

**Expected Rates of Return to University Study:
A Case Study of the University of Natal,
Durban, 2000**

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Declaration

Except for material specifically indicated in the text, and such assistance as I have acknowledged, this dissertation is my own work and has not been submitted for a degree in any other University.

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ABSTRACT

For many years economists have shown interest in studying education as a form of investment in human capital. It is widely believed that if one attains higher levels of schooling, higher financial rewards will result. This dissertation focuses on ex-ante rates of return to higher education, with particular reference to the University of Natal, Durban. Individual data on 672 undergraduate students (from six different faculties) in the academic year 2000 has been used to estimate the expected rewards they will get upon graduation.

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CHAPTER 1

Introduction

1.1 Introduction

“The cost of schooling and the returns resulting from investment in schooling are currently receiving more and more attention by economists, not only because of their possible implications for economic growth, but also because they may help individuals to determine how much they should invest in the development of their own human capital.”

Hansen (1963: 128)

“... education is such a huge undertaking, it has so radical an influence on man's destiny, that it will be damaging if it is only considered in terms of structures, logical means and processes. The very substance of education, its interaction with the environment as both product and factor of society must all be deeply scrutinized and extensively considered.”

(Faure et al, 1972:69)

Education is a way in which individuals invest in themselves in the sense of incurring costs today in order to enhance potential earnings tomorrow. Of course, no individual student can be certain that more schooling will raise his or her lifetime earnings but he or she can rely on the fact that between any two groups of individuals of the same age and sex, the one with more formal education will probably have higher average earnings than the one with less.

The fact that education and personal earnings are highly correlated does not by itself prove that the cause of higher earnings is extra schooling, but the basic explanation of employers offering higher pay to more educated workers is that education gives one useful skills which imply greater productivity (Blaug 1985: 21).

Of course, if education is a type of investment, it has to be possible to measure its rate of return in the same way as returns to investment in physical capital. Indeed, the calculation of both private and social rates of return to educational investment for all stages of education, which includes university education, has been undertaken in both developed and developing countries. The calculation of the private rates of return on educational investment is to cast light on the private demand for education while the case for calculating social rates of return act as an aid to public investment decisions in education. Williams and Gordon (1981) is just one example of studies designed to show that students do indeed perform some kind of a crude calculation of an expected private return on their own educational investment; the present study follows this approach by calculating the *expected* rates of return.

Higher education plays a very important role in economic development. Through it new knowledge required for technological adaptation and innovation is generated and social mobility can be facilitated. Rapid expansion in higher education, measured by enrollments, private expenditures, government spending and the number of institutions has had important consequences for the extent and distribution of labour market skills, the allocation of resources within the sector, and equity in terms of access to higher education and the distribution of government subsidy (Winkler 1990: 1).

1.2 Organization of the Dissertation

This dissertation is organized into six chapters. The remainder of chapter one introduces education in South Africa, particularly higher education enrolments, and lists the objectives of the study. Chapter two explains the human capital theory explanation of the relationship between education and earnings and discusses some criticisms of the theory. Chapter three discusses the methods that have been used to calculate rates of return to education and reviews various empirical studies. The methodology used in this study, the data, and sample characteristics are discussed in chapter four. In chapter five, expected rates of return are calculated and the results are

discussed. Chapter six gives an overview and summary of the findings.

1.3 The education system in South Africa

“Education is an economic wisdom which is widely accepted in South Africa, but what is not widely accepted is how education expenditure should be allocated within education” (Hosking 1997:245). Expenditure on education constitutes one of the major categories of expenditure in the national budgets of many developing countries and budget constraints have brought about a situation in South Africa where choices must be made - if more is spent on one category of education then less will have to be spent on another. Investment in education is justified because it is assumed to have re-distributional effects and also that it has high returns compared to other types of investment (Godana 1997: 99).

At present South Africa is still going through a phase of tremendous socio-economic, political, and social changes following the movement from apartheid to democracy, all of which impact on its education system (Dlamini 1995: 39). Great pressure is being exerted on the education system to break with the past and get the South African youth prepared for the new century. However, the education system itself is confronted with major problems like the huge increase in the number of pupils demanding higher education, there is a lack of resources especially in rural areas, and there is a large percentage of students who are unable to pay for tertiary education.

Funds allocated to education in the budget have increased substantially over the past three decades. Data shows that while R182.6 million (3.4 percent of Gross Domestic Product) was spent on education in 1960, this increased to R14.9 billion in 1990 (a 5.5 per cent of gross domestic product in 1990 or about a fifth of total government expenditure (Grobbelaar 1992: 6).

In the financial year 1996/97 R39.2 billion was allocated to the education sector and

in 1997/98 it was a total amount of R40.3 billion – which is 21 percent of the total budget and 7 percent of GDP. In October 1997, the government decided to implement a medium term expenditure framework (MTEF) from 1998/99, which would consist of a three year rolling budget. This was after realizing that the one-year budget system at the time limited opportunities for prioritization and often resulted in budget rollovers. According to MTEF, spending would increase from R46.8 billion (allocated in the financial year 1998/99) to 52.2 billion in 2000/01 (in nominal terms). Increased spending on education would predominantly occur in University and Technikon funding (between 7 and 10 percent annually) to reflect improved access to and rising demand for higher education (South Africa Survey 1997/98: 136).

1.4 Higher Education

1.4.1 Expenditure on Higher Education

The higher education system, it is believed, deserves to be expanded for a number of reasons. If a population is better educated and more highly skilled, it will deal more effectively with change. This includes technological change, which a skilled and educated labour force will find easy to adapt. One major function of education is to increase a person's capacity to learn, to provide them with the framework with which to analyse problems and to increase their capability to deal with new information (Maglen 1990: 282). Of course, allocations to higher education must be based on some sort of its rates of return to society, compared with those of other parts of the education sector.

It is indicated in a recent South Africa Survey report (South African Institute of Race Relations [SAIRR] 1998) that spending on higher education increased from 14 percent of the total education budget in 1994/95 to almost 18 percent in 1997/98. General subsidy allocations to Universities and Technikons increased by 12 percent and was said to provide for an average funding level of 66 percent in 1997 – the amount allocated as a proportion of the tertiary funding requirement. In 1997/98, between 60,000 and 70,000 higher education students received financial aid with a

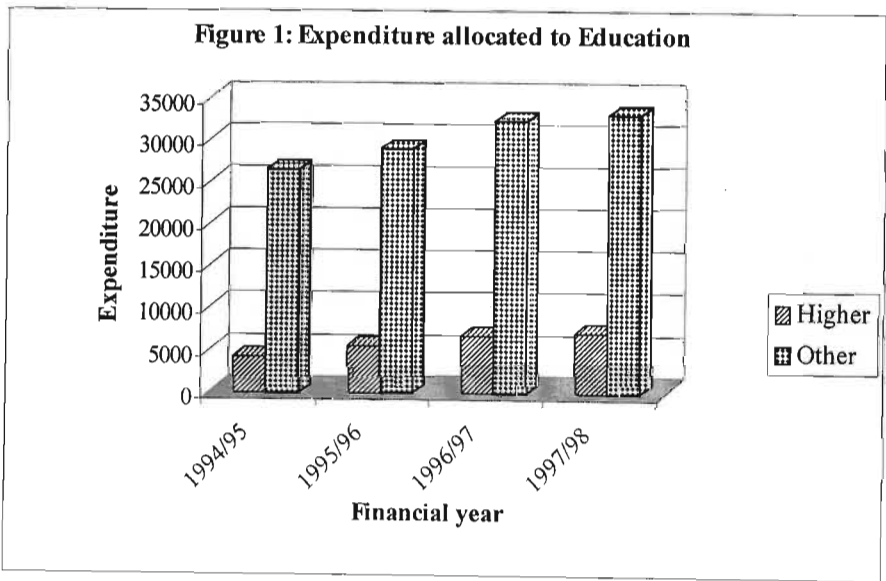
total amount of R363 million having been made available to help needy students, of which the government donated R200 million. The rest came from donors (South Africa Survey 1997/98: 139). Still during this financial year most of the education departments in the provinces indicated that the amounts allocated to education were not sufficient to meet the needs.

Given below is a table showing a breakdown of estimated expenditure on education from the financial year 1994/95 to 1997/98. The table indicates that expenditure on education has been increasing. A graphical presentation of the table is given in figure 1.

Table 1.1: Estimated education expenditure: 1994/95-1997/98 (Millions)

	1994/95	1995/96	1996/97	1997/98
Higher education	4,330	5,635	6,833	7,196
Other levels	26,520	28,959	32,333	33,074
Total	30,850	34,594	39,166	40,271

Source: SAIRR (1998)



1.4.2 Enrolments for Higher Education

The number of students enrolled in education is determined by a variety of economic and non-economic factors. Government policy on the allocation of funds has an important influence on demand since it determines the level of fees and financial support for students through loans, grants and scholarships.

The following table shows changes in University enrolments from 1985 to 1997. The table shows that University enrolments increased by 76 per cent between 1985 and 1997, but then it dropped by 2.3 per cent between 1996 and 1997.

