUTPUT(1,1,4),OUTPUT(1,1,4),OUTPUT(1,1,4),
     1OUTPUT(1,1,4),OUTPUT(1,1,4),OUTPUT(1,1,4),OUTPUT(1,1,4),
     2OUTPUT(1,1,4)
      END FILE 7
      REWIND 7
      WRITE(IX,399) ICODE,NTAPE
      STOP
      END
```

```
 1  0    00999    1
1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280
1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280
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1280 1280 1280 1280 1280 1280
1802 1802 1802 1802 1802 1802 1802 1802 1802 1802 1802 1802 1802 1802 1802
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1802 1802 1802 1802 1802 1802
2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282
2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282
2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282
2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282 2282
2282 2282 2282 2282 2282 2282
1881 3564 6275 2588 2738 3684 2155 3564 6275 2636 3564 6375 2871 4370 5622
5554 4536 6275 3997 7241 8656 2012 2887 6275 2670 4031 6275 2636 3564 6275
2580 4592 6275 2636 3605 6275 1778 3529 6275 2636 3564 6275 2302 5026 8033
4034 5364 6275 2636 3564 6275 2636 3564 6275 2636 3564 6275 2636 3564 6275
2636 3564 6275 2636 3564 6275
1853 3574 4405 1820 2095 3019 1710 2950 4405 1992 2695 4405 2501 3084 3885
3854 3820 6864 2470 5496 5596 1505 2581 4405 1860 3308 4405 1992 3623 4405
1984 4434 5390 2041 2882 4405 1171 2194 4183 1992 2695 4405 1496 3315 5284
4067 3920 4405 1992 2695 4405 2998 2695 4405 1992 3003 4405 1992 2695 4405
1992 2695 4405 1992 2695 4405
1286 3584 2535 1053 1453 2176 1266 1336 2535 1349 1827 2535 2032 1798 2148
2154 3005 7453  944 3752 2535  999 2276 2535 1051 2586 2535 1349 3483 2535
1389 4277 4506 1446 2160 2535  564  860 2091 1349 1827 2535  691 1605 2535
4101 1827 2535 1349 1827 2535 3360 1827 2535 1349 2442 2535 1349 1827 2535
1349 1827 2535 1349 1827 2535
1364 3241 2797 1176 1566 2908 1390 1925 2797 1993 2692 3358 2033 1975 2217
2831 3416 6147 1169 2651 2797 1438 2170 2797 1337 2481 2797 1610 3742 2797
1596 4528 3782 1587 2358 2797  762 1482 3172 1610 1945 2797  972 1723 2797
4525 1945 2797 1942 1945 2797 4347 1945 2797 1610 2253 2797 1610 1945 2797
1610 1945 2797 1610 1945 2797
1443 2899 3059 1299 1679 3640 1313 1313 3059 2637 3557 4182 2035 2153 2287
3509 3928 4841 1395 1550 3059 1877 2064 3059 1621 2377 3059 1872 4001 3059
1803 4780 3059 1713 2556 3059 1001 2105 4253 1872 2064 3059 1253 1841 3059
4950 2064 3059 2535 2064 3059 5334 2064 3059 1872 2064 3059 1872 2064 3059
1872 2064 3059 1872 2064 3059
1884 3250 3648 1315 1746 3619 1383 1767 3648 2226 3043 3669 2624 2930 3262
2916 3638 6999 1557 2423 3648 1980 2262 3648 1602 2528 3648 1859 3351 3648
1932 4565 3648 1947 3140 3648 1076 2120 4245 1859 2262 3648 1323 1892 3648
3884 2262 3648 2190 2262 3648 4556 2262 3648 1859 2262 3648 1628 5567 3648
185910326 3648 1859 2262 3648
2325 3602 4228 1332 1814 3599 1252 2019 4238 1815 2529 3156 3214 3707 4238
2324 3348 9158 1719 3296 4328 2084 2460 4238 1584 2679 4238 1846 2702 4238
2062 4351 4238 2182 3725 4238 1151 2135 4238 1846 2460 4238 1393 1943 4238
2818 2460 4238 1846 2460 4238 3778 2460 4238 1846 2460 4238 1384 9070 4238
184618193 4238 1846 2460 4238
2418 3111 4114 1579 2066 3552 1874 2163 4114 2193 3071 3573 3919 3879 4114
2956 453810493 2011 3227 4114 2049 2852 4114 1910 2973 4114 2117 2538 4114
2146 4220 4115 1978 3602 4114 1555 2330 4114 2117 2852 3713 1660 2787 4114
2603 3797 4115 3702 2852 4114 3083 2852 4114 2117 2852 4114 1886 6157 4114
211714862 4115 2117 2852 4114
0309 0562 0680 2178 1276 1387 1456 1638 1870 1799 2326
62   38   00   15   42   43   29   00   71   33   02   65   12   41   47 1967
54   44   02   16   43   41   29   00   71   34   01   65   12   42   46 1968
```

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 48   45   07   17   43   40   28   00   72   34   01   65   12   42   46
 35   58   07   17   44   39   27   00   73   35   01   63   13   45   42
 36   60   04   15   43   42   27   00   73   36   01   63   13   45   42
 37   58   05   15   45   41   26   00   74   36   01   63   14   45   41
 35   64   01   15   45   40   25   00   75   36   01   63   13   46   41
 35   62   03   15   45   40   27   00   73   36   02   62   13   47   40
 31   65   04   14   45   41   27   00   73   36   01   63   13   48   39
 33   65   02   15   43   42   27   00   73   36   01   63   13   48   39
 29   68   03   15   44   41   27   00   73   35   01   64   13   45   42
    4177 7339 2928 5501
    4946 8240 8410 5719
    5256 8817 8976 5937
    557510258 9962 6460
    59821128510433 6728
    59821128510433 7117
    67371392912033 7419
    73751441512644 8028
    80931490014440 8781
    82901598014440 8921
    89521743415438 9418
0304 0316 0333 0353 0368 0380 0404 0448 0489 0517 0551
```

```
      DIMENSION EARNUS(7,47,4),PCNTUT(9,47,2),CPI(11),OUTPUT(6), HRS(6),
     1 NCOUNT(10)
C         PROPERTY OF IRMA D. PERRY
C         5025 HILLSBORO
C         NASHVILLE,TENNESSEE
C         292-8571
C
  401 FORMAT(10X,'EARNUS')
  402 FORMAT(10X,'PCNTUT')
  403 FORMAT(10X,'CPI')
  404 FORMAT(10X,'OUTPUT FILE FORGON' ,I1)
  405 FORMAT(10X,'FORGON OVER $15000 FOR SSN ',F10.0)
  400 FORMAT(10X,'CONTROL CARD')
  500 FORMAT(3I4)
  900 FORMAT(1H1,3I4)
  901 FORMAT(2X,3I2)
  501 FORMAT(7(4X,F6.0))
  502 FORMAT(3X,9F5.3)
  902 FORMAT(3X,9F7.3)
  503 FORMAT(2X,11F5.1)
  504 FORMAT(        F9.0,8X,I2,5X,I1,10X,I1,7X,I2,16X,I1,1X,I1)
  904 FORMAT(       F12.0,8X,I2,5X,I1,10X,I1,7X,I2,16X,I1,1X,I1)
  905 FORMAT(1H1,'ERROR IN RECORD',2F12.0/2X,'MAX= ',I4)
  506 FORMAT(F9.0,17X,F5.0,9X,F5.0,9X,F5.0,1X,F3.1)
  906 FORMAT(2X,F10.0,17X,F6.0,9X,F6.0,9X,F6.0,1X,F4.1)
  907 FORMAT(2X,F10.0,6F8.2, 217,2F8.0,I4//)
C      THE NEXT STATEMENT WRITES DATA FOR SIMDATA(SEE 917 IN SIMDATA)
  908 FORMAT(F10.0,6F8.0/F10.0,2I2,4X,2F8.0,I4)
  909 FORMAT(1X,'NUMBER OF STUDENTS PER DEGREE'/6X,'DEGREE',4X,
     1'NUMBER'/)
  910 FORMAT(1X,2I10)
C
C     INITIALIZATION AREA
C
      DO 1 I=1,10
    1 NCOUNT(I)=0
      IN=1
      MAX=0
      SSN2=0.
      NN=5
      ITEST=-1
      HRS(1)=0.
      HRS(2)=6.
      HRS(3)=16.
      HRS(4)=28.
      HRS(5)=36.
      HRS(6)=40.
      IX=3
C
C      READ INPUT DATA
C
      READ(IN,500) ILIST,ITEST,ICODE
      IF(ILIST.NE.0) WRITE(IX,400)
      IF(ILIST.NE.0) WRITE(IX,900)ILIST,ITEST,ICODE
      READ(IN,501) (((EARNUS(I,J,K),I=1,7),J=1,47),K=1,4)
      IF(ILIST.NE.0) WRITE(IX,401)
      IF(ILIST.NE.0)WRITE(IX,501)(((EARNUS(I,J,K),I=1,7),J=1,47),K=1,4)
      READ(IN,502)(((PCNTUT(I,J,K),I=1,9),J=1,47),K=1,2)
      IF(ILIST.NE.0) WRITE(IX,402)
```

```
      IF(ILIST.NE.0)WRITE(IX,902)(((PCNTUT(I,J,K),I=1,9),J=1,47),K=1,2)
      READ(IN,503)(CPI(I),I=1,11)
      IF(ILIST.NE.0) WRITE(IX,403)
      IF(ILIST.NE.0)WRITE(IX,503)(CPI(I),I=1,11)
      IF(ITEST.NE.0) WRITE(IX,404) ICODE
C  REMOVE THIS AFTER TEST. THIS TEST SKIPS 52 RECORDS(104 CARDS).
C     DO 3 I=1,104
C     READ(IN,901) NO
C   3 CONTINUE
   30 CONTINUE
C
C     INITIALIZE OUTPUT FOR NEXT STUDENT.
C
      DO 2 I=1,6
    2 OUTPUT(I)=0.
C     READ FIRST STUDENT QUESTIONAIRE CARD(INPUT FROM QUEST)
C
      READ(IN,504) SSN1,IBORNY,ISEX,IDEGRE,NUTYR,NHRSUT, NHRS78
      IF(ILIST.NE.0.AND.ICODE.EQ.IDEGRE)WRITE(IX,904)SSN1,IBORNY,ISEX,
     1IDEGRE,NUTYR,NHRSUT, NHRS78
C
C     EDIT DATA ON THE FIRST CARD
C
      IF(SSN1.EQ.SSN2)          GO TO 999
      IF(SSN1.EQ.0.)            GO TO 998
      IF(IBORNY.GT.57)          GO TO 999
      IF(ISEX.GT.2)             GO TO 999
      IF(ISEX.LT.1)             GO TO 999
      IF(IDEGRE.GT.9)           GO TO 999
      IF(IDEGRE.LT.1)           GO TO 999
      IF(IDEGRE.EQ.6)           GO TO 999
      IF(IDEGRE.EQ.5)IDEGRE= 2
      IF(NUTYR.GT.77)           GO TO 999
      IF(NUTYR.LT.73)            GO TO 999
      IF(NHRSUT.GT.6)           GO TO 999
      IF(NHRSUT.LT.1)           GO TO 999
      IF(NHRS78.LT.1)           GO TO 999
      IF(NHRS78.GT.6)           GO TO 999
C
C     READ THE SECOND STUDENT CARD
C
      READ(IN,506) SSN2,EARNUT,EARN78,FORGO,YFORGO
      IF(ILIST.NE.0.AND.ICODE.EQ.IDEGRE)WRITE(IX,906)SSN2,EARNUT,
     1EARN78,FORGO,YFORGO
C     EDIT THE SECOND STUDENT CARD
C
      IF(SSN1.NE.SSN2)          GO TO 999
      IF(SSN2.EQ.0.)            GO TO 998
      IF(FORGO.GT.15000)        WRITE(IX,405) SSN1
      IF(YFORGO.GT.6)           YFORGO = 6.
      IF(IDEGRE.EQ.8.AND.YFORGO.GT.4)YFORGO= 4.
      IF(IDEGRE.EQ.1.AND.YFORGO.GT.4) YFORGO=4.
       IF(FORGO.GT.0.AND.YFORGO.EQ.0)  GO TO 999
      NCOUNT(IDEGRE) = NCOUNT(IDEGRE)+1
C     DETERMINE OF THIS STUDENT NEEDED FOR THIS RUN (DEGREE)
C
C     IF(ICODE.NE.IDEGRE) GO TO 30
C
C
```

```
CXXXXXCOMPUTE 'DIF' (THE DIFFERENCE BETWEEN ACTUAL GRADUATION AND 1977)
C       AND ADJUST FORGO TO1977 PRICES USING THE CPI.
C
      DIF= 77-NUTYR
      I=11-DIF
      WRITE(IX,503) CPI(11),CPI(I)
      IF(FORGO.NE.0)FORGO= FORGO+(((CPI(11)-CPI(I)) /CPI(I))*FORGO)
C
C     COMPUTE AGE AND CODE IT SO THAT IF 18 CODE IS 1
C
       NAGE= 77-IBORNY
      NAGE=NAGE-17
      IF(NAGE.GT.47)          GO TO 999
C
C
CXXXXXXCALCULATE FORGONE EARNINGS FOR YEARS THE STUDENT WAS IN SCHOOL
C
C     LOGIC FOR THIS PROGRAM IS AS FOLLOWS--
C      1. IF FORGON IS POSITIVE USE IT FOR NUMBER OF YEARS LISTED NOT TO
C         EXCEED NUMBER OF YEARS FOR THAT DEGREE.  THEN GO TO 40.
C      2. IF WORKED FULL TIME BUT NO FORGON EARNINGS LISTED GO TO 20
          (FORGO=0)
C      3. IF NOT FULL TIME AND NO FORGO, CALCULATE FORGO BASED ON HOURS
C        WORKED.  AMOUNT REPORTED AS EARNED AT UT PLAYS NO ROLE.
C
C
C       STORE ADJUSTED LISTED FORGONE EARNINGS FOR PROPER YEARS(YFORGO)
C      THEY ARE CALCULATED OK SO NEED ONLY TO BE STORED .GO TO 40 AND STORE
C      THEM.
      IF(FORGO.NE.0)          GO TO 40
C
CXXXXXCALCULATE FORGONE EARNINGS BECAUSE THEY ARE NOT LISTED
C
C      FORGONE EARNINGS ARE ZERO IF HRS WORKED ARE 40 (NHRSUT=6) SO SKIP
C      THIS.
      IF(NHRSUT.EQ.6.AND.FORGO.EQ.0) GO TO 20
C
C      DETERMINES MAXIMUM YEARS FORGONE. BASED ON DEGREE.
C
      YFORGO=7
      IF(IDEGRE.EQ.1) YFORGO =5
      IF(IDEGRE.EQ.8) YFORGO =5
C
C      FOR ALL OTHERS CALCULATE FORGONE EARNINGS AS FOLLOWS.
C      (NN= MAXIMUM NUMBER OF YEARS FORGONE EARNINGS COULD BE CALCULATED
C      FOR. THAT IS NN = 6 UNLESS DEGREE IS 1 OR 8 WHEN (( IS 4)
C
      NN=6
      IF(DEGREE.EQ.1) NN=4
      IF(IDEGRE.EQ.8) NN=4
C
C      SET EDUCATIONAL LEVEL CODE(VALUE =1 UNLESS DEGREE IS 1WHEN IT IS 3)
C
      NLEVEL=1
      IF(IDEGRE.EQ.1) NLEVEL=3
      NNAGE= NAGE
      DO 15 I=1,NN
      N=7-I
      YFORGO= YFORGO-1
```

```
      NO =2
C     WRITE(IX,901) NO
      IF(YFORGO.EQ.0) GO TO 20
      WRITE(IX,901) NO,NN
      WRITE(IX,901)N,NNAGE,NLEVEL
      WRITE(IX,901) IDEGRE,NAGE,ISEX
      WRITE(IX,907) EARNUS(N,NNAGE,NLEVEL),PCNTUT(IDEGRE,NAGE,ISEX),
     1 OUTPUT(N)
       OUTPUT(N)=(EARNUS(N,NNAGE,NLEVEL)*PCNTUT(IDEGRE,NAGE,ISEX))-
     1           ((EARNUS(N,NNAGE,NLEVEL)* PCNTUT(IDEGRE,NAGE,ISEX))*
     2            (HRS(NHRSUT)/40.))
C      IF(ILIST.NE.0) WRITE(IX,901) NO
C     IF(ILIST.NE.0) WRITE(IX,901)  NN
C     IF(ILIST.NE.0) WRITE(IX,901) N,NNAGE, NLEVEL
C     IF(ILIST.NE.0) WRITE(IX,901) IDEGRE,NAGE, ISEX
C     IF(ILIST.NE.0) WRITE(IX,907)EARNUS(N,NNAGE,NLEVEL),
C    1PCNTUT(IDEGRE,NAGE, ISEX), OUTPUT(N)
      NNAGE= NAGE-1
   15 CONTINUE
      GO TO 20
C
C      FORGONE EARNINGS AND YFORGO ARE LISTED.  STORE THEM HERE.
C
   40 TOTAL= FORGO* YFORGO
      DO 10 I=1,6
      N= 7-I
      IF(YFORGO.LE.0) GO TO 20
      OUTPUT(N) = FORGO
      IF(YFORGO.LT.1) OUTPUT(N) = OUTPUT(N) * YFORGO
      YFORGO = YFORGO-1
   10 CONTINUE
C     PRINT AND PUNCH DATA FOR ONE STUDENT
C  20 IF(ILIST.NE.0.AND.ICODE.EQ.IDEGRE)
   20 WRITE(IX,907) SSN1,OUTPUT(1),OUTPUT(2),OUTPUT(3),OUTPUT(4),OUTPUT(
     15),OUTPUT(6),NHRSUT,NHRS78  ,EARNUT,EARN78,IBORNY
      ITEST1 =ITEST1+1
C
CXXXXXWRITE FILE TO BE CALLED FORGN?. USED BY SIMDATA.
C
C     WRITE(2,908) SSN1,OUTPUT(1),OUTPUT(2), OUTPUT(3), OUTPUT(4),
C    1OUTPUT(5),OUTPUT(6),SSN1,NHRSUT,NHRS78,EARNUT,EARN78,IBORNY
      IF(ITEST.EQ.ITEST1) GO TO 999
C
C     RETURN TO BEGINNING TO READ ANOTHER STUDENT'S FIRST CARD.
      MAX=MAX+1
      GO TO 30
C
CXXXXERROR ROUTINE
C
  999 WRITE(IX,905) SSN1,SSN2 ,MAX
      GO TO 30
CXXXXWRITE END OF FILE RECORD(SSN=0) ON FILE FORGN? FOR PROGRAM SIMDATA.
C
  998 CONTINUE
C     WRITE(2,908) SSN1
      SSN2 = 0.
      WRITE(IX,905) SSN1, SSN2,MAX
      WRITE(IX,909)
      DO 1000 I=1,10
```

```
      WRITE(IX,910) I,NCOUNT(I)
      NCOUNT(10)=NCOUNT(10) + NCOUNT(I)
 1000 CONTINUE
      STOP
      END
     9999   1
```