Table 1.2: Enrolment at Universities - 1985 to 1997

Year	Total Enrolled	% increase or decrease
1985	211,756	N/A
1986	233,625	10.3
1987	250,243	7.1
1988	272,445	8.9
1989	286,359	5.1
1990	285,986	0.1
1991	323,889	13.3
1992	318,944	1.5
1993	329,892	3.4
1994	360,250	9.2
1995	385,221	6.9
1996	381,498	-1.0
1997	372,845	-2.3

Source: SAIRR (1998)

1.5 Demand for education

Social demand has been suggested to be the criterion for educational investment decisions. For example, manpower forecasting and cost benefit analysis were seen as unreliable guides for decisions about the scale of higher education. It was said that

higher education should be made available to each and every person qualified by ability and attainment to enter it and all those who wish to do it. The rationale behind this was that educational planning must see to it that investment in education aims to satisfy private demand. Also, policy makers should take all economic and non-economic factors determining private demand for education when forecasting future demand (Psacharopoulos and Woodhall, 1986: 105).

In order to economically examine the private demand for education, factors that determine the demand must be looked into. Examples of these are the private costs of education, which includes direct cost such as fees and indirect costs in the form of foregone earnings. The expected benefits, for example, personal disposable income must also be considered. The level of family income can also influence the demand for higher education. It is very difficult for poor families to pay tuition fees and in cases where education is free they still bear the burden of losing income that is foregone during the period of study. They have difficulties of paying for books, transport, and other fees that have to be borne by the individual or family. As a result, their demand for education tends to be low. Other economic factors that affect demand are job opportunities and what individuals perceive the costs and benefits, or rates of return, to be.

1.6 Graduates and the Labour Market

The difficulties that graduates have may reflect to some extent the wider economic scene as they form part of the labour market. Because higher education is subsidized, graduate unemployment and the dissatisfaction that comes with it shows that there is a misallocation of resources in the society. It has been shown in a number of countries that the highly educated are becoming increasingly vulnerable to economic fluctuations as some labour market segments that offered job security to graduates are facing structural changes that tend to limit their employment capacity. In spite of all this, graduates still have a competitive edge in the labour market and are more likely to find employment than those with less education.

An increasing number of people have been entering university education, as already shown in table 1.2. A study of graduates in South Africa has shown that more than 50 percent of graduates are able to secure employment immediately after completion of their studies. And most of them perceived considerable benefits from their higher education. For most of them, having a degree played a great role in helping to secure employment (HSRC, 1997).

1.7 Objectives of the Study

The aims of this dissertation are as follows:

- To review previous studies on rates of return to education (especially higher education)
- To estimate expected private and social rates of return to a number of different degrees at the University of Natal, Durban (first and final year students)
- To compare the expected rates of return with data which indicates actual rates of return to higher education in South Africa.

The main reason for estimating the rates of return to education is to help answer two important questions:

- a. Is it profitable for individuals to invest in their higher education and how do the returns vary between degree programmes?
- b. Does the return to society's investment in higher education make it a socially profitable investment?

1.8 Importance of the topic

The topic is significant because of the assumed relationship between education and the growth of the economy. This follows from the belief that educated manpower tends to be more productive and therefore enhances economic development, that education contributes to economic growth, and that it has an effect on the distribution of income and wealth.

It is widely (but not universally; see section 2.3.1) accepted that education or training raises the productivity of workers, and hence increased lifetime earnings by imparting useful knowledge and skills. Education not only imparts knowledge and skills, but is also used as a screening device (see section 2.4) by employers when hiring workers. They prefer educated workers because they are believed to possess both educational qualifications as well as certain abilities and aptitudes.

Economic growth is a fundamental objective of all countries. It is assumed that it means increased employment as well as real increases in the welfare of the population. For developing countries like South Africa, there has been an added goal of trying to raise their standard of living and to reduce widespread poverty and deprivation. Many countries are aiming to attain a high, steady rate of economic growth, which is measured by the growth rate of the gross national product. Education contributes to growth through its ability to increase the productivity of an existing labour force in various ways.

Education also affects the distribution of income in a country. Research into the distribution of income has concentrated on trying to explain the shape of the distribution. This is because the distribution of educational opportunities will have an impact on the future distribution of income, so that governments committed to redistributing income in the long term, must consider the role played by education (Woodhall, 1987: 209). The most prominent characteristic of the shape of income distribution is its positive skewness: most people tend to be concentrated below the mean value of income, while a small number of people have high incomes. The

positive skewness of income distribution is inconsistent with people's characteristics like **ability**, which approximates a normal distribution. If ability were normally **distributed**, then the resulting income distribution would be normally distributed. The **problem** with this view is that it lacks empirical support.

We now turn to examine, in Chapter 2, the basic theory which lies behind private and **social expenditure** on different levels of education.

CHAPTER 2

Human Capital Theory

2.1 Introduction

The purpose of this chapter is to discuss the theory behind the economics of education. Section 2.2 discusses the development of the human capital concept, the relationship between human capital and earnings, and section 2.3 discusses some of the criticisms of the assumed relationships between education and productivity and education and economic growth. The screening hypothesis is then discussed in section 2.4.

2.2 The Human Capital Theory

The idea that education is a form of investment is one of the most important developments in economics in recent decades and has had considerable impact on educational planning in developing countries. The human capital theory is the main theory in the relationship between education and earnings, and is central to much of the research in the economics of education. It has also had a powerful influence on the analysis of labour markets and wage determination.

The development of the theory is mostly associated with Jacob Mincer and Gary Becker, among others. According to this theory, investment in education contributes to the formation of human capital which enhances the productivity of labour. Individuals who achieve certain levels of education are paid higher wages on the basis of higher productivity (Godana, 1997: 101). Investment in education is not different from any other investment in physical capital. Different educational levels yield different levels of productivity and consequently, different levels of earnings in the labour market. One interesting thing about the theory is that it does recognise that differences in people's abilities also lead to different earnings to individuals with the same level of schooling (Godana, 1997: 102).

The theory postulates that the more skills and experience (or the more years of schooling or education) increase over time, the more earnings rise. But in latter years, as people age their productivity deteriorates, and hence earnings tend to decline. On the labour demand side, for an individual to demand higher earnings, his/her marginal product must rise with the level of schooling (Berndt, 1991: 154). And on the supply side, people forego earnings, pay tuition fees and continue to study because they expect to be compensated by higher earnings over their lifetimes. That is, the present value of the stream of payments generated by the investment in education must exceed that of the next best alternative (Jacobsen, 1994: 259).

2.2.1 The Relationship between Human Capital and Earnings

The earliest explanations of the concept of human capital suggested that education or training raised the productivity of workers, and hence increased their lifetime earnings (Woodhall, 1987b: 209). Education was viewed by the human capital school as a way of imparting knowledge and useful skills that made the worker more productive. The earnings of workers with more education were therefore more than those with less education because they were more productive than the less educated workers. This is the basis of viewing education as a form of investment in human capital, that is, education raises the productivity of workers and that higher earnings of the educated reflect the value of their marginal productivity.

The theoretical link between human capital and lifetime earnings is summarised in the form of an earnings profile. Earnings are seen as a return to training (both schooling and on-the job). Since human capital grows over the life cycle by means of investment and declines by means of depreciation and obsolescence, earnings change accordingly. An average earnings profile shows rapid growth during the first few years of working life and falls in subsequent years and in the last years of working life (Jacobsen, 1994: 265).

2.3 Criticisms of the Human Capital Theory

The view that education is a form of investment in oneself for future benefits measured by enhanced earnings has been challenged from several angles. Solmon (1987) argues that observers of education must remind themselves that monetary benefits are only one type, and perhaps not the most important type, to be considered in the total evaluation of the value of education. There is a consumption aspect of education, which is usually not easy to separate from the investment part.

2.3.1 Human Capital, Productivity, and Economic Growth

The human capital theory has been criticized, especially regarding the links it assumes between education and productivity, and between education and economic growth. Maglen (1990: 282) points out that “the notion that educational attainment improves productivity (thus, the link between human capital and productivity as well as earnings) has come under heavy criticism”. Productivity improvements associated with higher earnings need not be caused by higher education, that is, returns to education may arise not from editions to human capital but from institutional factors (Doucouliagos and Hopkins, 1993: 5).

The link between human capital and economic growth is also criticized. It is argued that the analysis of causality between the two is very much needed to establish their relationship. The critics argue that the nature of the relationship may be more complex than specified by human capital theory, but the problem is that the exact relationship has neither been theoretically modelled nor empirically tested (Maglen, 1990: 282). It is argued that the causal influences may be running from economic growth to human capital formation and not from human capital formation to economic growth, or causality may be running in both directions. Maglen (1990) re-examined the available evidence of links between education, productivity, and economic growth. The evidence, he concluded, seems to be very weak.

2.3.2 Education and Labour Markets

Human capital theory relies on observed earnings differentials as a means to measure the benefits to a certain level of education. Understanding how the labour market functions to determine those earnings is therefore important to understanding the human capital model. A major assumption of the human capital model is that the labour market is perfectly competitive. The implication of such an assumption is that the wages that are paid to the workers reflect their marginal productivity and are determined by the forces of demand and supply. The demand and supply functions reflect, respectively, the profit maximisation behaviour of employers and the utility maximisation of workers and a notion of competitive equilibrium. The interaction of demand and supply would determine the equilibrium wage and employment and would adjust the market back to equilibrium whenever a disequilibria situation exists. If there is an increase in high school graduates for instance, the market will automatically adjust their wages downward to reflect the abundance of such skill relative to demand (Hinchliffe, 1987: 142).

Labour markets, especially in less developed countries, are usually in continuous adjustment to disequilibria created by the demand for educated labour altering over the course of development process. On the demand side, the process begins with the emergence of a large public sector that provides the majority of formal sector employment. Later in development, a strong private sector emerges diminishing the importance of the public sector as an employer. The change in the economy usually leads to a change in the occupational structure, with demand for labour shifting from white collar jobs to blue collar jobs, especially in the manufacturing sector. Partly generating these changes and partly as a result, an expansion of the school system alters the composition of the labour supply, with each entering cohort of workers being more educated than the last. The result is a growing disparity between the structure of the labour force and the structure of employment opportunities leading to a “filtering-down” of educated workers into lesser skilled tasks (Cohen and House, 1994: 1556).

Sometimes rates of return may decline as a result of one or both of the following reasons. First, a rising supply of educated people unmatched by a corresponding increase in the demand for skilled labour will tend to decrease wages. This will happen if wages are sufficiently flexible and the labour market is competitive. Second, returns to education may fall if new entrants with a certain level of education are unable to get jobs in a well paying occupation and have to settle for lower occupation categories. The filtering down of new entrants into low paying jobs is possible where wages are inflexible downward.

Since the 1970's, a wide range of alternative labour market theories has been developed. The theories have emerged largely in response to a number of empirical observations of the industrialised countries labour markets which have been at odds with the implications of the neo-classical theory. Hinchliffe (1987: 142) mentions poverty and income inequality, failure of education and training to raise the incomes of the poorest groups, among others, as the empirical oddities observed. The alternative theories of labour market functioning can be divided into labour market segmentation and job competition models. Generally, segmentation models assert that labour markets are characterised by a number of segments, each of which has different conditions of employment and recruits from different parts of the labour force (Hinchliffe, 1987: 143). In developing countries, segmentation may be in the form of formal versus informal sector labour market, where a worker employed in the latter cannot easily move to the former. The implication is that the workers in the formal sector are sheltered from competition from those outside the sector. Such labour market sheltering usually comes in the form of institutional factors such as unions.

2.4 The Screening Hypothesis

The screening hypothesis comes in two forms, the strong version and the weak version. The strong version asserts that education merely identifies students with

particular attributes, acquired either at birth or by virtue of family background, but does not itself produce or in any way improve these attributes (Blaug, 1985: 133). The weaker version sees school as an index among others used by employers to sort out applicants given their lack of knowledge about the applicant's productivity. Blaug (1985: 134) interprets the weaker version of the screening hypothesis as a label for a classical information problem in a labour market.

The main challenge of the screening hypothesis (whether in the strong or weak) is to cast doubt on the human capital's explanation of the relationship between earnings and education as implying that educated workers earn more because they have acquired some useful skill in school that make them more productive. Those who believe in the screening theory argue that education simply confers a certificate, diploma or a sheepskin which enables a holder to get a well-paid job without necessarily affecting his or her productivity (Woodhall, 1987b: 217). Woodhall also points out that the screening hypothesis has helped us recognise that education affects attitudes, motivation, and other personal characteristics, as well as providing knowledge and skills.

Weiss (1995) points out that "sorting models" (a term he uses to refer to screening by firms) can best be viewed as an extension of human capital models. The major difference between the two models lies in the fact that human capital is concerned with the role of learning in determining the return to schooling. Screening, while allowing for learning, focuses on the ways in which schooling serves as either a signal or filter for productivity differences which firms cannot reward directly. Screening extends human capital by allowing for some productivity differences that firms do not observe to be correlated with the cost and benefits of schooling (Weiss, 1995: 133-135). Weiss sums up the argument that screening has all the features of human capital models by arguing that:

" it seems unlikely that learning explains all the wage differences associated with schooling and work history. Better-educated workers are not a random sample of workers: they have low propensities to

quit, or be absent, are less likely to smoke... However, if low levels of education are associated with unfavourable employee characteristics, and employers are allowed to take education into account when hiring workers, we would expect employers to favour better educated workers as a means of reducing their costs of sickness and job turnover. In turn, students will take these hiring criteria into account when deciding how long to go to school." (Weiss, 1995: 133).

CHAPTER 3

A Review of Previous Empirical Studies

3.1 Introduction

This chapter surveys the literature on rates of return to education. Section 3.2 introduces the concept of rate of return to education. Section 3.3 concentrates on the methodologies that have been employed in the estimation of returns to education. Section 3.4 reviews a number of studies on educational returns, while section 3.5 looks at the debate regarding the use of the existing rates of return to education.

3.2 The Concept of Rate of Return to Education

Treatment of education as an investment allows economists to calculate the profitability of education by using the same cost-benefit principles used for appraising physical capital. A central concept in cost benefit analysis is the rate of return, which is a measure of profitability of an investment project. In general, it is a measure of the expected yield of an investment in terms of the future stream of benefits generated by the capital, compared with the cost of acquiring the capital asset (Psacharopoulos, 1981: 321). More precisely, the rate of return is the rate of interest at which the present value of future benefits is exactly equal to the cost of the investment. This allows different investment projects to be compared in order to choose the one that offers the highest rate of return.

When cost-benefit analysis is applied to investment in education one needs to identify both costs and benefits to education. Increased lifetime earnings are the major benefits for schooling or training in the human capital models. These can then be compared with the direct costs of fees, expenditure on books and equipment, plus the indirect costs, which are forgone earnings while in school or training (Psacharopoulos, 1981: 322). The rate of interest that equates these expected benefits to the expected costs is the expected rate of return from that schooling.

3.3 Methods of Estimating Returns to Education

Estimates of the profitability of education can be obtained using a variety of methods and the method that one uses usually depends on the nature of the data available. In the empirical cost-benefit analyses of education, calculations have been based on the internal rate of return, rather than the alternative criteria, the net present value. Calculation of the internal rate of return, as discussed earlier, identifies the rate of interest or discount which equates the present value of costs and the present value of expected benefits or, alternatively, the rate of interest at which the difference between discounted benefits and costs is zero (Psacharopoulos 1981: 321).

In the economic literature on investment appraisal, the present value of a project is regarded as a better guide for investment choice than the internal rate of return. This is because, in some circumstances the two criteria may give conflicting signals, and in comparisons of mutually exclusive projects, the internal rate of return may be misleading. However, net present value has lost ground in the recent literature mainly because it has a less readily intelligible interpretation (Psacharopoulos 1981: 322). In any case, internal rates of return are the standard measure calculated in human capital studies.

The recent years have seen the development of several methods of calculating the rates of return. Three alternative methods have been used in recent studies – these are the “elaborate” or “full” method, the “earnings function” method, and the “short-cut” method. All these three methods of calculation yield the internal rate of return to investment in education, which is a measure of the profitability of investment from the point of view of the individual students or families – the private rate of return or, from the point of view of the society as a whole, the social rate of return (Psacharopoulos 1994: 1325).

The private rate of return measures the relationship between costs and benefits of education for the individual while the social rates of return measures the relationship between all the social costs of education that must be borne by society as a whole, and

the benefits that are expected to accrue to society (Psacharopoulos 1985: 33). Both these rates of return are important tools for evaluating investment. Not only do the private rates of return determine individual demand for education, but social rates of return also have great bearing on the question of how education should be financed and how the costs and benefits of education should be distributed. Costs include school operating costs incurred by society, opportunity costs incurred by individuals – mainly income foregone during school attendance - and incidental school-related costs incurred by individuals, like books and travel. Also included under costs are tuition fees.

In what follows, the three methods are discussed in detail. The “elaborate” method involves finding the discount rate that equates a stream of education benefits and a stream of costs at a given point in time. Thus, it requires in the first place detailed data on age-earning profiles by educational level. Included in the stream of costs are already listed in the previous paragraph. This method, however, has not been used in many studies because of it requires data or information which is rare in most countries, especially developing ones.

The second method, the earnings function method, is due to Mincer (1974) and it involves fitting a semi-logarithmic¹ using the natural logarithm of earnings as the dependent variable (Psacharopoulos 1994: 1325). Its popularity is ascribed to the fact that explicitly links the schooling parameter in the earnings function with the rate of return to investment on schooling (Hosking 1992: 224). This function is of two variants. The standard or basic earnings function is of the form:

$$\ln y_i = \beta_0 + \beta_1 s_i + \beta_2 x_i + \beta_3 x_i^2 + u_i \quad i = 1, \dots, n$$

¹ The semilogarithmic form arises from equating the net present value of the additional earnings streams with that of the additional cost of the investment in human capital. See Berndt (1991: 162) for detailed mathematical derivation.

where $\ln y_i$ = the natural log of earnings for the i th individual
 s_i = a measure of the number of years of schooling or educational attainment
 x_i = a measure of the individual's human capital stock of experience
 x_i^2 = the square of experience and it is included to take care of the concavity of the earnings function (its coefficient is expected to be negative, which implies that earnings will rise with experience but at a diminishing rate)
 u_i = a random disturbance term reflecting unobserved characteristics such as innate ability.