18	5647	5834	6195	6878	7508	7840	8453
19	6058	6259	6647	7379	8055	8518	9069
20	6457	6670	7083	7864	8584	9077	9964
21	6842	7068	7506	8333	9095	9619	10241
22	7253	7453	7915	8787	9592	10143	10799
23	7574	7824	8309	9224	10069	10648	11336
24	7919	8181	8688	9645	10528	11134	11854
25	8252	8525	9053	10050	10971	11602	12352
26	8573	8856	9405	10441	11397	12053	12832
27	880	9173	9741	10814	11805	12484	13291
28	9174	9477	10064	11173	12196	12898	13732
29	9455	9767	10372	11515	12570	13292	14152
30	9723	10044	10666	11841	12926	13669	14553
31	9978	10308	10947	12153	13266	14029	14936
32	10220	10558	11212	12447	13588	14369	15298
33	10449	10794	11462	12726	13891	14690	15640
34	10665	11017	11700	12989	14178	14994	15963
35	10868	11227	11923	13236	14449	15279	16267
36	11058	11423	12131	13467	14701	15546	16551
37	11235	11606	12325	13683	14936	15936	16817
38	11400	11776	12506	13883	15155	16027	17063
39	11551	11932	12671	14067	15356	16237	17289
40	11688	12074	12822	14235	15539	16432	17495
41	11813	12203	12959	14387	15705	16608	17662
42	11925	12319	13082	14524	15854	16766	17850
43	12024	12421	13191	14644	15985	16904	17998
44	12110	12510	13285	14749	16100	17026	18126
45	12183	12585	13365	14837	16196	17128	18235
46	12243	12647	13431	14910	16276	17212	18325
49	12289	12695	13482	14967	16338	17277	18395
48	12323	12730	13519	15008	16383	17325	18445
49	12344	12752	13542	15034	16411	17355	18477
50	12353	12760	13551	15044	16422	17366	18489
51	12347	12755	13545	15038	16415	17359	18482
52	12329	12736	13525	15015	16391	17333	18454
53	12298	12704	13491	14978	16350	17290	18408
54	12253	12658	13442	14923	16290	17227	18341
55	12196	12599	13380	14854	16214	17147	18255
56	12127	12527	13303	14769	16122	17049	18151
57	12043	12441	13212	14667	16011	16932	18027
58	11947	12341	13106	14550	15882	16795	17882
59	11838	12229	12987	14418	15738	16643	17719
60	11715	12102	12852	14268	15575	16470	17535
61	11581	11963	12704	14104	15396	16281	17334
62	11432	11809	12541	13922	15198	16072	17111
63	11271	11643	11969	13288	14505	15339	16331
64	11097	11463	11785	13083	14281	15103	16079
18	5406	5585	5931	6584	7187	7601	8092
19	5947	6144	6524	7243	7907	8361	8902
20	6474	6688	7102	7885	8607	9102	9690
21	6985	7216	7663	8507	9286	9821	10455
22	7481	7729	8208	9112	9947	10519	11199
23	7963	8227	8457	9971	10884	11510	12254

24	8430	8709	9249	10267	11208	11852	12619
25	8882	9176	9745	10818	11809	12488	13296
26	9318	9627	10223	11350	12389	13102	13949
27	9742	10064	10688	11865	12952	13697	14582
28	10148	10484	11134	12360	13493	14268	15191
29	10541	10890	11565	12839	14015	14821	15779
30	10919	11280	11979	13299	14517	15352	16344
31	11281	11654	12376	13740	14998	15861	16886
32	11629	12014	12758	14164	15462	16351	17408
33	11961	12357	13123	14569	15903	16817	17905
34	12280	12686	13472	14956	16326	17265	18382
35	12583	12999	13805	15325	16729	17691	18835
36	12871	13297	14121	15677	17113	18097	19267
37	13144	13579	14420	16009	17476	18481	19676
38	13403	13846	14704	16324	17819	18844	20062
39	13646	14098	14972	16621	18144	19187	20428
40	13875	14334	15222	16899	18447	19508	20770
41	14089	14555	15457	17160	18732	19809	21090
42	14287	14760	15675	17402	18996	20088	21387
43	14471	14950	15876	17626	19240	20347	21662
44	14641	15125	16062	17832	19465	20585	21916
45	14794	15284	16231	18019	19670	20801	22146
46	14934	15428	16384	18189	19855	20997	22355
47	15059	15557	16521	18341	20021	21173	22542
48	15168	15670	16641	18474	20167	21326	22705
49	15263	15768	16745	18590	20293	21460	22847
50	15342	15850	16832	18687	20399	21571	22966
51	15407	15917	16903	18766	20485	21663	23063
52	15458	15969	16959	18827	20552	21733	23139
53	15492	16005	16997	18870	20598	21782	23191
54	15513	16026	17019	18894	20625	21811	23221
55	15518	16031	17025	18900	20632	21819	23229
56	15509	16022	17015	18890	20620	21806	23215
57	15484	15996	16987	18859	20586	21770	23178
58	15445	15956	16945	18812	20535	21716	23120
59	15391	15900	16885	18746	20463	21640	23039
60	15321	15828	16809	18661	20370	21542	22934
61	11538	15742	16718	18559	20260	21424	22810
62	15138	15639	16608	18438	20127	21284	22660
63	15025	15522	16484	18300	19976	21125	22491
64	14896	15389	16343	18143	19805	20944	22298
18	4820	4980	5288	5871	6409	6777	7216
19	5462	5613	5992	6653	7262	7680	8176
20	6466	6680	7094	7875	8597	9091	9679
21	7253	7493	7957	8834	9643	10197	10857
22	8015	8280	8793	9762	10656	11269	11997
23	8751	9041	9601	10659	11635	12304	13100
24	9465	9778	10384	11528	12584	13307	14168
25	10153	10489	11139	12366	13499	14275	15198
26	10817	11175	11867	13175	14382	15209	16192
27	11457	11836	12167	13508	14745	15593	16601
28	12071	12471	12820	14703	16050	16973	18070
29	12662	13081	13892	15422	16835	17803	18954
30	13228	13666	14513	16112	17588	18559	19802
31	13769	14225	15106	16771	18307	1936	20612
32	14286	14759	15172	17400	18994	20087	21385
33	14779	15268	16214	18000	19649	20779	22123
34	15247	15752	16728	18571	20272	21438	22824
35	15691	16210	17215	19111	20862	22061	23824

36	16110	16643	17674	19622	21419	22651	24115
37	16505	17051	18108	20103	21944	23206	24706
38	16875	17433	18513	20553	22436	23726	25260
39	17221	17791	18894	20975	22897	24213	25779
40	17542	18122	19245	21265	23323	24664	26258
41	17839	18429	19571	21727	23718	25081	26703
42	18111	18710	19870	22059	24079	25464	37110
43	18359	18966	20141	22360	24409	25812	27481
44	18582	19197	20387	22633	24706	26127	27816
45	18781	19402	26406	22874	24970	26406	27874
46	18956	19583	26652	23088	25203	26652	28375
47	19105	19737	20960	23269	25401	26862	28598
48	19231	19867	21098	23423	25568	27038	28787
49	19331	19971	21209	23545	25702	27180	28938
50	19408	20050	21293	23638	25804	27288	29052
51	19460	20104	21350	23702	25873	27361	29130
52	19487	20132	21380	23735	25909	27399	29171
53	19490	20135	21383	23739	25913	27403	29175
54	19469	20113	21360	23713	25885	27373	29143
55	19423	20066	21310	23657	25825	27309	29075
56	19353	19993	21232	23571	25730	27210	28969
57	19258	19895	21128	23456	25604	27077	28827
58	19139	19772	20997	23311	25446	26909	28649
59	18995	19623	20839	23135	25254	26706	28433
60	18826	19449	20654	22930	25030	26470	28181
61	18634	19250	20443	22695	24774	26199	27893
62	18417	19026	20205	22431	24486	25894	27568
63	18175	18776	19940	22136	24164	25554	27206
64	17908	18501	19648	21812	23810	25179	26807
18	15298	15804	16783	18632	20339	21509	22900
19	15382	15891	16876	18735	20451	21627	23026
20	15471	15983	16973	18843	20570	21752	23159
21	15566	16081	17078	18959	20696	21886	23301
22	15665	16183	17186	19079	20827	22025	23449
23	15769	16291	17301	19207	20966	22172	23605
24	15879	16404	17421	19340	21112	23225	23769
25	15993	16522	17546	19479	21263	22486	23940
26	16113	16646	17678	19625	21423	22655	24120
27	16237	16774	17814	19776	21588	22829	24305
28	16366	16908	17956	19934	21760	23011	24499
29	16500	17046	18102	20097	21938	23199	24699
30	16639	17190	18255	20267	22123	23395	24908
31	16784	17339	18414	20442	22315	23598	25124
32	16934	17494	18578	20625	22514	23809	25348
33	17088	17653	18747	20813	22719	24025	25579
34	17247	17818	18922	21007	22931	24250	25818
35	17411	17987	19102	21206	23149	24480	26063
36	17580	18162	19288	21413	23374	24718	26316
37	17755	18342	19479	21625	23606	24963	26577
38	17934	18527	19675	21843	23844	25215	26845
39	18119	18718	19878	22068	24090	25475	27122
40	18307	18913	20085	22298	24341	25740	27404
41	18502	19114	20299	22535	24599	26014	27696
42	18701	19320	20517	22778	24864	26294	27994
43	18906	19531	20741	23027	25136	26581	28300
44	19115	19747	20971	23281	25414	26875	28613
45	19329	19968	21206	23542	25698	27176	28933
46	19547	20194	21446	23808	25989	78484	29261
47	19772	20426	21692	24082	26288	27799	29597