One would expect the β_1 , the coefficient on s_i and β_2 , the coefficient on x_i to be positive, indicating positive returns to education and experience. This equation is based on human capital theory and β_1 is interpreted as the average private rate of return to an additional year of schooling/education. (Psacharopoulos 1981: 323)

Yet there exists another type of earnings function, which is an extension of the above and it allows one to estimate returns to education at different levels of schooling. This is made possible by conversion of the years of schooling into a series of dummy variables representing the completion of the main schooling cycles like primary, secondary, and tertiary, or to dropouts from these levels (Psacharopoulos 1994:1325). This approach to the estimation of returns to education has an advantage of being quick and easy to compute, as long as data is available. The disadvantages are that it is applied to data for broad aggregates and therefore fail to give results that can be readily implemented at micro-level. Also, one cannot incorporate cost data for the estimation of social rates of return. Thirdly, returns to primary education are understated as a result of the formula assigning foregone earnings to primary school children, which is wrong because primary school children do not work.

The third alternative is to use the “short-cut” method. Psacharopoulos (1981) argues that this method does in an explicit way what the earnings function does implicitly and it has been used by Psacharopoulos (1981a) and by Psacharopoulos and Sanyal (1981a). Here the returns to education are estimated on the basis of a simple formula given by the following equation:

$$r_s = (W_s - W_{s-1}) / t_s(C_s + W_{s-1})$$

where r_s = the rate of return to educational level s over educational level $s-1$ as the control group;
 w_s and w_{s-1} = the mean annual salaries of graduates with s and $s-1$ level of education, respectively;
 C = the annual cost per student of educational level s ;
 t_s = is the number of years for educational level s .

This method is very easy to use and of great value in cases where information on individual earnings is not available. It also has the advantage of being able to use already tabulated information on the earnings of workers by educational level (that is, where different educational levels are used) in order to estimate private rates of return. It is easy to use when resource costs of schooling have to be added in the denominator to calculate social rates of return. Despite these advantages, the method is not without its limitations. It is said to be inferior because the discounting process used in estimating the true rates of return is sensitive to values of the early ages used in the calculation (Psacharopoulos, 1981: 325-326).

3.4 A Review of Studies on Rates of Return

A number of studies on rates of return have been carried out in many countries, both developing countries and developed ones, using the methods outlined above. In this section, some of these studies on rates of return to education, the methodologies used, as well as the results that have been obtained, are reviewed. Most studies carried out have calculated ex-post rather than ex-ante returns.

Monson (1979) used the elaborate method to estimate internal rates of return to secondary and university education in the Ivory Coast. He first calculated the returns using the standard method and then modified it to account for high failure rates and the job-screening role of the educational system. He took screening into account because it implies that “successfully higher educational levels are required to obtain entrance into higher occupations. Also, placement and advancement in government employment in the Ivory Coast had been found to be often contingent upon proper educational credentials, while employment in the private sector depends informally to a lesser, but still significant, degree upon the same criterion” (Monson 1979: 418).

Students who fail forego earnings and incur educational costs, which have to be added to those of the prior educational level. These students not only forego income while at school, but also postpone entry into the labour market and may incur costs of foregone experience accumulation. The results from this study (from the two methods used) are given in table 3.1 below.

Table 3.1: Standard and Adjusted Rates of Return to Education in the Ivory Coast (by occupation)

	Private		Social	
Occupation	Standard	Adjusted	Standard	Adjusted
Office labour	30.9	19.5	15.5	9.8
Supervisors	72.2	35.8	52.8	26.8
Technicians	19.2	12.7	38.3	10.5
Management	9.0	6.6	6.1	3.9

Source: Monson 1979: 428.

The estimates suggest that investment should be channelled toward secondary education, which is the lowest level of education examined in this study². In fact, this has been the case in the Ivory Coast³. It is clear from the results that private rates of return are greater than social rates of return.

Psacharopoulos (1981) presents rates of return to education for 44 developing countries and among these countries only eight are sub Saharan African countries. The results for the eight countries are shown in Table 3.2. The table shows that for all countries, the social returns are higher for primary schooling. In four of the six cases which have social rates of return, returns to higher education are lowest and are below 10 percent in three cases. This tends to imply that education budget resources should be switched away from higher education towards the other levels.

Table 3.2
Rates of Return to Education by Level and Country (percent)

Country	Year of Survey	Private			Social		
		Primary	Secondary	Higher	Primary	Secondary	Higher
Ethiopia	1972	35.0	22.8	27.4	20.3	18.7	9.7
Ghana	1967	24.5	17.0	37.0	18.0	13.0	16.5
Kenya	1971	28.0	33.0	31.0	21.7	19.2	8.8
Malawi	1978					15.1	
Nigeria	1966	30.0	14.0	34.0	23.0	12.8	17.0
Rhodesia	1960				12.4		
Sierra Leone	1971				20.0	22.0	9.5
Uganda	1965				66.0	28.6	12.0

Source: Psacharopoulos (1981) Table 1

² The first three occupations, that is, office labour, supervisor, and technician are held by those people who have completed only secondary school and they show higher rates of return. Management positions are held by university graduates and they reflect lower returns.

³ Secondary education is said to have received about three times more governmental funding than the university receives, and the university depends on foreign aid for more than 50 percent of its budget.

The Mincerian method (the earnings function) was used by Williams and Gordon (1981) to estimate/calculate perceived (ex-ante) returns to continued education in England. They obtained their data from a sample of 2944 students in their final year of compulsory education attending 110 secondary schools in England. In the perceived earnings functions, expected life-time earnings were first computed from anticipated earnings at the start of work and then replaced by estimated discounted life-time earnings. It turned out that the marginal rate of return to higher education from the first estimation were 13 percent for boys and 9.9 percent for girls, and the perceived returns to upper secondary education were higher, 21.6 and 11.7 percent for boys and girls, respectively. These were based on estimates of gross income.

After these figures were corrected to allow for the effect of tax, the private rates of return for upper secondary were 16.8 percent for boys and 9.1 percent for girls. The perceived rates of return to continue to higher education were lower ; 10.1 percent and 7.7 percent for boys and girls, respectively. This gives the same results as other studies, that rates of return to education are higher for lower levels of education than for higher levels of education.

Harris and Shariff (1984) estimated the expected rates of return to university study in Malaysia using an ex ante short-cut approach. Their study was based on data which they collected from final year students at the Malaysian Agricultural University by means of a questionnaire. They estimated the median private expected return at 34.8 percent, which explained the strong demand for university education at that time. The median social rate of return was estimated at 10.9 percent, which was much lower than the private rate of return. As Malaysian school leavers and graduates were most likely to face a period of unemployment (estimated at three months on average) after completion of their studies, adjustments were made to take unemployment into account. But the authors found no difference in the rates of return since being unemployed for only three months out of twenty-seven years of work does not really make investing in higher education unattractive.

The elaborate or full discounting method was used by Bosworth and Ford (1985) to estimate ex-ante rates of return to higher education using data drawn from a survey of Loughborough University of Technology students before entry (Bosworth et al 1985: 261). The results show that high rates of return can be anticipated, ranging from 21 per cent for females to 28 per cent for males. These are more than twice the size of those obtained by Williams and Gordon (1981). Also observed were the relatively high rates of return to female investment in higher education. The authors trace these high ex-ante rates of return to the fact that the sample comprised actual and not just potential entrants and also that it related to university entrants and not all higher education students.

George Psacharopoulos and Ying Chu Ng (1994) carried out a study on “Earnings and Education in Latin America” using first the Mincerian method (both basic and extended functions) and then using the full discounting method. They calculated rates of return to education in eighteen Latin American countries and among these countries, twelve had an average return of at least 10 percent (as required by the World Bank). This they calculated using the basic earnings function. In an attempt to observe differences in returns to schooling by gender, they found that working females in general attained more education than males in all except for only four countries. However, this did not give females an advantage over males as the mean earnings of each country showed that males in fact earned more than females. Presenting the results of their sample by public and private sectors of employment, they observed that public sector employees had more years of schooling than private sector employees, but public sector employees had a lower rate of return to their schooling investment (Psacharopoulos et al 1994: 192).

They further examined how the returns to education changed during the decade of study, 1980 to 1989. The results showed that a declining trend in the rates of return to education did exist. There were mixed results for the time trend in the returns by gender: the overall average schooling for both sexes increased over time, but the results supported a declining trend in average returns for males although not for females. In five out of eight countries studied, an increase over time in years of

schooling for females was associated with a higher rate of return. Using the extended earnings functions to disaggregate the educational returns by level of schooling, it was found that in 13 of the 18 countries, primary schooling had the highest rate of return compared to other levels of education. This is consistent with the Psacharopoulos' (1981) results. This finding again suggests that primary education is the most profitable way of investing in education. Private rates of return were higher than the social rates of return and the social rates of return to investment in primary education was highest in ten out of fourteen countries. They concluded that primary education is "a number one priority in most countries, and that the earnings premium of high education graduates has declined over the years." (Psacharopoulos et al 1994: 206).

In a later study, Psacharopoulos (1994) tabulates results from a number of rates of return studies carried out in developing countries in an attempt to compare the returns to education. The returns vary considerably between regions, with private returns to higher education ranging from 12.3 per cent to 27.8 per cent and social rates of return from 8.7 per cent to 12.3 per cent. This comparison also, like the Latin American study discussed above, shows that primary education has the highest social profitability in all world regions.

Also the private returns are higher than social returns because of the public subsidization of education, and the degree of public subsidy is found to increase with the level of education considered (Psacharopoulos 1994:1326). Returns to education are shown to have a declining pattern over time; social returns have declined by between 2-8 percentage points on average in a fifteen-year period (from 1980). An interesting finding is that the returns to higher education increased by about two percentage points during the same period. Table 3.3 overleaf gives these rates of return.