48	20001		20663		21944	24361		26593		28122		29940	
49	20236		20905		22201	24647		26904		28451		30291	
50	20475		21152		22463	24938		27222		28787		30649	
51	20719		21404		22731	25235		27546		29130		31014	
52	20967		21661		23003	25538		27877		29480		31386	
53	21222		21924		23283	25848		28216		29838		31767	
54	21481		22192		23567	26164		28561		30203		32156	
55	21745		22464		23856	26485		28911		30573		32550	
56	22015		22743		24153	26814		29270		30953		32954	
57	22289		23026		24453	27147		29634		31338		33364	
58	22568		23314		24759	27487		30005		31730		33781	
59	22852		23608		25071	27833		30383		32130		34208	
60	23141		23906		25388	28185		30767		32536		34639	
61	23435		24210		25711	28543		31158		32949		35080	
62	23734		24519		26039	28907		31556		23370		35528	
63	24038		24833		26372	29278		31960		33797		35983	
64	24347		25152		26711	29654		32370		34231		36445	
18	790	890	700	800	890	750	870						
19	790	890	700	800	890	750	870						
20	790	890	700	800	890	750	870						
21	790	890	700	800	890	750	870						
22	790	890	700	800	890	750	870						
23	790	885	731	800	885	785	734						
24	790	881	762	800	881	821	700						
25	790	877	794	800	877	856	666						
26	790	872	825	800	872	892	632						
27	790	868	857	800	868	927	598						
28	790	864	888	800	864	963	564						
29	790	860	920	800	860	999	530						
30	796	860	926	820	860	999	557						
31	802	860	932	840	860	999	584						
32	808	860	938	860	860	999	611						
33	814	860	944	880	860	999	638						
34	820	860	950	900	860	999	665						
35	826	860	956	920	860	999	692						
36	832	860	962	940	860	999	719						
37	838	860	968	960	860	999	746						
38	844	860	974	980	860	999	773						
39	850	860	980	1000	860	999	800						
40	835	866	967	991	866	999	778						
41	820	872	954	982	872	999	766						
42	805	878	941	973	878	999	754						
43	790	884	928	964	884	999	742						
44	775	890	915	955	890	999	730						
45	760	896	902	946	896	999	718						
46	745	902	889	937	902	999	706						
47	730	908	876	928	908	999	694						
48	718	914	863	919	914	999	682						
49	700	920	850	910	920	999	670						
50	700	878	850	924	878	979	670						
51	700	836	850	938	836	959	670						
52	700	794	850	952	794	939	670						
53	700	752	850	966	752	919	670						
54	700	710	850	980	710	899	670						
55	700	668	850	994	668	879	670						
56	700	626	850	1008	626	859	670						
57	700	584	850	1022	584	839	670						
58	700	542	850	1036	542	819	670						
59	700	500	850	1050	500	800	670						

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26        585  543        585        630  610
27        592  532        592        638  600
28        598  520        598        646  591
29        606  510        606        654  582
30        603  511        603        638  569
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39        576  522        576        498  456
40        561  516        561        493  449
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43        578  498        578        478  429
44        504  492        504        474  423
45        489  486        489        469  416
46        475  480        475        464  409
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49        432  462        432        450  390
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11 1122 2 1 2 3 2   41 3      74        0 300   4 6
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05200 201 05                                       0
37 0346 2 1 1 1 1   64 3       75          0 000   3 6
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11 0231 2 1 2 7 1   48 3       76          0 300   6 6
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21 0946 2 1 2 1 1   64 3       74            300   1 6
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21 0651 2 1 2 1 1   69 3       75          0 000   3 1
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11 1231 3 1 2 0 2   49 3       74                  6 6
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02000 609     03000 609     10500 110              1
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11 0231 3 1 2 1 2   49 3       73          0 300   1 6
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06000 115 00  06000 115 045 13000 114 130           1
21 0443 1 2 2 0 1   63 3       75           000    6 1
03000 601 02  05000 103 100                         0
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03732 403 010 06000 403 025 03000 114 030           1
13 0820 3 1 2 4 2   38 3       74           300    6 6
00528 114 020 08000 114 080 11000 114 040           2
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11 1235 4 1 2 0 1   53 3       77                 1 4
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11 0539 1 1 1 0 1   57 8       76                 4 6
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34 0551 2 1 2 0 2   69 8       73                 3 6
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11 0442 2 1 2 3 1   60 8       76                 1 4
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21 1247 3 1 2 0 2   66 8       73           6     4 6
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11 0738 2 1 2 4 1   56 8       74                 3 6
03700 402 05  02000 118 01  12500 118 04            1
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12 0147 2 1 1 3 2   65 8       74                 3 6
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23 1046 3 1 2 0 1   64 8      75                  4 6
07000 403 08  03000 110 02    10000 118 005 04000  2 1
23 0449 3 1 2 0 1   67 8      75                  4 6
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23 0530 3 1 2 3 2   48 8      73                  4 6
01040 405 13  04000 118 11    13600 118 15  02000  2 1
21 0141 2 1 2 3 1   58 8      77                  1 6
06000 403 16                  11500 118 005         1
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11 0846 2 2 2 2 2   65 8      76                  5 6
06000 118 09  07200 118 10    09927 118 11          1
12 0841 2 1 2 2 1   59 8      76                  1 5
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23 0156 1 1 2 0 1   74 8      76                  1 6
                              09000 118 015         1
11 0353 2 1 2 1 2   71 8      73                  1 6
                              12100 118 04          1
22 0657 1 1 1 0 1   75 8      77                  3 6
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11 0534 2 1 2 1 2   53 8      75                  4 6
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22 0553 1 1 2 0 1   71 8      73                  1 6
                              09500 118 045         1
23 0750 3 1 1 1 2   68 2      77            1     5 6
04000 110 035 10000 110 035   14000 118 015 04800  151
33 0649 2 1 2 1 2   67 8      77                  4 6
02940 402 004 04800 404 04    11680 118 005 06000  6 1
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32 0741 2 1 2 1 1   58 9      77            12    6 6
04000 118 01  08000 118 04    12000 118 05          1
41 1044 2 1 2 1 1   62 9      77            2     6 6
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33 0542 2 1 1 2 1   61 8      76            12    5 6
04000 607 04  06000 110 04    12000 118 01          1
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11 1126 2 1 2 4 2   43 8      73          1      4 6
10000 500 22  05000 500 24  15000 118 05  05000  2 1
12 1244 2 1 2 2 2   62 8      73          7      2 6
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11 0330 2 1 2 4 1   49 8      73                 2 6
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37 0355 1 1 1 0 1   73 8      76                 1 6
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22 0255 2 1 1 1 1   73 8      76                 2 6
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11 0141 2 1 2 2 2   68 8      74          7      4 6
0                   05000 110 10  13000 118 035        1
11 1038 2 1 1 2 1   57 2      76          12     6 6
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34 0356 2 1 2 0 1   74 8      77          1      5 6
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21 0138 2 1 2 0 1   56 8      75                 6 6
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22 0157 2 1 2 1 1   74 8      77                 1 6
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22 0754 2 1 2 0 1   72 8      76                 4 6
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31 0649 2 1 1 1 1   67 8      75                 6 6
03600 607 03  06000 406 02  08000 700 01        1
31 0252 3 1 1 1 2   70 8      74                 3 6
05000 110 015 03000 118 02  10000 118 06  02000  2 3
25 0140 2 1 2 2 1   58 8      75          1      1 6
                                  11544 118 02        1
58 1052 2 1 1 0 1   71 8      77                 1 6
06000 110 02                      10000 118 03        1
21 0451 3 1 2 1 2   69 8      76                 3 6
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21 0651 3 1 2 1 2   69 8      77          1      1 6
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11 0334 2 1 2 1 1   52 8      76                 1 6
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11 0644 2 3 1 0 1   62 8      77          2      5 6
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11 1137 2 1 2 2 1   55 8      74                 1 5
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04000 800 16                              15000 118 01            1
53 1157 1 1 2 0 2    75 8                 77                     2 6
                     02000 118 005 08000 118 01                  1
22 0652 1 1 1 0 2    70 8                 77          2          6 6
01500 406 05  05600 118 03 08600 118 04                          1
21 0141 2 1 1 3 1    59 8                 73                     1 6
                                        13400 118 05            1
22 0956 2 1 2 0 1    74 8                 77                     4 6
                     05000 403 005 10945 118 006                 1
22 1037 3 1 2 3 1    55 8                 77                     6 6
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11 0440 3 1 2 5 1    58 8                 74          7          3 6
0                    09000 118 05 13000 118 07  02000            3 1
11 0926 2 1 1 1 2    69 8                 75          7          6 6
04000 800 26  08000 118 02 12000 118 04                          1
32 0744 2 1 2 3 1    62 8                 74                     2 4
                                        07200 118 03            1
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06000 110 02                              10000 118 006 10000    2 1
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06000 403 06  02000 118 01 12200 118 02  04000                  2 1
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22 1054 2 1 2 1 2    72 8                 74          1          4 6
02000 604 01  02800 118 01 14000 118 03  06000                  2 3
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22 0547 1 1 1 0 2    65 8                 73                     2 6
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11 0823 2 1 2 2 2    41 8                 74                     1 6
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25 0256 1 1 2 0 1    74 8                 77          1          3 6
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11 1231 2 1 1 2 1    47 8                 73                     6 6
04000 607 02  07000 112 22 13000 118 05                          1
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                                                                 0
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                                        08000 118 04            1
67 0446 2 1 2 1 2    63 8                 76          2          6 6
      700            08400 110 04 09600 118 015                  1
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27 1053 2 1 2 0 1    71 8                 77                     1 6
      700            700                09600 118 01              1
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22 0541 2 1 2 2 1   59 8      73                    3 6
04500 405 01  03500 405 06  18500 118 10           1
21 1148 2 1 2 0 1   66 8      76                    4 6
03000 118 03  07000 118 07  12300 118 085 03000   2 1
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                            14000 118 03           1
11 0832 2 1 2 4 1   49 8      73                    3 6
                  02000 118 01  11280 118 05        1
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37 0246 2 1 1 0 1   65 8      73                    1 3
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23 0956 1 1 1 0 1   74 8      76                    4 6
                  03125 118 02  10800 118 03         1
37 0744 2 1 2 2 1   62 8      76                    1 6
02400 405 01                10800 303 015          1
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06000 604 10  09000 403 02  10000 118 02           1
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04320 405 02  04000 118 01  12000 118 015 04000   2 1
33 0653 1 1 1 0 1   71 8      77          2         3 1
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05500 118 05  08500 118 10  10800 118 105 02000   2 1
26 0336 2 1 2 3 1   53 5      74                    3 3
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23 1048 2 1 2 1 1   66 2      75                    5 5
                  06360 107 04  10500 103 02         1
11 0546 2 2 1 1 1   64 5      76                    5 6
      607 05  06000 610 06  10500 610 08           1
21 0248 2 2 2 2 1   66 2      76                    6 6
                  12000 108 04  16000 207 02         1
33 0737 2 1 2 5 1   55 5      74                    1 6
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33 0954 2 2 2 0 1   72 2      77                    3 1
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22 0141 2 1 2 3 1   58 2      75          3         1 3
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12 0949 2 1 1 1 2   67 2      75                    6 6
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24 1151 1 1 1   1   69 2      75          1         3 6
04000 604 03  05200 604 05  09480 118 01  02500 02 3
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06240 609 01  08400 207 03  10300 105 03           1
22 0145 2 1 1 2 1   63 2      74          2         6 6
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04500 609 02  05200 115 03  17200 108 04                1
22 0547 2 1 2 1 1   65 5      76                      3 6
05000 403 02  05500 120 10  08000 204 01                1
23 0918 2 1 1 2 2   37 2      74                      6 6
03000 607 20  09000 201 14  14000 201 18                1
21 0348 2 1 2 1 1   66 2      76                      1 6
                            13000 118 04                1
21 0754 1 1 2 0 1   72 5      77              1       1 6
                            07236 119 01                1
21 1153 2 1 2 1 1   71 5      77                      6 6
                  06500 201 03  10000 201 04            1
11 0849 2 1 1 0 1   67 2      77              1       6 6
06300 111 02  12000 111 04  15000 111 07                1
46 1151 2 2 2 1 2   69 2      77                      6 6
02000 604 02  04000 402 015 10000 117 03                1
22 1147 2 1 1 1 1   65 2      73                      6 6
07200 604 004 07200 115 01  15000 205 05                1
27 1145 2 1 1 2 2   64 2      77              2       6 6
      700     12000 205 25  12000 205  25              1
21 0741 2 1 1 2 1   60 2      77              2       6 6
                  15000 204 09  15000 204 09            1
11 0344 3 1 2 1 1   62 5      75              3       4 6
05000 401 07  09500 108 02  10500 207 01                1
22 0350 1 1 1 0 1   68 2      77                      6 6
06000 607 04  07000 800 04  08500 301 01                1
11 0926 2 1 2 2 1   47 2      74                      6 6
02700 500 01  15000 204 23  22400 204 29                1
11 0430 3 1 2 3 1   48 2      76                      6 6
                  06000 403 15  11000 112               1
25 0150 2 1 2 0 1   68 2      77              1       6 6
                  09500 118 01  13000 118 06            1
44 1049 2 1 2 2 1   67 2      77                      6 6
                  09000 403 04  11000 403 08            1
11 0943 2 1 1 3 1   63 2      77              1       6 6
05000 602 01  15000 602 25  15000 602 25                1
23 0253 2 1 1 1 1   71 2      77                      4 2
07000 604 02  04000 604 05  02000 700      03000 02 2
23 0151 1 2 2 0 2   69 2      75                      6 6
                  05016 604 055 07878 604 065 01100 04 1
47 0853 2 1 2 0 1   71 2      76                      3 6
                  02750 401 02  08660 117 01            1
32 1242 2 1 1 2 2   60 5      76                      6 6
                  10000 115 12  12400 114 01            1
11 0807 4 1 1 1 1   25 2      75                      3 1
00550 120 40  00550 120 40
47 0351 2 1 1 2 1   69 5      76                      6 6
01000 607 06  12000 304 04  11750 112 01                1
23 0842 2 1 1 1 2   61 2      77                      4 6
03500 405 01  05687 405 06  09500 111 02  02000 02 1
11 0245 3 1 2 0 1   63 2      77                      6 6
04000 604 03  05500 103 025 09500 114 002               1
11 0339 2 1 1 4 1   57 2      77                      6 6
02080 402 02  27000 103 18  27000 103 18                1
22 1050 1 1 2 0 1   68 2      77                      6 6
03900 700 015 06000 117 04  08880 117 06                1
36 0349 2 1 1 0 1   67 2      77                      6 6
08700 303 07  06000 800 03  09500 108 003 02700 03 1
21 0231 3 1 2 4 1   49 5      75                      1 6
                            09620 114 02                2
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22 1251 3 1 2 2 1   69 2      77                  6 6
                08000 112 01  10200 207 03          1
21 0222 2 1 1 2 2   40 5      76            1     6 5
00372 607 01  18000 001 35  00000 405 02          1
22 1140 3 2 2 3 1   58 2      77            2     5 5
                06000 403 07  07500 403 11          1
36 0842 1 1 1 0 2   60 2      77            6     1 1
02400 604 04  06000 405 04                  06000 02 0
22 1046 2 1 2 2 1   64 2      77                  1 6
                              08500 207 002         1
21 0944 2 1 2 0 1   62 5      77                  1 1
06560 403 08                                      0
24 0447 2 1 1 0 1   65 2      75                  1 1
                              10000 604 02  07000 05 1
22 0138 2 1 2 3 2   55 2      76            4     6 6
                10920 110 08  16000 110 10          1
23 1243 3 1 2 2 1   61 5      76            2     5 5
06000 403 03  07000 403 06  08000 111 05          1
21 0849 1 2 2 0 3   66 2      77                  4 1
                07200 112 01                05400   8
21 0446 1 1 1 0 2   65 2      77                  2 6
07200 207 045 02500 500 025 08800 112   5         1
31 0351 3 2 1 2 1   67 2      76                  6 6
07000 604 02  07000 604 03  14000 304 01          1
11 1249 2 1 1 0 2   68 2      75                  6 6
03000 610 02   5000 150 055 15000 303 02           1
35 0254 2 1 1 0 1   71 2      75                  5 5
02000 610  05 05000 609 02  02400 700 02          3
12 1249 2 1 1 0 1   67 2      75            12    6 1
                08500 405 04                      0
11 0554 1 1 1 0 3   72 5      77                  4 6
02000 800 01  03000 800 05  06437 403   3         1
11 0234 2 1 1 0 1   55 2      76            1     6 6
                15000 604 16  15000 604 17          1
22 0742 2 1 1 3 2   59 2      75          6       6 6
                13000 500 12  10000 304 01          1
12 0449 2 1 1 1 1   67 2      75                  4 6
03000 610   5 05000 800 02  12000 106     08500 03 1
27 0851 2 1 1 1 2   69 2      76                  6 6
                06200 110 02  08400 110 025         1
11 0220 4 2 2 1 1   39 2      76                  3 1
                01980 405 12      700               0
24 1133 2 1 2 5 2   51 5      77            23    4 1
01560 405 01  10000 403 13      700       02500 04 0
27 0451 2 1 1 2 1   69 2      75                  6 5
                08000 608 05  15000 202 02  04000 03 1
64 0943 3 1 1 0 1   61 2      77                  4 6
     607 03  05000 303 06  09888 116 02           1
46 0154 2 1 1 0 2   71 2      77            2     6 6
                06000 207 02  09000 108 01          1
11 0537 3 1 1 2 2   56 2      77            2     3 3
                01200 108 05  01200 700 03          23
23 0324 4 1 2 1 2   42 2      76                  6 6
03000 403 14  08835 110 03  09500 110 04          1
12 0133 2 1 1 4 2   50 2      77            2     6 6
05000 609 01  18600 207 14  20000 207 15          1
13 0247 2 1 1 2 1   65 2      74                  6 6
05200 406 005 09000 609 07  11000 207 05          1
22 1046 1 1 2 0 1   65 2      76                  2 2
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  500 700  03 10000 118 08  12000 118 11          1
32 1243 1 1 1 1 1   62 5      77                6 6
      607  02 18000 116 09  20000 118 10          1
21 0849 2 1 2 2 1   67 5      76                6 1
03536 405  1  07280 405 05                       0
22 1044 2 1 1 2 1   63 2      73          2     6 6
08000 405 05  11000 405 08  17000 405 13          1
42 1032 2 1 2   2   49 2      73                6 6
                07000 119 13  10400 119 18        1
22 0128 2 1 2 4 1   45 5      73                6 6
                07000 117 06  16000 117 10        1
13 0219 2 1 2 3 2   68 2      75          7     6 6
  884 609 03  09500 604 20  14775 604 25          1
11 1048 2 1 1 2 1   66 2      75                6 6
05000 610 005 06000 114 01  30000 200 03          1
12 1113 4 1 2 4 2   32 2      73                3 3
03500 403 05  01600 114 18  03000 114 21          1
11 0446 2 1 1 2 1   64 2      74                2 6
04000 609 03  08400 112 01  07560 110 025         1
11 1036 2 1 1 2 1   55 2      74          3     6 6
13000 604 10  20000 604 17  25000 604 20          1
11 1136 2 1 1 5 1   55 2      75          3     6 6
08400 607 07  08000 604 03  10400 112 04          1
22 0242 2 1 2 2 1   60 2      77          2     6 6
                07800 207 025 10500 207 03        1
23 0549 2 1 1 1 1   67 2      74          12    5 6
                07000 207 02  15000 202 05
22 0947 1 1 1 0 1   65 7      73                1 6
                              13500 207 010 08000 02 1
22 0350 2 1 1 2 2   68 7      76          100   6 6
05400 115 03  08840 101 03  14500 101 015         1
63 0551 1 1 1 0 1   69 7      74          100   4 6
                03000 114 03  09800 107 02          1
56 1251 1 1 1 0 1   70 7      77                6 6
05000 104 07  05000 207 04  12000 201 010 06500 04 4
11 1026 2 1 1 3 2   43 7      77                6 6
02500 607 20  09000 101 03  10000 101 04          1
11 1043 2 1 1 1 1   61 7      76                6 6
      607 04  10000 104 08  13500 101 01          1
31 0949 2 1 1 2 2   67 7      77                6 6
                16000 116 085 16000 116 088       1
21 0742 2 1 1 2 2   60 7      76                6 6
06000 405 01  12000 405 10  14500 405 16          1
11 1147 2 1 1 2 1   65 7      74                6 6
      607 04  06960 115 04  12900 207 03          1
11 1244 3 1 1 2 1   62 7      76                6 6
04000 607 04  15000 104 10  23000 103 01          3
11 1147 2 1 1 2 1   65 7      76                6 6
03000 115 03  06000 115 03  20000 115 04          1
12 1241 2 1 1 2 1   60 7      77                6 6
03000 607 04  19000 207 11  19000 207 11          1
23 0250 2 1 1 3 1   68 7      77                6 6
06000 205 02  10800 101 03  13800 201 01          1
44 1252 1 1 1 0 1   71 7      76                3 1
01000 303 01  03000 303 03
31 0150 1 1 1 0 2   68 7      77                1 6
02500 610 01                08300 405 01          1
12 0945 2 1 1 1 2   64 7      77                6 6
      607 04  12000 103 04  15000 103 05          1
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24 0145 2 1 1 3 2   63 7       77              460   6 6
08000 115 15  15000 104 05  25000 104 10  10000  5 1
22 0152 2 1 1 0 1   70 7       75                    6 6
03000 405 01  12000 207 03  20500 207 05           1
21 0945 2 1 1 1 1   63 7       75                    6 6
04500 115 0   10000 111 07  18000 207 12           1
11 0551 2 1 1 1 1   69 7       74                    5 6
      700     05000 604   5 12600 205 03           1
11 0521 2 1 1 2 2   39 7       77                    6 6
01080 403     10000 405 23  12336 204 24           1
23 0249 2 1 1 0 2   67 7       77                    6 6
08000 405 02  09000 405 04  13000 405 10  04000 08 1
34 1153 1 1 1 0 1   71 7       77                    3 5
02500 610 02  02500 610 04  09600 607 01           3
24 0250 1 1 1 0 2   68 7       75                    6 6
      700     05000 609 05  09000 609 07           1
21 0742 2 1 2 2 1   60 7       76                    1 1

22 1045 2 1 2 2 1   63 7       76                    6 6
      607 04  10000 207 05  12000 207 08           1
61 0848 3 1 1 1 2   66 7       76                    6 6
      607 04  08500 301 02  14600 301 035          1
12 0740 2 1 1 2 2   58 7       74                    6 6
                13000 207 12  20000 207 16          1
11 0336 2 1 1 1 1   54 7       74                    6 6
02200 405     10000 101 14  18000 101 22           12
11 1247 2 2 1 0 1   65 7       76                    6 6
      607 03  08500 604 02  12000 207              1
32 0251 1 1 1 0 2   69 7       77                    3 3
                    602  4        602 04            1
22 0952 3 1 2 1 2   70 7       76                    3 6
                    303       12000 303 02          1
11 0148 3 1 1 0 2   66 7       77                    6 6
05400 500 015 08400 101 02  11000 101 02           1
33 0155 1 1 1 0 1   73 7       77                    4 4
03000 608 03  03500 101 04  03500 101 04           1
21 0146 2 1 1 2 1   64 7       76            2       6 6
                09000 115 03  10800 207 01          1
12 0550 1 1 1   2   68 7       76                    6 6
02362 405   7 05408 101 03  10296 101 012 05600 03 1
21 0150 2 1 1 0 1   68 7       75                    6 6
05200 609     06000 204 05  09000 204   2          1
21 0749 1 1 1 0 2   67 7       76                    6 6
06000 405 02  07200 604 04  14250 101 01  03000 0251
65 1051 1 1 2 0 1   69 7       77            2       5 6
                08000 404 02  09600 201   5          1
11 0732 2 1 1 0 1   50 7       74                    6 6
05000 405 06  14000 207 11  17000 207 14           1
11 1032 2 1 1 0 1   47 7       76            2       1 6
04000 607 20  12000 606 20  17844 207 015 11000 02 1
55 1052 2 1 1 0 2   70 7       76                    6 6
      700     08000 101 025 12500 207  12           1
23 0247 2 1 1 3 1   65 7       77            2       6 6
04000 700     16000 303 06  16000 303 06           1
23 0749 2 1 1 0 1   67 7       76                    6 6
      609 04  25000 201 055 25000 201 055          1
11 0836 2 1 1 0 1   54 7       74            2       6 6
                15000 104 17  25000 104 20          1
21 1144 2 1 1 3 1   64 7       77            7       6 6
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04160 610 01  14000 303 05  16800 207 01          1
21 0536 3 1 1 3 1   54 7      76                5 5
02500 609     14500 104 18  21400 104 22          1
24 0352 1 1 1 0 1   70 7      77                6 6
05000 500 01  15000 201 06  15000 201 06          1
63 0440 3 1 2 3 1   58 7      77                6 6
              07700 302 03  09828 108 02          1
11 1036 2 1 1 3 1   54 7      76                6 6
      607 02  17600 207 19      207 23          1
42 1051 2 1 2 0 1   69 7      77                6 6
05400 403 05  09600 207 03  11000 207  35        1
22 0347 2 1 2 0 1   65 7      73                6 6
      700     05000 101 015 15600 101 03          1
13 1225 2 1 2 0 3   43 7      76                6 1
01500 405     08500 405 20              08500   2
11 1245 4 1 2 001   63 7      77                6 1
      303 04  08500 403 07              08500   1
11 0645 2 1 1 0 2   64 7      77          2     6 6
04000 406     09000 406 10  13500 406 11          1
22 0342 2 1 1 5 1   59 7      73                6 6
03000 303 04  13000 207 13  60000 302 05          1
22 1044 2 1 1 0 2   63 7      77                6 6
01104 607 03  12000 001 03  15000 001 04          1
11 0542 3 1 1 1 1   60 7      74                6 6
05000 103 10  07000 103 13  16000 103 17          1
21 0150 2 1 1 2 1   68 7      76                6 6
03900 402 01  09000 101 05  14000 201 03          1
32 0148 1 1 2 0 1   64 7      75                6 6
              07000 403 06  10200 403 08          1
24 0634 3 1 1 7 2   51 7      76                1 6
15000 303 20                10500 101 01          1
32 0849 1 1 1 0 1   67 7      76                4 6
      700     05000 303 01  11000 104 02          1
24 1252 2 1 1 0 1   71 7      76                4 6
              03500 115 02  13000 101 02          1
21 0244 2 1 1 1 1   62 7      77                6 6
02000 500 01  30000 104 15  30000 104 15          1
11 0936 1 1 1 0 2   55 7      77                6 6
02000 500 04  14259 207 14  14259 207 14          2
23 0220 2 1 1 0 2   39 7      75                6 1
00840 303 05  25000 207 25                        2
22 1244 3 1 1 0 1   62 3      74                6 6
03000 405 01 006000 303 04  10000 114 015 02000 04 1
22 0747 2 1 1 1 1   65 7      76                6 6
08200 608 03  18000 207 04  18200 303 01          1
36 0441 2 1 1 1 1   59 7      75                6 6
07000 117 07  12000 117 12  20000 117 17          1
23 0448 2 1 1 2 1   66 7      77                6 6
03000 607 02  10000 101 05  18000 304 02          1
32 0150 1 1 1 1 1   67 7      73                6 5
            009500 609 03  12500 101 04          1
41 1046 2 1 1 3 2   64 4      77                6 6
03640 500 03  08000 115 03  12636 104 03          1
42 0731 2 1 1 3 1   49 4      742               6 6
4             16000 104 06  19000 104 10          1
24 0441 2 1 1 2 1   59 4      74                6 6
              07488 104 04  24960 104 14          1
47 1248 2 1 1 0 1   66 4      76          23    6 6
              16000 104 03  18000 104 04          1
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12 0647 2 1 1 3 1   65 4      76                  5 6
05000 610 10  10000 115 05  28000 104 06  05000 05 1
22 0353 2 1 2 2 1   71 8      74                  3 4
02000 403 01  02000 118 01  05000 118 04          1
21 0749 2 1 1 3 1   67 4      74            3     6 6
              08000 203 04  25000 104 04          1
21 0628 2 1 1 1 2   46 4      74                  6 6
01260 607 015 18000 104 16  21000 104 22          1
11 0939 2 1 1 2 1   57 4      74                  6 6
                            18000 104 04          1
22 1147 2 1 1 1 1   65 2      74                  6 6
07200 604 004 07200 116 01  15000 304 05          1
21 0641 2 1 1 2 1   59 1      74            2     6 6
              15000 200 06  24000 200 11          0 1
21 0243 2 1 1 0 1   61 4      75            23    6 6
               8000 104 08  18000 104 05          0 1
12 1249 1 1 2 0 1   67 4      77            22    6 6
               5000 400 05  17000 106 04          1
12 0838 2 1 1 2 1   56 4      73            3     6 6
              16000 104 14  30000 200 20      0 1
24 1021 2 1 2 2 1   39 3      73                  6 6
               4000 114 01  12000 114 12          0 1
12 1249 1 1 2 0 1   67 2      75            22    6 6
              03000 400 01  17000 106 04          1
23 0852 2 1 1 0 1   70 4      77                  6 6
              13000 104 02  16200 104 03          1
12 1249 1 1 2 0 1   67 2      73            22    6 6
               3000 400 01  17000 106 04          1
11 0232 2 1 1 0 1   50 7      75            3     6 6
00500 607 03  14000 200 16  18000 200 18          1
23 0750 3 1 1 1 2   68 8      76            2     5 6
04000 110 035 09300 110 025 14000 118 015 03000  151
21 0451 1 1 1 0 1   69 2      73            1     6 6
05000 604 022                                     1
33 0649 2 1 2 1 2   67 2      75            1     4 6
02940 402 004 04200 404 02  11680 118 005         1
32 0741 2 1 2 1 1   58 8      73            22    6 6
04000 118 01  06000 118 02  12000 118 05          1
11 1038 2 1 1 2 1   57 8      73            2     6 6
              11200 301 10  15000 301 14          1
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C
      REAL ME(50),MSTX(50),NE(50),IRR(7,60,2)
      INTEGER ULAGE
      DIMENSION EARNUS(8,47,4),CPI(11), PCNT78(9,47,2), HRS(6),B(6),
     1 DONE(12,4,3),OUTPUT(6,17), GE(50),AE(50),FTGE(50),STGE(50),
     2 FTAE(50),STAE(50),                    FDLIM(20), STLIM(20),
     3 STRATE(20),FDRATE(20),C(60),RMALE(7),RFEMAL(7),RTOT(7)
     4,PCNTUT(9,47,2),XMALE(7),XFEMAL(7),XTOT(7),T(7,8),AGE1(7)
      DOUBLE PRECISION SSN1,SSN2  ,PV1,PV2,PV3,SUMM,SUMM2,XM,XDEVM,SUMF,
     1 SUMF2,XF,XDEVF
CXXXXXXFORMAT STATEMENTS
  400 FORMAT(10X,'CONTROL CARD-ICODE, ILIST, IOVER,ITEST')
  401 FORMAT(10X,'EARNUS')
  402 FORMAT(10X,'LOWER AND UPPER LIMITS AND 3 DISCOUNT RATES')
  403  FORMAT(10X,'PCNT78')
  404 FORMAT(10X,'PCNTUT')
  405 FORMAT(10X,'CPI')
  406 FORMAT(10X,'FEDERAL LOWER INCOME BRACKETS AND AVERAGE RATES')
  895 FORMAT(1H1,//,11X,'STATISTICS FOR DEGREE ',I1,//,
     1        14X,'AND AGE ',I2,' TO ',I2,///
     2        12X,'MEAN',1X,'STD DEV',5X,'NUM'//
     3        4X,'MALES',2F8.2,I3,//
     4         2X,'FEMALES',2F8.2,I3)
  407 FORMAT(10X,'STATE LOWER INCOME BRACKETS AND AVERAGE RATES')
  896 FORMAT(1H1)
  897 FORMAT(2X ,I2,F10.0,8F7.0)
  898 FORMAT(1X,'NOO IS ', I4)
C
  899 FORMAT( 4I4)
C
C     900 AND 905 READS DATA IN PUNCH FROM SIMDATA
C     SEE STATEMENTS 911,915 AND 916 IN SIMDATA.
C
  900 FORMAT(F11.0,2X,5I7,2F7.0)
  905 FORMAT(I1,F10.0,2X,8F7.0)
  901 FORMAT(5X,2I5,3F5.3)
  902 FORMAT(8(4X,F6.0))
  903 FORMAT(2X,11F5.1)
  904 FORMAT(10X, 2F6.0)
  906 FORMAT(1X,F10.0,5I4)
  907 FORMAT(3X,9F5.3)
  908 FORMAT(3X,9F7.3)
  909 FORMAT(10X,2F10.3)
  918 FORMAT(1H1,//,20X,  'TOTAL PRESENT VALUE, COMPOUND COSTS AND NET
     1MARGINAL EARNINGS BY TYPE AND RATE',//,100X,'DEGREE' 2X,I1,/,100X
     2,'SEX',5X,I1,/,100X,'AGE LIM',1X,I2,'-',1X,I2,///20X,'PRIVATE',16X
     3,'DIRECT LIMITED SOCIAL',11X,'LIMITED SOCIAL',19X,'UTN',//,13X,
     4 3F9.4,3X,3F9.4,3X,3F9.4,3X,3F9.4///)
  919 FORMAT(1H1,//,26X, 'PRESENT VALUE,COMPOUND COSTS AND NET MARGINAL
     1',      'EARNINGS BY TYPE AND RATE'/46X, 'FOR STUDENT ',F10.0,///
     2100X,'DEGREE',2X,I1,/,100X
     3,'SEX',5X,I1,/,100X,'AGE LIM 'I2,'-',1X,I2,///20X,'PRIVATE',16X
     4,'DIRECT LIMITED SOCIAL',11X,'LIMITED SOCIAL',19X,'UTN',//,13X,
     5 3F9.4,3X,3F9.4,3X,3F9.4,3X,3F9.4,//)
  920  FORMAT(1H1,//,18X,'AVERAGE PRESENT VALUE, COMPOUND COSTS AND NET
     1MARGINAL EARNINGS BY TYPE AND RATE',///,100X,'DEGREE' 2X,I1,/,100X
     2,'SEX',5X,I1,/,100X,'AGE LIM',1X,I2,'-',1X,I2,///20X,'PRIVATE',16X
     3,'DIRECT LIMITED SOCIAL',11X,'LIMITED SOCIAL',19X,'UTN',//,13X,
     4 3F9.4,3X,3F9.4,3X,3F9.4,3X,3F9.4,//)
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  921 FORMAT(1X,'GROSS',7X,3F9.0,3X,3F9.0,3X,3F9.0,3X,3F9.0/
     11X,'EARNINGS',///)
  922 FORMAT(1X, 'MARGINAL ',3X,3F9.0,3X,3F9.0,3X,3F9.0,3X,3F9.0,/
     1,1X,'EARNINGS'///)
  923 FORMAT(1X,'COMPOUNDED ',1X,3F9.0,3X,3F9.0,3X,3F9.0,3X,3F9.0,/
     1,1X,'COSTS'///)
  924 FORMAT(1X,'NET MARGINAL',3F9.0,3X,3F9.0,3X,3F9.0,3X,3F9.0,/
     1 ,1X,'EARNINGS')
  925 FORMAT(1H1,//,2X'ERROR IN SSN ',F10.0,5X,F10.0)
C      FORMATS FOR INTERNAL RATE OF RETURN TABLE
  950 FORMAT(1H1,//,32X,'NUMBER OF STUDENTS AND AVERAGE',/,
     123X,'INTERNAL RATE OF RETURN FOR SELECTED UTN DEGREES',//,
     255X,'DEGREE IS' 6X,I1,/,
     355X,'AGE LIMIT',2X,I2,1X,'-',1X,I2,///
     411X,'RETURN ON',11X,'RETURN ON',6X,'RETURN ON',10X,'RETURN ON',11X
     5,'NUMBER OF'/,
     610X,'STUDENT COST',8X,'STATE COST',5X,'TOTAL COST',10X,'UTN COST',
     712X,'STUDENTS',//)
  951 FORMAT(10X,'GROSS    MARGINAL       MARGINAL     GROSS     MARGINAL'
     1,5X,
     1'GROSS    MARGINAL'/,9X,'RETURN   RETURN         RETURN       RETURN
     2    RETURN       RETURN   RETURN',//)
  952  FORMAT(1X,'MALES',2X,F9.4,1X,F9.4,5X,F9.4,2X,F9.4,1X,F9.4,2X,F9.4
     1, F9.4,7X,I3)
  953 FORMAT(1X,'FEMALES', F9.4,1X,F9.4,5X,F9.4,2X,F9.4,1X,F9.4,2X,
     1F9.4, F9.4,7X,I3)
  954 FORMAT(/,1X'TOTAL'2X,F9.4,1X,F9.4,5X,F9.4,2X,F9.4,1X,F9.4,2X,F9.4,
     1  F9.4,7X,I3)
  955 FORMAT(1X,10F10.0)
  956 FORMAT(1X,F20.10)
  957 FORMAT(10X,3F10.3)
  958 FORMAT(     //
     123X,'INTERNAL RATE OF RETURN FOR STUDENT 'F10.0,//,
     255X,'DEGREE IS' 6X,I1,/,
     355X,'AGE LIMIT' 2X,I2,1X,'-',1X,I2,///
     411X,'RETURN ON',11X,'RETURN ON',6X,'RETURN ON',10X,'RETURN ON',/,
     510X,'STUDENT COST',8X,'STATE COST',5X,'TOTAL COST',10X,'UTN COST'
     6 ,//)
  959 FORMAT(     //
     123X,'INTERNAL RATE OF RETURN',//,
     255X,'DEGREE IS' 6X,I1,/,
     355X,'AGE LIMIT' 2X,I2,1X,'-',1X,I2,///
     411X,'RETURN ON',11X,'RETURN ON',6X,'RETURN ON',10X,'RETURN ON',/,
     510X,'STUDENT COST',8X,'STATE COST',5X,'TOTAL COST',10X,'UTN'
     6 ,//)
  960 FORMAT(10X,7F12.0)
  961 FORMAT(1H1,//,20X,'NUMBER OF STUDENTS BY EMPLOYMENT STATUS',//
     1               55X,'DEGREE IS ',I3,//
     2               21X,'MALE',24X,'FEMALE',/
     3 2X'AGE'6X'NOT'7X'PART'6X'FULL'6X'NOT'7X'PART'6X'FULL'5X'TOTAL',/
     4 1X'LOWER'4X'WORKING'4X'TIME'6X'TIME'5X'WORKING'4X'TIME'6X'TIME'/)
  962 FORMAT(1X,F3.0,2X,7(7X,F3.0))
  963 FORMAT(5X,7(7X,F3.0))
CXXXXXXINITIALIZE PROGRAM DATA
C
      DO 212 I=1,7
      DO 212 J=1,60
      DO 212 K=1,2
  212 IRR(I,J,K)=0.
```