Table 3.3: Returns to investment in Education by level - percentage

Region	Private			Social		
	<i>Primary</i>	<i>Secondary</i>	<i>Higher</i>	<i>Primary</i>	<i>Secondary</i>	<i>Higher</i>
Sub-Saharan Africa	41.3	26.6	27.8	24.3	18.2	11.2
Asia	39.0	18.9	19.9	19.9	13.3	11.7
Europe, Middle East, and North Africa	17.4	15.9	21.7	15.5	11.2	10.6
Latin America/Caribbean	26.2	16.8	19.7	17.9	12.8	12.3
OECD	21.7	12.4	12.3	14.4	10.2	8.7
World	29.1	18.1	20.3	18.4	13.1	10.9

Source: Psacharopoulos (1994)

An estimation of returns by faculty shows that the returns varied between higher education faculties, with sciences, agronomy, and physics showing lower social returns (8.9, 7.6, and 1.8 percent, respectively), and engineering and economics showing highest private returns (19.0 and 17.7 percent, respectively). A sectoral analysis of the results showed that returns in the private sector of the economy are higher than those in the public sector, with 11.2 and 9.0 percent, respectively (Psacharopoulos 1994: 1330). Higher returns are also observed in countries with lower per capita income and the differences between private and social returns are greatest in the poorest countries.

Psacharopoulos comments that it is not really easy to compare rates of return results the way he does across countries because different methods were used to calculate the returns. Also, he says that recent studies have been based on earnings of those employed in the private sector, which is the competitive sector of the economy, where the wages paid should better reflect the worker's productivity. This means that previous estimates based on earnings of workers in all sectors may have underestimated returns to education.

Menon (1994) also used the Mincerian method to examine the costs and economic benefits of higher education as perceived by final secondary school students in

Cyprus. She used primary data collected from a sample of 811 students doing their final year of secondary education at eight secondary schools in Cyprus in the academic year 1993/94. In estimating the model, she found that the educational intentions of students were not significantly associated with expected earnings. She gives the reason for this as being the fact that “students who intend to work did not expect to earn considerably less than those who intended to go into higher education”(Menon 1994: 58).

This is in support of the human capital theory in that students who decide not to pursue higher education do not consider it profitable to do so.

Blundell et al (2000) applied Mincer type functions to data for Britain and found that returns for men were around 15.0 percent to a non-degree higher education qualification, 20.8 percent for first degree, and 15.6 percent for a higher degree. For women these were estimated at 26.1, 39.1, and 42.7 percent, respectively. Looking at the results in general, the returns to higher degrees and non-degree higher education courses were lower than those to undergraduate degrees.

3.5 The Debate on the Use of Rates of Return

“The World Bank plays an important and influential role in shaping the economic policy agenda of governments in many developing countries, as well as those of other donor agencies, which happens to be a consequence of the Bank’s fast growing financial involvement in the education sector.” (Bennell 1996: 235)

The World Bank published the *Education Sector Review: Priorities and Strategies for Education* (the Review) in 1995, which states that it sees its main role as providing advice to help governments develop their own education policies suitable for the circumstances of their own countries. This review relied heavily on the rates of return

analysis and the findings of George Psacharopoulos's 'Global Update' (1994) in support of three of six major policy recommendations. These are, that there should be higher priority to education, that public investment should be focused on education and that there should be greater attentions to outcomes⁴ (Bennell 1998: 108).

The pattern of the rates of return in Psacharopoulos' study established that primary education is the number one investment priority in developing countries; the returns decline by the level of schooling and the country's per capita income; investment in women's education is more profitable than that of men; returns to education in the private sector of the economy are higher than among those working in the public sector; and that public financing of higher education is regressive (Psacharopoulos 1994: 1325).

There has been a vigorous debate around the use of these rates of return used by the World Bank. Bennell (1996) critically examines how this Review estimates and uses rates of return to education research.

Looking at the policy recommendation of higher priority for education, Bennell states that his examination of the full method rates of return that Psacharopoulos uses to calculate aggregate estimates shows that investment in education are not universally profitable. He gives evidence that among the forty-five developing countries, only twenty-nine have social rates of return to at least one level of education that are 10 percent or lower, and in all, except for one country, at least one level of education has a social rate of return below 15 percent (Bennell 1996: 236). He also indicates that there are data deficiencies as most developing countries rarely have quality data and therefore there are problems of omitted variables and sample selectivity biases which will tend to give overestimated or underestimated results. Also, many rates of return studies used out of date cross-sectional data which biases social and private returns upwards (Bennell 1996: 237). Bennell suggests that if these biased are taken into

⁴ Three other policy recommendations are greater household involvement, greater attention to equity, and more autonomous institutions.

account, the current social returns could be well below social opportunity costs of capital in the majority of developing countries. On public investment on basic education and the financing of higher education by households, he points out that it is not true that rates of return to primary education are highest in most developing countries. He states that for 34 developing countries with a complete set social returns by educational level, only in half is the return to primary education significantly higher than other levels of education (Bennell 1996: 238).

The Review emphasizes that lower secondary education be part of basic education, but the problem with this view is that it does not give any evidence whether returns to lower education are attractive and therefore need higher priority. The available evidence on returns to lower secondary education is very limited and cannot be used to support investment in lower secondary education. Another weakness in the Review is that it does not say anything about upper secondary education, yet having access to upper secondary education determines one's chance of obtaining higher education (Bennell 1996: 240). Bennell stresses that if, as the Review argues, social returns are to be the main criterion for public sector resource allocation, then upper secondary education should be given high priority in many developing countries.

That general secondary education has higher returns than vocational secondary education was also stated by the Review, supported by Psacharopoulos' study of comparative rates of return to academic and vocational secondary education. Bennell's examination reveals the social returns to vocational secondary school are as high if not higher than returns to general secondary education. He notes that in cases where secondary education enrolment ratios are low, more able students will tend to be in general secondary school and the less able ones, usually poorer, are enrolled in vocational education. The fact that among all the rates of return that the Review uses have not been adjusted for such factors as ability and family background will bias the results upwards. Psacharopoulos' finding that the gap between private and social returns is greater in higher education than in basic education is criticized in that from the examination, the estimates are not supported by evidence (Bennell, 1996: 243).

The recommendation that policymaking should pay more attention to education outcomes is considered very important but then the possibility of relying on rates of return analysis is said to be not ‘clear’ and could lead policymakers in developing countries in wrong directions. This is because of lack of “comprehensive detailed and high quality analytical econometric skills” in developing countries. Even the World Bank admits that rates of return are of limited value in the priority setting process.

In summary, Bennell (1996: 246) states that “the rates of return analysis and evidence used in the review are flawed” and finds it surprising that the Review relies so heavily on rates of return when the World Bank and other agencies place low emphasis on conventional rates of return analysis.

Bennell also concludes that the pattern of rates of return reported by Psacharopoulos do not prevail for most of the Sub-Saharan countries. Only in two of those countries shown in Table 3.4 (in the next page) does the private rate of return to primary education exceed either secondary or higher education. Bennell (1996) notes that the quality of data in the countries that have the highest rates of return being for the primary level of education is very poor.

Bennell asserts that calculating rates of return to the whole secondary school cycle and not making a distinction between lower and upper secondary masks some important differences. He argues (1996) that if Psacharopoulos’s aggregate rates of return are calculated with upper secondary and lower secondary being separated, the aggregate rate of return to upper secondary is in fact the highest and not primary education.

In his response to the above criticisms of using rates of return by Bennell, Psacharopoulos (1996) gives a hypothetical example of a government which receives millions of US Dollars to be used in the fixation of the educational system, saying that the government will have to set priorities on how the money is going to be used. In

cases like these, there is need to adhere to some kind of theory for the expected effect of this money to education. This theory is the human capital theory, which states that

Table 3.4 Private and social rates of return to education for some Sub-Saharan countries**

<u>Country Study</u>	<u>Primary.</u>	<u>Lower Sec.</u>	<u>Upper Sec.</u>	<u>Secondary</u>	<u>University</u>
Botswana (1984)	528 (42)	76 (41)	80 (62)	_____	38 (15)
Cote d'Ivoire (1987)	25.7	11.3	30.7	_____	25.1
Ethiopia (1972)	35 (20.3)	36.7 (28.6)	22.8 (18.7)		27.4 (9.7)
Lesotho (1983)*	15.5 (10.7)	_____	_____	26.7(18.6)	36.5 (10.2)
Malawi (1986)	15.7 (14.7)	26.3 (21.2)	16.8 (15.2)	_____	46.6 (11.5)
Somalia (1983)	59.9 (20.6)	13 (10.4)	25.1 (19.7)	_____	33.2 (19.9)
Zimbabwe (1992)	(M)15.5(11.3)	(M)25.6(22.8)	(M)59.1(61.5)	_____	(M)6.4(1.9)
	(F)17.7(11.1)	(F)32.5(26.6)	(F)37.9(33.7)	_____	(F)3.8(-4.3)

Source: Bennell (1996: 186-87)

**Social rates of return to education are reported in parenthesis

*The Lesotho study did only have rates of return to the whole secondary education cycle.

students who incur expenses today will later earn more than those with lower levels of schooling. Thus, education is considered an investment. He refers to rates of return to education as a “tool” for establishing investment priorities in education. He compares this to the case of a firm which calculates returns to different projects and these can be miscalculated. But still, their validity cannot be denied and the estimates cannot be ignored.

Psacharopoulos also points out that planners used to rely on manpower forecasting to predict a country's requirements in educating people and it had led to recommendations that vocational schooling and university be expanded. But the rates of return applied to the same countries would give a recommendation that if a country has \$1000 per capita income, basic education should be the priority, which is good in that the people's living standards will be improved and poverty will be alleviated.

CHAPTER 4

Methodology and Sample Characteristics

4.1 Introduction

The aim of this chapter is to discuss the methodology used in this study, including the methods of primary data collection. The characteristics of the sample will also be presented. Section 4.2 discusses the data and the data collection method. Section 4.3 looks at the actual method employed in the calculation of the rates of return, section 4.4 describes the sample characteristics, and section 4.5 points out some limitations of the study.

4.2 Data Collection

The data used in this study was collected from a sample of 673 students at the University of Natal, Durban in the academic year 2000. A total of 437 of these were first year students while 235 were doing their final year. I would have wished to have a much larger sample size (of maybe more than a thousand), but some students were not really willing to help. Some decided not to give the questionnaires back while others gave misleading information. The students interviewed were chosen from six different faculties or degrees. These are Bachelor of Social Science, Bachelor of Science, Bachelor of Science-Engineering, Bachelor of Commerce, Bachelor of Law, and Bachelor of Arts. The data collection instrument was a questionnaire designed by the author to capture all the information that is needed in the formula used for the calculation of rates of return. The questionnaire can be viewed in appendix 1.

To administer the questionnaire, appointments were made with first and final year lecturers in these six faculties, asking them to allow me to use about seven to ten minutes of their lecture time to distribute the questionnaires and then to collect them after they have been completed. For each faculty, the most representative first and final year groups were chosen. The survey was carried out in the last four weeks of

the first semester, 2000 and the first three weeks of the second semester. The survey was open only to South African citizens.

Each student was asked to provide information on his/her expected earnings at the start of their working life (with and without a university qualification), the cost of their education, the kind of occupation they hoped to enter, the sector in which they expect to be employed, the number of years they expected to work after graduation, etc. The students were asked to give this information irrespective of whether they intended to work or continue studying.

4.3 The Rate of Return Formula

As already mentioned in Chapter 3, there are several ways in which to undertake the estimation of rates of return to investment in education. The ‘short-cut’ method was adopted for this study because the data that has been collected suited to this type of method.

The following “short cut” method formula, which was used by Harris and Shariff (1984), is used in the computation of the expected rates of return. This formula shows various elements in the investment decision. The formula is given by:

$$\begin{array}{l} \text{Private rate} \\ \text{of return} \end{array} = \frac{\left[\begin{array}{l} \text{Expected annual} \\ \text{(after tax) earnings,} \\ \text{with university} \\ \text{qualification} \end{array} - \begin{array}{l} \text{Expected annual} \\ \text{(after tax) earnings,} \\ \text{without university} \\ \text{qualification} \end{array} \right] \times \begin{array}{l} \text{Expected} \\ \text{Years} \\ \text{of} \\ \text{employment} \end{array}}{\left[\begin{array}{l} \text{Expected annual} \\ \text{(after tax) earnings,} \\ \text{without university} \\ \text{qualification} \end{array} - \begin{array}{l} \text{Allowances minus} \\ \text{private educational} \\ \text{costs} \end{array} \right] \times \begin{array}{l} \text{Years of} \\ \text{university} \\ \text{study} \end{array}}$$

The numerator in the above formula indicates the benefits of university education in terms of an increase in expected net earnings. The assumption is that the proportional difference between earnings with and without university qualification will be constant over time. This is also known as the horizontal age-earnings profile and it may result in rates of return that are not valid (Harris and Shariff, 1984: 81).

A horizontal age-earnings profile may not apply for a number of reasons. An individual with a university qualification may be promoted quickly and this will tend to widen the gap between the incomes. Wage structures may alter, leading to a reduction in the gap between incomes of people with degrees and those without the degrees.

Merit and productivity on the part of non-graduates may come to be recognized and rewarded. However, because this is an ex-ante study, it was not possible to get accurate projections of the future relationship between incomes with and without a university qualification. Costs, in terms of foregone earnings or income during the period of study plus the educational costs incurred by the individual, are measured in the denominator.

Estimates of the expected rates of return in this study are based on the students' earnings expectations and actual costs. Pupils or their families do not, of course, actually sit down and calculate private rates of return. Nevertheless, students in many countries, especially developing countries, and their families seem to have some perception of private costs and benefits, which influences their decision to invest in education. Williams and Gordon (1981: 200) point out that "a high rate of return may not actually influence the students' decisions if the return is not perceived and a student may choose a particular route if they perceive the returns to be high, even if, in reality, the actual returns are low".

Research has found that students also have expectations about their employment opportunities in different fields, the likely duration of their job search, their initial

earnings, and the rate of growth of their earnings (see section 2.2.1). A number of studies of these expectations in both developed and less developed countries reveal that these expectations tend to be reasonably accurate. That is, students do perceive the fields where demand is strong, where there are differences in initial earnings between graduates and non-graduates and where there are high rates of growth of earnings.

They also take differences in costs into account and so are broadly aware of different expected rates of return. Therefore, most students tend to enter those fields where demand is high and where it is expected to grow. An objective of this research, it will be recalled, is to test whether this conclusion is valid for South Africa in the year 2000.

4.4 Basic Characteristics of the Sample

A frequency distribution of respondents by degree studied or faculty and gender is given in table 4.1. Note that all the degree courses in this study, except for Law and Engineering, have a three-year duration period; these two have a four-year duration. The table clearly shows that females are underrepresented in the Science and Engineering degrees. Less than 39.0 per cent of female students in the survey are enrolled for science degrees and 15.0 per cent for engineering. Female students, on the other hand, dominate the other four degrees studied in the survey. These are Social Science, Commerce, Law, and Arts with 71.0, 62.6, 64.9, and 74.1 per cent, respectively.

Table 4.1: Respondents by Degree and Gender

Degree/Course Studied	Male	Female	Total
Social Science	18	44	62
Science	114	73	187
Science, Engineering	125	22	147
Commerce	34	57	91
Law	46	85	131
Arts	14	40	54
Total	351	321	672

A break up of the students by race and degree can be observed in table 4.2 in the next page. Most students covered by the survey are Indians. This is not surprising as they dominate the whole university population. They make about 50.1 per cent of the survey population, and they are followed by Whites and Blacks who make up 24.1 per cent and 22.2 per cent, respectively. The number of coloured students in the survey is very low, comprising only 2.5 per cent. Over half (59.3 per cent) of the white students are enrolled for Science and Engineering degrees with 31.5 and 27.8 per cent, respectively. Most blacks (25.5 percent) are studying Law. As it is the case with Whites, a majority of Indians are in the Science (33.2 per cent) and Engineering (20.2 per cent) degrees.

Table 4.2: Respondents by Race and Degree

Degree	RACE					Total
	White	Black	Indian	Coloured	Other	
Social Science	9	20	26	5	2	62
Science	51	21	112	1	2	187
Science:Engineering	45	30	69	1	2	147
Commerce	15	28	46	1	1	91
Law	31	38	57	5	0	131
Arts	11	12	27	4	0	54
Total	162	149	337	17	7	672

Table 4.3 gives the break up of the respondents by the source of finance for their studies. The majority (59.2 per cent) are paying for their education, either through family funds or from personal savings. About 20.9 per cent and 19.5 per cent have bursaries or scholarships and loans, respectively. Those with loans will have to pay them back upon completion of their studies.

Table 4.3: Respondents by Source of Finance

Source of finance	Number	Percentages
Bursary/Scholarship	137	20.39
Loan	131	19.49
Personal Savings	32	4.76
Family funds	366	54.46
Employer	6	0.89
Total	672	100.00

In table 4.4, it is indicated that 60.6 per cent of the students expect or want to work in the private sector when they complete their schooling while only 10.9 per cent expect to work for the government. A further 12.4 per cent want to be self-employed. About 16.2 per cent were not sure about which sector they want to work in.

Table 4.4: Respondents by Sector of Employment

Sector	Number	Percentages
Government	73	10.9
Private	407	60.6
Self Employment	83	12.4
Don't know	109	16.2
Total	672	100.0

The students' proposed occupations are reported in table 4.5. The coding scheme used was adopted from the Botswana Standard Classification of Occupations, given in appendix 2. From the examination of the data, some occupations are specifically related to the courses that the students study. Only 36.3 per cent of the respondents are certain that they will pass while 35.1 percent, 22.6 per cent, and 4.5 per cent are 75, 50, and 25 per cent sure, respectively. A further 1.5 has no idea whether they will make it or not. This is shown in table 4.6.

Table 4.5: Intended Occupations of Respondents

Occupation	Number	Percentages
Govt. Senior Official	1	0.15
Company Directors & Managers	11	1.64
Scientists and Health Professionals	15	2.23
Engineers	139	20.68
Teachers	4	0.60
Maths, Statisticians & Computer Profs	146	21.73
Accountants	49	7.29
Economists	10	1.49
Other Business professionals	45	6.70
Psychologists and other Social Science	34	5.06
Lawyers and other legal professionals	128	19.05
Authors and Journalists	23	3.42
Actors, TV presenters, etc	17	2.53
Not Known	50	7.44
Total	672	100.00

Table 4.6: Confidence of completing Degree

Confidence of completing	Number	%
100%	244	36.31
75%	236	35.12
50%	152	22.62
25%	30	4.46
0%	8	1.19
Don't Know	2	0.30
Total	672	100.00

The most important variable in the calculation of rates of return is the expected incomes between courses, which are reported in table 4.7. Bachelor of Science-Engineering has the highest expected incomes, both with and without university qualifications. This is followed by Bachelor of Science and then Bachelor of Law degrees. The degree which shows the lowest expected incomes is Bachelor of Arts.