```
      DO 85 I=1,7
      XMALE(I)=0.
      XFEMAL(I)=0.
      XTOT(I)=0.
      RMALE(I) =0.
      RFEMAL(I) =0.
   85 RTOT(I) =0.
      SUMM=0.
      SUMM2=0.
      SUMF=0.
      SUMF2=0.
      AI = .1
      DO1 I= 1,12
      DO 1 J= 1,4
      DO 1 K=1,3
      DONE(I,J,K) = 0.
    1 CONTINUE
      IX=3
      IN=1
      SSN1=1.
      IMALE=0
      IFEMAL=0
      PV1=0.
      PV2=0.
      PV3=0.
      XI=0.
      ITEST1=0
      DO 83 I=1,7
      DO 83 J= 1,8
      T(I,J)=0.
   83 CONTINUE
C
C     VALUES FOR EMPLOYMENT STATUS TABLE
      AGE1(1) =0.
      AGE1(2) =20.
      AGE1(3) =25.
      AGE1(4)= 35.
      AGE1(5) =45.
      AGE1(6) =55.
      AGE1(7) = 65.
C                  THERE IS NO LC TEST OTHER THAN ITEST1.
CXXXXXREAD INPUT FILES
      N17=20
      READ(IN,899)ICODE, ILIST, IOVER,ITEST
      IF(ILIST.NE.0) WRITE(IX,400)
      IF(ILIST.NE.0) WRITE(IX,899 ) ICODE, ILIST, IOVER, ITEST
      READ(IN,902)(((EARNUS(I,J,K),I=1,8),J=1,47),K=1,4)
      IF(ILIST.NE.0) WRITE(IX,401)
      IF(ILIST.NE.0)WRITE(IX,902)(((EARNUS(I,J,K),I=1,8),J=1,47),K=1,4)
      READ(IN,901) LLAGE, ULAGE, RATE1 ,RATE2,RATE3
C     AGES LT LLAGE OR GE  ULAGE ARE ACCEPTED IN THE RANGE CHECK ROUTINE.
      IF(ILIST.NE.0) WRITE(IX,402)
      IF(ILIST.NE.0) WRITE(IX,901) LLAGE, ULAGE, RATE1, RATE2,RATE3
      READ(IN,907) (((PCNT78(I,J,K),I=1,9),J=1,47),K=1,2)
      IF(ILIST.NE.0) WRITE(IX,403)
      IF(ILIST.NE.0)WRITE(IX,908)(((PCNT78(I,J,K),I=1,9),J=1,47),K=1,2)
      READ(IN,907)(((PCNTUT(I,J,K),I=1,9),J=1,47),K=1,2)
      IF(ILIST.NE.0) WRITE(IX,404)
      IF(ILIST.NE.0)WRITE(IX,908)(((PCNTUT(I,J,K),I=1,9),J=1,47),K=1,2)
```

```
      READ(IN,903)(CPI(I),I=1,11)
CT    IF(ILIST.NE.0) WRITE(IX,405)
CT    IF(ILIST.NE.0)WRITE(IX,903) (CPI(I),I=1,11)
      IF(ILIST.NE.0) WRITE(IX,406)
      DO 2 I=1,N17
      READ(IN,904)  FDLIM(I), FDRATE(I)
      IF(ILIST.NE.0) WRITE(IX,909) FDLIM(I),FDRATE(I)
    2 CONTINUE
      IF(ILIST.NE.0) WRITE(IX,407)
      DO 3 I=1,N17
      READ(IN,904) STLIM(I),STRATE(I)
      IF(ILIST.NE.0) WRITE(IX,909)  STLIM(I),STRATE(I)
    3 CONTINUE
C
CXXXXXINITIALIZE STUDENT INFO.
C
    7 IF(ITEST1.EQ.ITEST) GO TO 75
CT    NOO =0
CT    IF(ILIST.NE.0) WRITE(IX,898) NOO
      DO 4 I=1,6
      DO 4J=1,17
      OUTPUT(I,J) = 0.
    4 CONTINUE
      HRS(1)=0.
      HRS(2)=6.
      HRS(3)=16.
      HRS(4)=28.
      HRS(5)=36.
      HRS(6)=40.
      DO 8 I=1,50
      GE(I)=0.
      AE(I)=0.
      FTGE(I)=0.
      STGE(I)=0.
      FTAE(I)=0.
      STAE(I)=0.
      ME(I)=0.
      MSTX(I)=0.
      NE(I)= 0.
    8 CONTINUE
C
CXXXXXREAD A STUDENT RECORD(INPUT IS OUTPUT FROM SIMDATA)
      IF(ILIST.NE.0) WRITE(IX,896)
      DO 5 I=1,6
      READ( 7,905)LC, SSN2,OUTPUT(I,1),OUTPUT(I,2),OUTPUT(I,3),OUTPUT(I,
     14),                OUTPUT(I,5),OUTPUT(I,6),OUTPUT(I,7),OUTPUT(I,9)
      IF(ILIST.NE.0)
     1WRITE(IX,897)LC,SSN2,OUTPUT(I,1),OUTPUT(I,2),OUTPUT(I,3),OUTPUT(I,
     24),                OUTPUT(I,5),OUTPUT(I,6),OUTPUT(I,7),OUTPUT(I,9)
      IF(SSN2.EQ.0) GO TO 75
      READ( 7,905)LC,SSN1,OUTPUT(I,10),OUTPUT(I,12),OUTPUT(I,13),
     1                    OUTPUT(I,14)
      IF(ILIST.NE.0)
     1WRITE(IX,897)LC,SSN1,OUTPUT(I,10),OUTPUT(I,12),OUTPUT(I,13),
     2 OUTPUT(I,14)
      IF(SSN1.EQ.0) GO TO 75
    5 CONTINUE
      READ( 7,900)SSN1,IBORNY,ISEX,IDEGRE, NUTYR,NHRS78,EARNUT,EARN78
      IF(ILIST.NE.0)
```