**Table 4.7: Expected Incomes by course
(Rand per annum, Gross)**

Course	Expected mean incomes	
	<i>With Qualification</i>	<i>Without Qualification</i>
Social Science	5366	2305
Science	8788	2580
Science: Engineering	11241	3758
Commerce	5952	2162
Law	6246	2237
Arts	4046	2397

The expected and actual median monthly incomes with university qualification by faculty are shown in table 4.8. The actual incomes have been obtained from the Human Sciences Research Council publication on salaries of working people. The table shows that students in the social science faculty do have knowledge about what they will earn upon graduation, both in the private and public sectors. Science

students expecting to work in the public sector have overestimated their incomes, with an expected income of R9600 while the actual income is R5008. This shows a ratio of expected to actual income of 1:0.5. The expected incomes of engineering students, like social science students, do not differ that much from the actual incomes. Also overestimated are expected private sector incomes of Law students, with the ratio of expected to actual income of 1:0.5.

Commerce students underestimated private sector incomes while Arts students underestimated public sector incomes, showing a ratio of 1:1.6 each. But overall, the students seem to have a reasonable idea about starting salaries as most of the ratios show little difference between expected and actual incomes.

Table 4.8: Expected and Actual Incomes of graduate Employees (Median)Gross R/mth

<i>Course</i>	Expected		Actual		Ratio of Expected to Actual Incomes	
	<i>Public Sector</i>	<i>Private Sector</i>	<i>Public Sector</i>	<i>Private Sector</i>	<i>Public Sector</i>	<i>Private Sector</i>
Social Science	4500	5000	4083	5300	1 : 0.9	1 : 1.1
Science	9600	6000	5008	5700	1 : 0.5	1 : 0.9
Engineering	7000	7000	5916	6916	1 : 0.8	1 : 0.9
Commerce	9000	5000	7033	8125	1 : 0.8	1 : 1.6
Law	4500	6000	4108	2708	1 : 0.9	1 : 0.5
Arts	3000	5000	4850	-	1 : 1.6	-

Table 4.9 shows the number of respondents by degree studied and the expected number of years of employment after graduation. About 21 per cent of the students expect to work for a period of 26 to 30 years, and 19 per cent expect to work for 36 to 40 years. Ten per cent do not know how long they expect to work.

Table 4.9: Expected years of Employment by Degree

Expected Years of Employment	DEGREE						Total
	Soc. Science	Science	Engineering	Commerce	Law	Arts	
0 - 5	5	4	1	1	5	2	18
6 - 10	3	8	9	5	8	1	34
11 - 15	5	7	8	4	4	0	28
16 - 20	8	21	13	12	20	7	81
21 - 25	7	13	14	9	6	5	54
26 - 30	4	44	36	22	24	11	141
31 - 35	4	13	19	8	11	9	64
36 - 40	11	39	21	20	23	13	127
41 - 45	2	6	7	1	1	0	17
46 - 50	2	6	8	3	5	2	26
51 +	1	4	0	0	5	2	12
Don't know	10	22	11	6	19	2	70
Total	62	187	147	91	131	54	672

4.5 Limitations of the Study

One problem with the data that I have collected is that some of the students seem to have over estimated the expected earnings that they will get upon graduation. Some estimates seem unbelievably high but are largely taken care of by averaging. In any case, if these are genuine estimates, they will influence the demand for higher education, whether they are wrong or not.

Data limitations also do not allow for non-monetary private returns and social externalities to education. That is, the benefits to education are limited to only monetary benefits. Non-monetary returns are omitted because they are hard to measure, and will result in expected returns to education being understated.

The method used to calculate rates of return focuses on the expected net earnings differential at graduation, and must be used with caution because the focus on initial earnings does not take into account the growth of earnings thereafter. This means that it underestimates the rates of return (McMahon: 193). This is because it is possible for

starting salaries of graduates to be lower than the earnings of high school graduates who have had a steady growth of earnings while on the job. Also, starting salaries tend to be erratic in nature and there may be a period of job search or unemployment before a new graduate finds a job. I have also noted the issue of a horizontal age earnings profile in section 4.3.

CHAPTER 5

Calculation of Rates of Return to Higher Education

5.1 Introduction

The concept of rate of return has been discussed in section 3.2 and the relevant formula used in the calculations in section 4.3. This chapter will focus on the calculation of private and social rates of return and the discussion of the results. Social rates of return are important in the assessment of the efficiency with which an economy's resources are allocated, but for individuals and/or their parents, the relevant rates of return are those based on private costs.

The chapter is divided into four sections. In section 5.1 the results of the research are presented. Comparisons of these results with other studies in South Africa and in other developing countries are presented in sections 5.2 and 5.3, respectively. Section 5.4 highlights some of the general problems with rates of return calculations.

5.2 Results

5.2.1 Returns by Faculty

Expected rates of return to private investment in schooling and rates of return to social resource cost by faculty are shown in table 5.1.

Table 5.1: Expected Private and Social Returns by Faculty

Faculty	Private			Social		
	Male	Female	Total	Male	Female	Total
Social Science	7.5	10.4	9.7	4.3	5.9	5.4
Science	11.1	14.7	12.5	6.2	8.3	7.1
Science: Engineering	10.3	7.4	9.6	5.6	4.0	5.2
Commerce	13.5	11.2	11.8	9.3	7.7	8.1
Law	10.2	8.9	9.6	6.8	6.1	6.4
Arts	10.7	9.5	9.9	7.1	6.4	6.7
Total	11.9	10.3	11.2	7.4	6.3	6.9

It is evident from the table that private rates of return are greater than social ones, which as already pointed out earlier, is because of the inclusion of tax and subsidy in the formula when calculating social returns; thus the denominator is increased. The table indicates that investment in the Sciences, with a 12.5 per cent rate of return, yields by far the most attractive private rate of return, followed by Commerce with 11.8 per cent, and Arts with 9.9 per cent. Engineering and Law yield the same return of 9.6 per cent each. Here we are looking at the totals.

The faculty which yields the highest social rate of return is Commerce, with 8.1 percent. It is followed by science with 7.1 per cent, and Arts with 6.7 per cent. With respect to sex, mixed results are observed. In only two faculties, social science and science, women have higher private and social rates of return, with private returns of 10.4 and 14.7, respectively; and social returns of 5.9 and 8.3 per cent, respectively. This is in line with the existing empirical findings on the pattern of rates of return to education: that returns are higher for the education of women (due to their low alternative earnings) than for men. For the remaining four faculties - Engineering, Commerce, Law, and Arts - returns to men's education exceed those for women. The overall rates, both private and social, show that men have higher returns than women.

5.2.2 Returns by degree studied

Table 5.2 reports expected rates of return by degree or course studied. A special subject of training used here, adapted from the Botswana classification, is given in appendix 3. The highest expected rate of return fields are accounting, with private returns of 16.7 per cent and social returns of 12.2 per cent. This is followed by computer science follows with private returns of 16.2 and social returns of 9.2 percent; natural science programmes, having private and social rates of return of 14.3 and 8.6 per cent, respectively; drama studies yields private and social returns of 11.5 and 7.6 per cent, respectively. Engineering has the fifth highest returns, with private and social returns of 10.7 and 5.8 per cent. A degree in Psychology, with a private return of 6.9 per cent and a social return of 4.9 per cent, reflects the lowest return.

Table 5.2: Expected Private and Social Rates of Return to Different Degrees

DEGREE	Private	Social
<i>Social Sciences:</i>		
Psychology	6.9	4.9
Labour Studies/HRM	9.0	5.3
Media & Comm.	9.4	6.3
<i>Science:</i>		
Natural Science	14.3	8.6
Computer Science	16.2	9.2
<i>Science (Engineering):</i>	10.7	5.8
<i>Commerce:</i>		
Economics	8.5	6.1
Accountancy/Auditing	16.7	12.2
BIS	9.2	6.4
<i>Law:</i>	10.0	6.7
<i>Arts:</i>		
Drama	11.5	7.6

Economic theory would predict that the choices of students would be influenced heavily by differences in expected monetary rates of return. The persistence of different rates of return to different degrees or courses is most likely to be a result of some limitations on entry imposed by some fields, combined with the relative ease of entry in other fields. It is also possible that perceived non-monetary benefits are important for some degrees.

A breakdown of the returns to different degrees by sex is given in table 5.3. As can be seen, expected returns to women in most degrees are lower than those for men. This suggests the presence of labour market segregation by sex, which is a problem also in labour markets of other countries. Both sexes expect higher returns from having an accounting degree. Most people doing this course intend to be self-employed when

they complete their studies and they expect earnings in this sector to be higher than if working as an employee in the public sector or in the private sector.