```
     1WRITE( IX,900) SSN1,IBORNY,ISEX, IDEGRE,NUTYR,NHRS78,EARNUT,EARN78
      ITEST1 = ITEST1 +1
      IF(SSN1.EQ.0) GO TO 75
CXXXXXCHECK TO SEE IF THIS STUDENT RECORD IS DESIRED FOR THIS RUN.
C
      IF(IDEGRE.NE.ICODE) GO TO 7
      NNAGE= 77-IBORNY
      NNAGG= NUTYR-IBORNY
CT    IF(ILIST.NE.0) WRITE(IX,898) NOO
        IF(NNAGG.GE.ULAGE.OR.NNAGG.LT.LLAGE) GO TO 7
CT    NOO =31
CT    IF(ILIST.NE.0) WRITE(IX,898) NOO
C
CXXXXXINCREMENT SEX COUNTERS.
C
      IF(ISEX.EQ.1) IMALE = IMALE+1
      IF(ISEX.EQ.2) IFEMAL= IFEMAL+1
C
C     COMPUTE SUM OF AGE AND SUM OF AGE E SQUARED FOR MEAN AND STD DEV
C
      AGE =NUTYR -IBORNY
      IF(ISEX.EQ.2) GO TO 10
C     CREATE SUMS FOR MALES
      SUMM = SUMM+AGE
      SUMM2= SUMM2 +(AGE**2)
      GO TO 11
C     COMPUTE SUMS FOR FEMALES
   10 SUMF= SUMF +AGE
      SUMF2 = SUMF2 + (AGE**2)
   11 CONTINUE
C
C     COMPUTE NUMBER OF STUDENTS FOR EMPLOYMENT STATUS TABLE
C
      LOC=2
      IF(NHRS78.EQ.1) LOC=1
      IF(NHRS78.EQ.6) LOC=3
      IF(ISEX.EQ.2) LOC=LOC+3
      IF(AGE.LT.20.)          T(LOC,1) = T(LOC,1) + 1
      IF( AGE.GE.20..AND.AGE.LE.24.) T(LOC,2) = T(LOC,2) +1
      IF(AGE.GE.25..AND.AGE.LE.34.)T(LOC,3)= T(LOC,3) + 1
      IF(AGE.GE.35..AND.AGE.LE.44.)T(LOC,4)= T(LOC,4) + 1
      IF(AGE.GE.45..AND.AGE.LE.55.)T(LOC,5)= T(LOC,5) + 1
      IF(AGE.GE.55..AND.AGE.LE.64. )T(LOC,6)=T(LOC,6) + 1
      IF(AGE.GE.65.)     T(LOC,7) =T(LOC,7) + 1
      WRITE(IX,899)ISEX,LOC
C
CXXXXXCOMPUTE GROSS EARNINGS.
C     SET LEVEL AND IG(IG DETERMINES EARNUS BY SEX)
      IF(ISEX.EQ.1) IG=7
      IF(ISEX.EQ.2) IG=8
      NLEVEL=3
      IF(IDEGRE.EQ.8) NLEVEL=2
      IF(IDEGRE.EQ.1)NLEVEL=4
      NAGEG = NNAGG-17+1
      NAGE64 = 47
      N64 = 47 -NAGEG +1
      IF(NHRS78.EQ.1) GO TO 20
      IF(NHRS78.EQ.6) GO TO 21
      GO TO 30
```

```
C
C      COMPUTE GROSS EARNINGS ---UNEMPLOYED
C
   20 J=1
      DO 9 I=NAGEG,NAGE64
      GE(J)= PCNT78(IDEGRE,I,ISEX)*EARNUS(IG,I,NLEVEL)
CT    IF(ILIST.NE.0) WRITE(IX,957)PCNT78(IDEGRE,I,ISEX),
CT   1 EARNUS(IG,I,NLEVEL),GE(J)
    9 J=J+1
      GO TO 40
C
C      COMPUTE GROSS EARNINGS---WORKED FULL TIME
C
   21 CONTINUE
      PCNT= (EARN78/(EARNUS(IG,NAGEG,NLEVEL)) )
      J=1
      DO 22 I=NAGEG,NAGE64
      GE(J) = PCNT * EARNUS(IG,I,NLEVEL)
   22 J=J+1
      GO TO 40
C
C      COMPUTE GROSS EARNINGS---PART TIME
C
   30 CONTINUE
      PCNT =((EARN78/(HRS(NHRS78)/40))/EARNUS(IG,NAGEG,NLEVEL))
      J=1
      DO 31 I=NAGEG,NAGE64
      GE(J)=PCNT*EARNUS(IG,I,NLEVEL)
CT    IF(ILIST.NE.0) WRITE(IX,957) PCNT,EARNUS(IG,I,NLEVEL),GE(J)
   31 J= J+1
C
CXXXXXCOMPUTE TAXES ON GROSS EARNINGS. FDLIM AND STLIM ARE UPPER LIMITS
C      OF RANGE
   40 CONTINUE
CT    NOO =40
CT    IF(ILIST.NE.0) WRITE(IX,898) NOO
C
C       N17 IS NUMBER OF STATE AND FEDERAL TAX CLASSES VALUE SETAT 20.
      DO 41 I=1,N64
      DO 42 J=1,N17
      IF(GE(I).LT.FDLIM(J)) GO TO 43
   42 CONTINUE
   43 J= J-1
      FTGE(I) = GE(I) *FDRATE(J)
      DO 44 K=1,N17
      IF(GE(I).LT.STLIM(K)) GO TO 45
   44 CONTINUE
   45 K= K-1
      STGE(I)= GE(I) *STRATE(K)
   41 CONTINUE
C
C      COMPUTE ALTERNATE EARNINGS AND TAXES ON ALTERNATE EARNINGS
C
      NLEVEL= 1
      IF(IDEGRE.EQ.1) NLEVEL = 3
      J=1
      DO 46 I= NAGEG,NAGE64
      AE(J)= PCNTUT(IDEGRE,I,ISEX) * EARNUS(IG,I,NLEVEL)
      IF(ILIST.NE.0)WRITE(IX,957) PCNTUT(IDEGRE,I,ISEX),
```

```
     1 EARNUS(IG,I,NLEVEL),AE(J)
       J=J+1
    46 CONTINUE
       DO 51 I=1,N64
C      COMPUTE FEDERAL TAX ON ALTERNATE EARNINGS
       DO 52 J=1,N17
       IF(AE(I).LT.FDLIM(J)) GO TO 53
    52 CONTINUE
    53 J=J-1
       FTAE(I) =AE(I) * FDRATE(J)
       DO 54 K=1,N17
C       COMPUTE STATE TAX ON ALTERNATE EARNONGS
       IF(AE(I).LT.STLIM(K)) GO TO 55
    54 CONTINUE
    55 K =K-1
       STAE(I)=   AE(I) * STRATE(K)
    51 CONTINUE
C
C      COMPUTE MARGINAL TAX GAIN FOR STATE OF TN (MSTX)
C
       DO 56 I= 1,N64
    56 MSTX(I) = STGE(I) - STAE(I)
C
C      COMPUTE MARGINAL EARNINGS AND  NET EARNINGS
C
       DO 60 I= 1,N64
       NE(I) = GE(I) - AE(I)
    60 ME(I) = GE(I) -FTGE(I)-STGE(I)-(AE(I)-FTAE(I)-STAE(I))
C
CXXXXXCOMPUTE PRESENT VALUES AND STORE IN DONE AFTER CALLINGE
C      SUBROUTINE PVALUE
C      PRESENT VALUE ON GE (ROW 1)
C
       CALL PVALUE(GE,RATE1,RATE2,RATE3,N64,PV1,PV2,PV3)
CT     IF(ILIST.NE.0) WRITE(IX,909) PV1,PV2,PV3
       DO 61 I= 1,12,3
    61 DONE(I,1,3    ) = DONE(I,1,3    ) +PV1
       DO 62 I= 2,12,3
    62 DONE(I,1,3    ) = DONE(I,1,3    ) + PV2
       DO 63 I= 3,12,3
    63 DONE(I,1,3    ) = DONE(I,1,3    ) + PV3
       CALL PVALUE(STGE,RATE1,RATE2,RATE3,N64,PV1,PV2,PV3)
       DONE(4,1,3) = PV1
       DONE(5,1,3) = PV2
       DONE(6,1,3) = PV3
C
C      PRESENT VALUE ON ME     (ROW 2)
C
       CALL PVALUE(ME,RATE1,RATE2,RATE3,N64,PV1,PV2,PV3)
       DONE(1,2,3    ) = DONE(1,2,3    ) + PV1
       DONE(2,2,3    ) = DONE(2,2,3    ) + PV2
       DONE(3,2,3    ) = DONE(3,2,3    ) + PV3
       CALL PVALUE(NE,RATE1,RATE2,RATE3,N64,PV1,PV2,PV3)
       DONE(10,2,3    )=DONE(10,2,3    ) + PV1
CT     IF (ILIST.NE.0) WRITE( IX,909) PV1,PV2,PV3
       DONE(11,2,3    )=DONE(11,2,3    ) + PV2
       DONE(12,2,3    )=DONE(12,2,3    ) + PV3
       DONE( 7,2,3    ) = DONE( 7,2,3    ) + PV1
       DONE( 8,2,3    )=DONE( 8,2,3    )+ PV2
```

```
      DONE( 9,2,3    ) = DONE( 9,2,3    ) + PV3
C
C     PRESENT VALUE ON MSTX (IN ROW 2 COL 4,5,6)
      CALL PVALUE(MSTX,RATE1,RATE2,RATE3 ,N64,PV1,PV2,PV3)
CT    IF(ILIST.NE.0) WRITE(IX,909) PV1,PV2,PV3
      DONE(4,2,3    ) = DONE(4,2,3    ) + PV1
      DONE(5,2,3    ) = DONE(5,2,3    ) + PV2
      DONE(6,2,3    )= DONE(6,2,3     ) + PV3
C     COMPOUND COSTS
C                        (ROW 3)
C     STUDENT COSTS      (ROW 3,COL1,2,3)
      DO 79 I=1,6
   79 B(I) =0.
      DO 67 J=1,7
      DO 67 I=1,6
      B(I) =B(I) + OUTPUT(I,J)
   67 CONTINUE
      CALL CCOST(B,RATE1,RATE2,RATE3, PV1,PV2,PV3)
CT    IF(ILIST.NE.0)WRITE(IX,909) PV1,PV2,PV3
      DONE(1,3,3    ) = DONE(1,3,3    ) + PV1
      DONE(2,3,3    ) = DONE(2,3,3    ) + PV2
      DONE(3,3,3    ) = DONE(3,3,3    ) + PV3
C     UTN (ROW 3,COL 10,11,12)
      DO 68 I=1,6
   68 B(I) =  OUTPUT(I,1)+OUTPUT(I,4)+OUTPUT(I,6)+OUTPUT(I,9)
     1+OUTPUT(I,12)
      CALL CCOST(B,RATE1,RATE2,RATE3,PV1,PV2,PV3)
      DONE(10,3,3   )  = DONE(10,3,3    ) + PV1
      DONE(11,3,3    ) = DONE(11,3,3    ) + PV2
      DONE(12,3,3    ) = DONE(12,3,3    ) + PV3
C     TOTAL COSTS (ROW 3,COL 10,11,12)
      DO 78 I=1,6
   78 B(I) =0.
      DO 69 I= 1,6
      DO 69 J= 1,17
C     ASSUMES NO SUB TOTALS WILL BE ADDED TO OUTPUT BEFORE THIS POINT.
      B(I) = B(I) + OUTPUT(I,J)
   69 CONTINUE
CT    IF(ILIST.NE.0)WRITE(IX,956) (B(I),I=1,6)
      CALL CCOST(B,RATE1,RATE2,RATE3,PV1,PV2,PV3)
CT    IF(ILIST.NE.0)WRITE(IX,956) PV1,PV2,PV3
      DONE(7,3,3    ) = DONE(7,3,3    ) + PV1
      DONE(8,3,3    ) = DONE(8,3,3    ) + PV2
      DONE(9,3,3    ) = DONE(9,3,3    ) + PV3
C      STATE COSTS  (ROW 3,COL 4,5,6)
C
      DO 70 I= 1,6
   70 B(I) = OUTPUT(I,10) + OUTPUT(I,9)
      CALL CCOST(B,RATE1,RATE2,RATE3, PV1,PV2,PV3)
CT    IF(ILIST.NE.0) WRITE(IX,909) PV1,PV2,PV3
CT    IF(ILIST.NE.0)  WRITE(IX,955)(B(I),I=1,6 )
      DONE(4,3,3    )=DONE(4,3,3    ) + PV1
      DONE(5,3,3    ) = DONE(5,3,3    ) + PV2
      DONE(6,3,3    )=DONE(6,3,3    ) + PV3
C     SEE OUTPUT SECTION FOR ROW 4 .( IT IS ROW 2 MINUS ROW 3)
C     ALL STORAGE IN DONE IS COMPLETE FOR THIS STUDENT.
       DO 261 I=1,N64
      IF(ILIST.NE.0)WRITE(IX,955)GE(I),FTGE(I),STGE(I),AE(I),FTAE(I),
     1 STAE(I),ME(I),MSTX(I),NE(I)
```

```
  261  CONTINUE
CXXXX THIS SECTION COMPUTES INTERNAL RATES OF RETURN
C
      IPASS=1
C
C     COMPUTE INTERNAL RATE OF RETURN.
C
C     INITIALIZE 'C'. PROGRAM RETURNS HERE TO BEGIN CALCULATIONS FOR INTE
  255 DO 94 I=1,60
   94 C(I) = 0.0
CT    NOO =255
CT    IF(ILIST.NE.0) WRITE(IX,898) NOO
C
CXXXX PUT VARIOUS COSTS IN 'OUTPUT' ARRAY FOR EACH YEAR 'I' IN 'C' WHEN
C     IPASS=1
C     STUDENTS COSTS          (IPASS = 1)
C
      IF(IPASS.NE.1) GO TO 100
      DO 95 I =1,6
      DO 95 J =1,7
   95 C(I) = C(I) + OUTPUT(I,J)
      GO TO 160
C
C     STATE COSTS       (IPASS = 2)
C
  100 IF(IPASS.NE.2) GO TO 120
      DO 110 I=1,6
  110 C(I) = C(I) +OUTPUT(I,9)+OUTPUT(I,10)
      GO TO 160
C
C     TOTAL COSTS             (IPASS = 3 )
C
  120 IF(IPASS.NE.3) GO TO 140
      DO 130 I=1,6
      DO 130 J=1,17
  130 C(I) = C(I)+ OUTPUT(I,J)
      GO TO 160
C
C     UTN COSTS               (IPASS = 4)
C
  140 IF(IPASS.NE.4) GO TO 999
      DO 150 I=1,6
  150 C(I) = OUTPUT(I,1)+ OUTPUT(I,9)+OUTPUT(I,12)+OUTPUT(I,4)+OUTPUT(I,
     16)
C     GO TO 160
CXXXXXBEGINNING WITH YEAR 1 DETERMINE THE NUMBER OF YEARS BEFORE COSTS
C  BEGIN. N IS THE NUMBER OF YEARS WITH ZERO COST.
  160 DO 161 I=1,N64
CT    IF(ILIST.NE.0)WRITE(IX,955)C(I)
  161 CONTINUE
      N=0
      DO 170 I=1,6
      IF(C(I).EQ.0) N=N+1
      IF(C(I).NE.0) GO TO 171
  170 CONTINUE
  171 CONTINUE
C
CXXXXXMOVE COSTS DOWN IN ARRAY 'C' TO ELIMINATE ZERO COSTS YEARS.
C
```

```
C       MOVE DOWN N YEARS AND CHANGE SIGN OF COST TO NEGATIVE
        DO 180 I= 1,6
        J=I+N
  180 C(I)= - C(J)
  190 CONTINUE
        I2= N64+N
CXXXX ADD THE BENEFITS TO 'C' BEGINNING WITH POSITION N+1, CALL SUBROUTINE
C AND  STORE RESULTS ********I2 IS SUM OF COST AND BENEFIT YEARS.
        IF(IPASS.NE.1) GO TO 224
C
C       STUDENT COSTS- GROSS   (IPASS = 1 )
C
        DO 200  I= 1,N64
        J=I+6-N
  200 C(J) =GE(I)
        DO 201 K=1,I2
  201 IRR(1, K,ISEX)=IRR(1, K,ISEX) + C(K)
        IF(ILIST.NE.0) WRITE(IX,955) ( C(K),K=1,I2)
C       CALL BT(C,AI,I,XI,SSN1)
CT      IF(ILIST.NE.0) WRITE(IX,956) XI
CT      IF(ILIST.NE.0) WRITE(IX,955) (C(I),I=1,50)
        IF(ISEX.EQ.1) RMALE(1)= RMALE(1) + XI
        IF (ISEX.EQ.2)RFEMAL(1)=RFEMAL(1) + XI
C       STUDENT COSTS-- MARGINAL
        DO 210 I= 1,N64
        J =I+6-N
  210 C(J)=ME(I)
        DO 211 K=1,I2
  211 IRR(2, K,ISEX)=IRR(2, K,ISEX)+C(K)
        IF(ILIST.NE.0) WRITE(IX,955) (C(K),K=1,I2)
C FIX THIS PROBLEM. SKIP MBA RECORD FOR 0410662239.
C       CALL BT(C,AI,I,XI,SSN1)
CT      IF(ILIST.NE.0) WRITE(IX,956) XI
CT      IF(ILIST.NE.0) WRITE(IX,955) (C(I),I= 1,50)
        IF(ISEX.EQ.1) RMALE(2) = RMALE(2) + XI
        IF(ISEX.EQ.2)RFEMAL(2) =RFEMAL(2) + XI
        GO TO 250
C
C       STATE COSTS- MARGINAL  (IPASS = 2)
C
  224 IF(IPASS.NE.2) GO TO 229
C       COMPUTE STATE BENEFITS
        DO 220 I= 1,N64
  220 STGE(I)= STGE(I)-STAE(I)
C       NOTE--- STGE'S MEANING IS CHANGED
        DO 225 I=1,N64
        J =I + 6-N
  225 C(J)= STGE(I)
        DO 226 K=1,I2
  226 IRR(3, K,ISEX)=IRR(3, K,ISEX)+C(K)
        IF(ILIST.NE.0) WRITE(IX,955) (C(K),K =1,I2)
C       CALL BT(C,AI,I,XI,SSN1)
  221 CONTINUE
CT      IF(ILIST.NE.0)WRITE(IX,956) XI
CT      IF(ILIST.NE.0) WRITE(IX,955) (C(I),I=1,50)
        IF(ISEX.EQ.1) RMALE(3)=RMALE(3)+ XI
        IF(ISEX.EQ.2)RFEMAL(3)=RFEMAL(3)+XI
        GO TO 250
C
```

```
C      TOTAL COSTS - GROSS     ( IPASS = 3 )
C
  229 IF(IPASS.NE.3) GO TO 239
      DO 230 I=1,N64
      J=I + 6-N
  230 C(J)=GE(I)
      DO 231 K=1,I2
  231 IRR(4, K,ISEX)=IRR(4, K,ISEX)+C(K)
      IF(ILIST.NE.0)WRITE(IX,955) (C(K),K=1,I)
C     CALL BT(C,AI,I,XI,SSN1)
CT    IF(ILIST.NE.0) WRITE(IX,956) XI
      IF(ISEX.EQ.1) RMALE(4) = RMALE(4) + XI
      IF(ISEX.EQ.2)RFEMAL(4) =RFEMAL(4) + XI
C     TOTAL COSTS- MARGINAL
      DO 235 I=1,N64
      J = I + 6-N
  235 C(J) =GE(I) -AE(I)
      DO 236 K=1,I2
  236 IRR(5, K,ISEX)=IRR(5, K,ISEX)+C(K)
      IF(ILIST.NE.0) WRITE(IX,955)(C(K),K=1,I2)
C     CALL BT(C,AI,I,XI,SSN1)
CT    IF(ILIST.NE.0) WRITE(IX,956) XI
      IF(ILIST.NE.0) WRITE(IX,955) (C(K),K=1,I )
      IF(ISEX.EQ.1) RMALE(5) = RMALE(5) + XI
      IF(ISEX.EQ.2)RFEMAL(5) =RFEMAL(5) + XI
      GO TO 250
C     UTN COSTS- GROSS        (IPASS = 4)
C
  239 IF(IPASS.NE.4) GO TO 999
      DO 240  I = 1,N64
      J=I +6-N
  240 C(J)= GE(I)
      DO 241 K=1,I2
  241 IRR(6,K ,ISEX)=IRR(6, K,ISEX)+C(K)
      IF(ILIST.NE.0)  WRITE(IX,955)(C(K),K=1,I2)
C     CALL BT(C,AI,I,XI,SSN1)
CT    IF(ILIST.NE.0) WRITE(IX,956) XI
      IF(ISEX.EQ.1)  RMALE(6) = RMALE(6) + XI
      IF(ISEX.EQ.2) RFEMAL(6) =RFEMAL(6) + XI
C     UTN COSTS- MARGINAL
      DO 245 I= 1,N64
      J= I+6-N
  245 C(J) = ME(I)
      DO 246 K=1,I2
  246 IRR(7, K,ISEX)=IRR(7, K,ISEX)+C(K)
      IF(ILIST.NE.0)  WRITE(IX,955)(C(K),K=1,I2)
C     CALL BT(C,AI,I,XI,SSN1)
CT    IF(ILIST.NE.0) WRITE(IX,956) XI
      IF(ISEX.EQ.1)  RMALE(7) = RMALE(7) + XI
      IF(ISEX.EQ.2) RFEMAL(7) =RFEMAL( 7) + XI
      GO TO 250
C
CXXXXXDETERMINE IF CALCULATIONS COMPLETE FOR THIS CASE.IF COMPLETE
C      READ A NEW STUDENT RECORD AT 7.
  250 CONTINUE
      NOO = IPASS
      IF(ILIST.NE.0) WRITE(IX,898) NOO
      IPASS = IPASS + 1
      IF(IPASS.GT.4) GO TO 76
```

```
C
CXXXXX CALCULATIONS NOT COMPLETE GO  TO STATEMENT 255.
      GO TO 255
C
C
CXXXXXWRITE THE INDIVIDUAL TABLE. THIS TABLE CONTAINS PRESENT VALUE AND
C     COMPOUND COSTS.
   76 IF(ILIST.NE.0) GO TO 84
      DO 80 I=1,12
   80 DONE(I,4,3)=DONE(I,2,3)-DONE(I,3,3)
      WRITE(IX,919)SSN2,IDEGRE,ISEX,LLAGE,ULAGE,RATE1,RATE2,RATE3,RATE1,
     1RATE2,RATE3,RATE1,RATE2,RATE3,RATE1,RATE2, RATE3
      WRITE(IX,921) (DONE(I,1,3),I=1,12)
      WRITE(IX,922)(DONE(I,2,3),I=1,12)
      WRITE(IX,923) (DONE(I,3,3),I=1,12)
      WRITE(IX,924)(DONE(I,4,3),I=1,12)
C
C     STORE INDIVIDUAL DATA IN GROUP TABLE BY ISEX. ALSO INITIALIZE INDIVI
C     PART OF THE TABLE (3) TO ZERO.
C
   84 DO 81 I=1,12
      DO 81 J=1,4
      DONE(I,J,ISEX)=DONE(I,J,ISEX) +   DONE(I,J,3)
   81 DONE(I,J,3) =0.
C
C     WRITE INTERNAL RATE OF RETURN FOR THIS INDIVIDUAL.
C
C     WRITE(IX,958) SSN2,IDEGRE,LLAGE,ULAGE
C     WRITE(IX, 951)
C     WRITE(IX,952) RMALE(1),RMALE(2),RMALE(3),RMALE(4),RMALE(5),
C    1 RMALE(6),RMALE(7)
C     WRITE(IX,953)RFEMAL(1),RFEMAL(2),RFEMAL(3),RFEMAL(4),RFEMAL(5),
C    1 RFEMAL(6),RFEMAL(7)
C     WRITE(IX,954)RTOT(1),RTOT(2),RTOT(3),RTOT(4),RTOT(5),RTOT(6),
C    1RTOT(7)
C     STORE DATA IN GROUP TABLE(XMALE,XFEMAL,XTOT) AND INITIALIZE INDIVID
C     TABLE TO ZERO.
C
      DO 82 I=1,7
      XMALE(I)=XMALE(I) + RMALE(I)
      XFEMAL(I)=XFEMAL(I) + RFEMAL(I)
      RMALE(I)=0.
      RFEMAL(I) =0.
   82 RTOT(I) =0.
C     THIS STUDENT COMPLETE.RETURN TO 7 TO READ ANOTHER RECORD.
       GO TO 7
C
CXXXXX THIS SECTION PRINTS OUT THE GROUPS TABLE FOR MALES AND FEMALES.
C     COMPUTE THE MALES PLUS FEMALES PORTION OF THE TABLE.
   75 DO 71 I= 1,12
      DO 71 J= 1,4
      DONE(I,J,3) = DONE(I,J,1) + DONE(I,J,2)
   71 CONTINUE
C
CXXXXXCOMPUTE NET MARGINAL EARNINGS
C
      DO 72 I= 1,12
      DO 72 J= 1,3
      DONE(I,4,J) = DONE(I,2,J) -DONE(I,3,J)
```

```
   72 CONTINUE
C
C      PRINT GROUP TABLE FOR TOTAL INFORMATION ABOUT EARNINGS AND COSTS
C
       DO 77 ISEX=1,3
       WRITE(IX,918)IDEGRE,ISEX,LLAGE,ULAGE,RATE1,RATE2,RATE3,RATE1,RATE
      12,RATE3,RATE1,RATE2,RATE3,RATE1,RATE2,RATE3
       WRITE(IX,921) (DONE(I,1,ISEX), I=1,12)
       WRITE(IX,922)(DONE(I,2,ISEX),I=1,12)
       WRITE(IX,923) (DONE(I,3,ISEX),I=1,12)
       WRITE(IX,924) (DONE(I,4,ISEX),I=1,12)
   77 CONTINUE
C
C      COMPUTE MEANS FOR THE TABLE AND PRINT THE SAME TABLE WITH MEAN DATA
C
       DO 73 I= 1,12
       DO 73 J= 1,4
       DO 73 K= 1,3
       IF(K.EQ.1.AND.IMALE.NE.0) DONE(I,J,K) = DONE(I,J,K) /IMALE
       IF(K.EQ.2.AND.IFEMAL.NE.0) DONE(I,J,K) = DONE(I,J,K) /IFEMAL
       IF(K.EQ.3) DONE(I,J,K) = DONE(I,J,K) /(IMALE+ IFEMAL)
   73 CONTINUE
       DO 74 ISEX= 1,3
       WRITE(IX,920)IDEGRE,ISEX,LLAGE,ULAGE,RATE1,RATE2,RATE3,RATE1,RATE
      12,RATE3,RATE1,RATE2,RATE3,RATE1,RATE2,RATE3
       WRITE(IX,921)(DONE(I,1, ISEX),I=1,12 )
       WRITE(IX,922)(DONE(I,2,ISEX),I=1,12 )
       WRITE(IX,923)(DONE(I,3,ISEX), I= 1,12)
       WRITE(IX,924)(DONE(I,4,ISEX), I=1,12)
   74 CONTINUE
C
CXXXX PRINT INTERNAL RATE OF RETURN TABLE
C
C      COMPUTE TOTALS AND MEANS.
       OVER=0
       DO 256 I=1,7
       XTOT(I)=(XMALE(I)+XFEMAL(I))/(IMALE+IFEMAL)
       IF(IMALE.NE.0) XMALE(I) =XMALE(I) /IMALE
       IF(IFEMAL.NE.0) XFEMAL(I) =XFEMAL(I)/IFEMAL
  256 CONTINUE
       WRITE(IX,950)IDEGRE,LLAGE,ULAGE
   98 IF(OVER.NE.0.) WRITE(IX,959)
       WRITE(IX,951)
       WRITE(IX,952)XMALE(1),XMALE(2),XMALE(3),XMALE(4),XMALE(5),XMALE(6)
      1,XMALE(7),IMALE
         WRITE(IX,953) XFEMAL(1) ,XFEMAL(2),XFEMAL(3),XFEMAL(4),XFEMAL(5)
      1,XFEMAL(6),XFEMAL(7),IFEMAL
       IXMALE= IMALE+ IFEMAL
       WRITE(IX,954)XTOT(1),XTOT(2),XTOT(3),XTOT(4),XTOT(5),XTOT(6),
      1XTOT(7),IXMALE
C
C      COMPUTE AND PRINT MEANS AND STANDARD DEVIATION FOR MALES AND FEMALE
C
       XM = SUMM/IMALE
       XDEVM = (SUMM2/IMALE)-(XM**2)
       XDEVM=DSQRT(XDEVM)
       XF = SUMF/IFEMAL
       XDEVF =(SUMF2/IFEMAL) - (XF**2)
       SDEVF =DSQRT(XDEVF)
```

```
      WRITE(IX,895) IDEGRE,LLAGE,ULAGE,XM,XDEVM,IMALE,XF,XDEVF,IFEMAL
C
C     COMPUTE AND PRINT NUMBER OF STUDENTS BY EMPLOYMENT STATUS TABLE
      WRITE(IX,961) IDEGRE
      DO 86 I= 1,7
      T(7,I) = T(1,I)+T(2,I)+T(3,I)+T(4,I)+T(5,I)+T(6,I)
      WRITE(IX,962)AGE1(I),(T(J,I),J=1,7)
   86 CONTINUE
      DO 87 I=1,7
      T(I,8)=T(I,1)+T(I,2)+T(I,3)+T(I,4)+T(I,5)+T(I,6)+T(I,7)
   87 CONTINUE
      WRITE(IX,963) (T(I,8),I=1,7)
      IF(OVER.NE.0.)GO TO 999
C
C     CALCULATE IRR(MEAN METHOD)
C
C     PRINT OUT IRR
                        WRITE(IX,960)
     1 (((IRR(I,J,K),I=1,7),J=1,60),K=1,2)
      DO 90 I=1,7
      XMALE(I)=0.
      XFEMAL (I)=0.
   90 XTOT(I)=0.
      K=60
      DO 91 J=1,7
      DO 92 I=1,60
   92 C(I)=IRR (J,I,1)
      IF(J.NE.3)
     1CALL BT(C,AI,K,XMALE(J),SSN1)
   91 CONTINUE
      DO 93 J=1,7
      DO 96 I=1,60
   96 C(I)=IRR (J,I,2)
      IF(J.NE.3)
     1CALL BT(C,AI,K,XFEMAL(J),SSN1)
   93 CONTINUE
      DO 99 J=1,7
      DO 97 I=1,60
   97 C(I)=IRR(J,I,1)+IRR(J,I,2)
      IF(J.NE.3)
     1CALL BT(C,AI,K,XTOT(J),SSN1)
   99 CONTINUE
      OVER=1.
      GO TO 98
C
CXXXXXERROR ROUTINE
  999 REWIND 7
      WRITE(IX,925) SSN1,SSN2
  998 CONTINUE
      CALL PPRINT(IRR,IPASS,N)
      STOP
      END
      SUBROUTINE PVALUE(B,RATE1,RATE2,RATE3,N64,PV1,PV2,PV3)
      DIMENSION B(50)
      DOUBLE PRECISION PV1,PV2,PV3
      PV1=0.
      PV2=0.
      PV3=0.
CT    WRITE(3,2)
```

```
      DO 1 I=1,N64
      J=I-1
      PV1 =PV1 + (B(I)/((1+RATE1)**J))
      PV2 = PV2 + (B(I)/((1+RATE2)**J))
      PV3= PV3 + (B(I) /((1+RATE3)**J))
      A= (B(I)/((1+RATE1)**J))
CT  2 FORMAT(5X,'PRESENT VALUE')
CT  3 FORMAT(2X,I5,F10.2)
C
CT    WRITE(3,3) I,A
    1 CONTINUE
      RETURN
      END
      SUBROUTINE CCOST(B,RATE1,RATE2,RATE3,PV1,PV2,PV3)
      DIMENSION B(50)
      DOUBLE PRECISION PV1,PV2,PV3
      PV1 =0.
      PV2=0.
      PV3=0.
CT    WRITE(3,2)
      DO 1 I=1,6
      J= 7-I
      PV1=(PV1+(B(I) *((1+RATE1)**J)))
      PV2=(PV2+(B(I) *((1+RATE2)**J)))
      PV3=(PV3+(B(I) *((1+RATE3)**J)))
      A=(B(I)*((1+RATE1)**J))
CT  2 FORMAT(5X,'COMPOUND COSTS')
CT  3 FORMAT(5X,I5,2F10.2)
C
CT    WRITE(3,3) I,A,B(I)
    1 CONTINUE
      RETURN
      END
      SUBROUTINE BT(B,AI,N,XI,SSN1)
      DIMENSION B(60)
      DOUBLE PRECISION SSN1
C     COMPUTATION OF RATE OF RETURN USING NEWTON-RAPHSON METHOD
C
C     THIS PART OF THE PROGRAM CHECKS TO MAKE SURE THAT LIFETIME EARNINGS
C     ARE NEVER NEGATIVE AFTER THE ORIGINAL COSTS ARE INCURRED (4 OR 6 YRS)
      J  =0.
C     DO 4 I=1,N
C     WRITE(3,100) I,B(I)
C 100 FORMAT('THE VALUE OF C(',I2,') IS ',F10.0)
C     IF(B(I).GT.0) J=1
C     IF(J.EQ.1.AND.B(I).LT.0) GO TO 5
C   4 CONTINUE
C     GO TO 2
    5 XI= 0.
C   3 FORMAT(3X,'LIFETIME EARNINGS ARE IN ERROR FOR ',F10.0,'INTERNAL RA
C    1TE SET TO ZERO.')
C      WRITE(3,3) SSN1
C
C     PRINT OUT PROBLEM DATA (B) THEN RETURN
C
C     WRITE(3,8)(B(K),K=1,60)
C   8 FORMAT(1X,10F10.0)
C     GO TO 60
C     THIS SECTION OF THE PROGRAM COMPTES THE LOWEST NON ZERO ARRAY
```

```
C     LOCATION (LLOW) AND THE NEXT (HOPEFULLEY HIGHEST) NON ZERO
C     THESE VALUES ARE USED IN COMPTING THE INTERNALRATE FOR VALUES
C     WITHIN THE RANGE.
      LLOW=0
      LHI=0
      DO 102 I= 1,3
      IF(  B(I).EQ.0 ) LLOW=LLOW+1
  102 CONTINUE
      IF(LLOW.EQ.0) LLOW=1
      DO 103 I=1,60
      IF(  B(I).EQ.0) LHI=I-1
      IF (LHI.NE.0) GO TO 104
  103 CONTINUE
  104 CONTINUE
C
C     DO NOT COMPUTE PV IF THERE IS A ZERO IN ARRAY B (0 CAUSES DIV BY
C     ZERO)
      DO 105 I= LLOW,LHI
           IF(B(I).EQ.0.) GO TO 60
C
C     PRINT OUT PROBLEM DATA (B) THEN RETURN
C
C     IF(B(I).NE.0) GO TO 105
C     WRITE(3,8)(B(K),K=1,60)
C     GO TO 60
  105 CONTINUE
    2 X = 1./(1.+AI)
      ACC=.00001
   10 FX = 0.0
      FDX = 0.0
      DO 20 I=LLOW,LHI
      D=I -1
      D1=I-2
C     WRITE(3,80) FX,D,D1
C     WRITE(3,80) FDX,X
      FX= FX+B(I)*X**D
      FDX= FDX+D*B(I)*X**D1
    1 FORMAT(1X,'NO SOLUTION FOR SSN ',F10.0,'INTERNAL RATE SET TO ZERO.
     1')
      IF(FDX.NE.0) GO TO 20
      IF(I.LT.3) GO TO 20
      WRITE(3,1) SSN1
      XI=0.
      GO TO 60
   20 CONTINUE
  101 FORMAT(' THE INTERNAL RATE IS ',F10.3)
   30 XNEW= X-FX/FDX
      IF(ABS(X-XNEW).LE.ACC) GO TO 50
      X=XNEW
      WRITE(3,80) XNEW
   80 FORMAT(3F15.4)
      GO TO 10
   50 ROOT = X
      XI= 1./ROOT-1.
   60 CONTINUE
      WRITE(3,101) XI
      RETURN
      END
      SUBROUTINE PPRINT(IRR,IPASS,N)
```

```
  960 FORMAT(10X,7F12.0)
      DIMENSION IRR(7,60,2)
      WRITE(3,960) IRR(1,4,1)
      WRITE( 3,899) IPASS,N
      WRITE(3 ,960)(((IRR(I,J,K),I=1,7),J=1,60),K=1,2)
  899 FORMAT(2I4)
      RETURN
      END
/*
* BE SURE THERE IS NO RING ON THE TAPE
* THIS PROGRAM READS THE TAPE
* MOUNT TAPE PERRY1
// EXEC LNKEDT
// PAUSE
// TLBL IJSY04,,0
// ASSGN SYS004,X'280',X'C0'
// EXEC ,SIZE=(AUTO,2K)
   1    0    0 999
18     5647       5834       6195       6878       7508       7840       8453
19     6058       6259       6647       7379       8055       8518       9069
20     6457       6670       7083       7864       8584       9077       9964
21     6842       7068       7506       8333       9095       9619      10241
22     7253       7453       7915       8787       9592      10143      10799
23     7574       7824       8309       9224      10069      10648      11336
24     7919       8181       8688       9645      10528      11134      11854
25     8252       8525       9053      10050      10971      11602      12352
26     8573       8856       9405      10441      11397      12053      12832
27     8800       9173       9741      10814      11805      12484      13291
28     9174       9477      10064      11173      12196      12898      13732
29     9455       9767      10372      11515      12570      13292      14152
30     9723      10044      10666      11841      12926      13669      14553
31     9978      10308      10947      12153      13266      14029      14936
32    10220      10558      11212      12447      13588      14369      15298
33    10449      10794      11462      12726      13891      14690      15640
34    10665      11017      11700      12989      14178      14994      15963
35    10868      11227      11923      13236      14449      15279      16267
36    11058      11423      12131      13467      14701      15546      16551
37    11235      11606      12325      13683      14936      15936      16817
38    11400      11776      12506      13883      15155      16027      17063
39    11551      11932      12671      14067      15356      16237      17289
40    11688      12074      12822      14235      15539      16432      17495
41    11813      12203      12959      14387      15705      16608      17662
42    11925      12319      13082      14524      15854      16766      17850
43    12024      12421      13191      14644      15985      16904      17998
44    12110      12510      13285      14749      16100      17026      18126
45    12183      12585      13365      14837      16196      17128      18235
46    12243      12647      13431      14910      16276      17212      18325
49    12289      12695      13482      14967      16338      17277      18395
48    12323      12730      13519      15008      16383      17325      18445
49    12344      12752      13542      15034      16411      17355      18477
50    12353      12760      13551      15044      16422      17366      18489
51    12347      12755      13545      15038      16415      17359      18482
52    12329      12736      13525      15015      16391      17333      18454
53    12298      12704      13491      14978      16350      17290      18408
54    12253      12658      13442      14923      16290      17227      18341
55    12196      12599      13380      14854      16214      17147      18255
56    12127      12527      13303      14769      16122      17049      18151
57    12043      12441      13212      14667      16011      16932      18027
58    11947      12341      13106      14550      15882      16795      17882
59    11838      12229      12987      14418      15738      16643      17719
```

60	11715	12102	12852	14268	15575	16470	17535
61	11581	11963	12704	14104	15396	16281	17334
62	11432	11809	12541	13922	15198	16072	17111
63	11271	11643	11969	13288	14505	15339	16331
64	11097	11463	11785	13083	14281	15103	16079
18	5406	5585	5931	6584	7187	7601	8092
19	5947	6144	6524	7243	7907	8361	8902
20	6474	6688	7102	7885	8607	9102	9690
21	6985	7216	7663	8507	9286	9821	10455
22	7481	7729	8208	9112	9947	10519	11199
23	7963	8227	8457	9971	10884	11510	12254
24	8430	8709	9249	10267	11208	11852	12619
25	8882	9176	9745	10818	11809	12488	13296
26	9318	9627	10223	11350	12389	13102	13949
27	9742	10064	10688	11865	12952	13697	14582
28	10148	10484	11134	12360	13493	14268	15191
29	10541	10890	11565	12839	14015	14821	15779
30	10919	11280	11979	13299	14517	15352	16344
31	11281	11654	12376	13740	14998	15861	16886
32	11629	12014	12758	14164	15462	16351	17408
33	11961	12357	13123	14569	15903	16817	17905
34	12280	12686	13472	14956	16326	17265	18382
35	12583	12999	13805	15325	16729	17691	18835
36	12871	13297	14121	15677	17113	18097	19267
37	13144	13579	14420	16009	17476	18481	19676
38	13403	13846	14704	16324	17819	18844	20062
39	13646	14098	14972	16621	18144	19187	20428
40	13875	14334	15222	16899	18447	19508	20770
41	14089	14555	15457	17160	18732	19809	21090
42	14287	14760	15675	17402	18996	20088	21387
43	14471	14950	15876	17626	19240	20347	21662
44	14641	15125	16062	17832	19465	20585	21916
45	14794	15284	16231	18019	19670	20801	22146
46	14934	15428	16384	18189	19855	20997	22355
47	15059	15557	16521	18341	20021	21173	22542
48	15168	15670	16641	18474	20167	21326	22705
49	15263	15768	16745	18590	20293	21460	22847
50	15342	15850	16832	18687	20399	21571	22966
51	15407	15917	16903	18766	20485	21663	23063
52	15458	15969	16959	18827	20552	21733	23139
53	15492	16005	16997	18870	20598	21782	23191
54	15513	16026	17019	18894	20625	21811	23221
55	15518	16031	17025	18900	20632	21819	23229
56	15509	16022	17015	18890	20620	21806	23215
57	15484	15996	16987	18859	20586	21770	23178
58	15445	15956	16945	18812	20535	21716	23120
59	15391	15900	16885	18746	20463	21640	23039
60	15321	15828	16809	18661	20370	21542	22934
61	11538	15742	16718	18559	20260	21424	22810
62	15138	15639	16608	18438	20127	21284	22660
63	15025	15522	16484	18300	19976	21125	22491
64	14896	15389	16343	18143	19805	20944	22298
18	4820	4980	5288	5871	6409	6777	7216
19	5462	5613	5992	6653	7262	7680	8176
20	6466	6680	7094	7875	8597	9091	9679
21	7253	7493	7957	8834	9643	10197	10857
22	8015	8280	8793	9762	10656	11269	11997
23	8751	9041	9601	10659	11635	12304	13100
24	9465	9778	10384	11528	12584	13307	14168

25	10153	10489	11139	12366	13499	14275	15198
26	10817	11175	11867	13175	14382	15209	16192
27	11457	11836	12167	13508	14745	15593	16601
28	12071	12471	12820	14703	16050	16973	18070
29	12662	13081	13892	15422	16835	17803	18954
30	13228	13666	14513	16112	17588	18559	19802
31	13769	14225	15106	16771	18307	1936	20612
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VITA

Irma Ortega Perry, daughter of Juan J. and Guadalupe Ortega, was born in Laredo, Texas on October 27, 1941. She attended St. Augustine Parochial School in that city and graduated from Martin High School in 1960. She then attended Texas Woman's University for two years and transferred to the University of Oklahoma where she received a Bachelor of Science Degree in Education in 1964. She taught in the Des Moines Community Public Schools for six years and at the same time worked toward completion of a Masters Degree in Educational Administration at Drake University. This degree was awarded in 1971. In the fall of 1974 she entered the Graduate School of The University of Tennessee, Knoxville and received the degree of Doctor of Education, with a major in Educational Administration and Supervision in August 1980.

She is married to William Allen Perry of Shenandoah, Iowa. They have two children, William Allen and Sylvia Laura.