Table 5.3: Expected Private and Social Returns by Degree and Sex

DEGREE	Private		Social	
	<i>Male</i>	<i>Female</i>	<i>Male</i>	<i>Female</i>
<i>Social Sciences:</i>				
Psychology	4.8	7.2	2.7	4.1
Labour Studies/HRM	4.1	10.8	2.4	5.9
Media & Comm.	10.1	8.3	5.7	4.5
<i>Science:</i>				
Natural Science	11.4	8.1	6.8	4.9
Computer Science	15.6	15.4	8.7	8.5
<i>Science (Engineering):</i>	10.8	6.1	5.8	3.3
<i>Commerce:</i>				
Economics	10.8	7.0	7.4	4.8
Accountancy/Auditing	17.8	15.1	12.3	10.3
BIS	12.8	6.7	8.8	4.5
<i>Law:</i>	10.7	9.5	7.0	6.4
<i>Arts:</i>				
Drama	13.4	9.4	9.0	6.2

The median expected private return is 10.8 per cent for men and 8.3 per cent for women. Men completing a qualification in labour studies and psychology expect substantially lower returns than those in accounting, computer science (the two have the highest returns), and other degrees. This pattern is somewhat a bit different for women, who have lower returns in engineering, business information systems, and economics. Higher returns for women appear to be achieved in computer science, accounting, and labour studies.

5.2.3 Returns by Intended Occupation

The students' expected rates of return by occupation are presented in table 5.4. These expected returns seem to vary widely by occupational field. Private returns vary from 6.7 per cent at the lowest to 15.8 at the highest (total returns), while social returns vary from 3.7 per cent to 11.6 per cent. The highest expected rates of return fields are accounting, computer professionals, life scientists, engineers, actors, and journalists, with expected total private returns lying in the 11.1 to 15.8 per cent range.

Table 5.4: Expected Private and Social Rate of Return by intended Occupation

Occupation	Private			Social		
	Male	Female	Total	Male	Female	Total
Managerial	10.1	24.0	13.4	7.1	23.1	9.6
Physical Scientists	10.5	7.3	8.1	6.2	4.5	4.8
Life Scientists	14.2	12.4	13.6	8.5	7.1	7.3
Engineers & Architects	12.4	8.4	11.1	6.6	4.6	6.0
Teachers	7.5	4.9	6.7	4.2	2.6	3.7
Computer Professionals	15.2	14.7	15.0	8.7	8.4	8.6
Accountants	21.7	13.9	15.8	16.1	10.2	11.6
Other Business Profs.	6.5	7.9	7.4	4.6	5.5	5.3
Economists	7.0	8.2	8.1	5.1	5.9	5.8
Psychologists	4.5	10.5	8.7	3.0	7.5	6.0
Community Devt.	8.8	16.7	12.5	5.9	11.5	8.4
Lawyers	10.2	9.4	9.5	6.8	6.3	6.3
Authors/Journalists	12.2	13.9	13.2	8.2	9.5	9.1
Actors, Presenters, etc	12.9	12.6	12.8	8.9	8.4	8.6
Total	11.9	10.3	11.2	7.4	6.3	6.9

The highest expected total social returns are in the 7.3 to 11.6 per cent range. Occupations showing the lowest expected private rates of return are teachers, physical scientists, economists, psychologists, and lawyers, falling in the 3.7 to 6.3 per cent range.

Social rates of return are highest for accounting, managerial positions, and journalism, with 11.6, 9.6, and 9.1 percent, respectively. In six of the fourteen occupations presented in table 5.4, expected social returns for women are greater than for men.

These occupations are managerial, other business professionals, economists, psychologists, community development, and journalism. The differences between private returns for men and women fall between 1.6 to 13.9 percentage points. Men expect private returns that exceed women's in sciences (both natural science and life science), engineering, teaching, accounting, law, and acting, with differences ranging from 0.3 to 7.8 percentage points. Expected social returns fall between 0.9 and 16.0 per cent for those occupations where expected returns are greater for women than men and between 0.5 and 5.9 per cent for those where men's expected returns exceed women's. This indicates that the gap between men and women's expected returns is wider for social returns than for private returns.

5.2.4 Returns by Faculty and Race

Table 5.5 gives the expected returns by faculty and race. For decades the South African education system was segregated into different education systems for each of the four race groups, that is, African, White, Indian, and Coloured. The largest education budget was allocated to the white education system and the African education system received the smallest proportion. An intermediate budget was allocated to each of the other two race groups. These differences in the education systems brought about varying qualities of education. In the labour market, it gave rise to different wage rates for the different groups. Those who had the lowest quality of education, Africans, received the lowest wages, when Whites got the highest wages. Table 5.5 overleaf shows us whether students from different races now expect to get the same wages, now that there is only one education system.

The expected returns, both private and social, seem to be unaffected by ethnicity. That is, the returns are almost the same for the four race groups, even though coloured students expect a little bit lower than students of other races. Indian men, White women, and African women expect very high returns, but these have been lowered by averaging between the sexes.

In the sciences faculty, the expected rates of return of Africans exceed those of the other races, but the difference in this case, as in the social sciences, are small between White and African expected returns. Indian returns are about 4.6 percentage points below those of Whites. The social returns are also not that different between races.

Table 5.5: Expected Private and Social Rates of Return by Faculty and Race

Faculty and Race	Private			Social		
	Male	Female	Total	Male	Female	Total
1. Social Science:						
White	7.6	11.3	9.9	4.5	6.1	5.6
Black	6.1	11.7	9.7	3.5	7.5	5.5
Indian	13.5	9.1	9.6	7.6	5.1	5.4
Coloured	3.4	7.4	5.1	1.6	4.2	2.8
2. Science						
White	17.6	20.2	18.2	10.0	11.2	10.3
Black	16.5	20.1	19.3	8.8	11.5	10.6
Indian	13.2	14.2	13.6	7.4	8.0	7.7
Coloured	-	14.9	-	-	8.1	-
3. Science: Engineering						
White	9.7	10.7	9.6	5.1	5.7	5.1
Black	11.6	10.0	11.4	6.3	5.4	6.2
Indian	11.3	6.5	9.9	6.1	3.5	5.4
Coloured	5.5	-	-	1.6	-	-
4. Commerce						
White	6.5	12.6	8.5	4.5	8.7	5.9
Black	18.8	13.7	15.2	13.0	9.6	10.6
Indian	15.8	10.5	11.9	10.9	7.1	8.1
Coloured	3.9	-	-	2.7	-	-
5. Law						
White	12.9	7.1	9.2	8.5	4.7	6.1
Black	9.6	9.5	9.6	6.3	6.5	6.4
Indian	8.8	8.5	8.7	6.0	5.7	5.8
Coloured	15.8	14.6	15.2	10.7	9.8	10.2
6. Arts						
White	10.6	11.2	10.6	7.9	7.5	7.1
Black	8.0	14.2	11.7	5.7	9.7	8.2
Indian	17.1	6.9	7.3	12.2	4.7	4.9
Coloured	10.1	21.6	17.6	6.4	14.6	11.8

- Data not available, there are not many coloured students.

The same goes for the Engineering, Commerce, Law, and Arts faculties. Thus, there are mixed results, but in most of the faculties studied (5), African expected rates of return are higher than those for Whites, with Indians and Coloured students not lagging far behind. But for coloured students in the Arts faculty, the expected returns are higher than those of other races, with coloured women expecting returns as high as 21.6 per cent.

From the results in the table, and the small differences between ethnic groups, it appears that people of different races expect to experience equal treatment, as regards pay, in the labour market.

Sometimes, it may be noted, students are uncertain about their future prospects. It has been postulated that those students with lower ability may be more uncertain about their future prospects.

In what follows, I look at how the rates of return presented above compare with those calculated for higher education by other researchers.

5.3 Comparison with Other South African Studies

I have found only one study in which rates of return were calculated in South Africa. This is a study by Trotter (1984), titled “A Survey on Educational Facilities in the Durban Metropolitan Region”. This could have been a good study to compare with the present study because they both calculate rates of return in the same region. The problem is that only social rates of return to various educational levels for different ethnic groups, with a view to assessing the present allocation of educational resources in the region, were calculated in the earlier study. Trotter’s study, unlike mine, calculates actual rates of return.

The only two returns that he has for higher education are for Whites and Indians. These are given in table 5.6, with the rates of return for the four race groups from the present study.

Table 5.6: Social Rates of Return to Higher Education by Race

Race	1984 Study	2000 Study
African	-	7.9
White	11.8	6.7
Indian	13.1	6.2
Coloured	-	6.2

The social rates of return from the 1984 study are very high, with Indians having higher returns than Whites. But the present survey shows that they are much lower. Given the large increase in the number of graduates, this is not surprising. Africans have higher returns of 7.9 per cent, followed by Whites with 6.7 per cent. Indians and Coloureds have the same returns of 6.2 per cent each. This shows that there is not that much difference in rates of return to different races. These results do not suggest that the South African government must invest more on Africans from an efficient point of view, although equity concerns well lead to this outcome.

5.4 Comparison with Studies from Other Countries

Table 5.7 shows private and social returns to higher education for twelve African countries. Note that South African estimates presented are from this present study. These estimates, except for South Africa are from ex-post studies, provided by Psacharopoulos (1981 and 1994) in his very comprehensive survey of rates of return in developing countries. Great care has to be taken when comparing rates from this paper, as the studies looked at by Psacharopoulos cover a wide range of different assumptions and methodologies, and have also been carried out at very different times.

Most of the studies tend to be focused on comparing the pattern of rates of return to education from primary to secondary, and on to higher education. The general pattern was for the rates to be highest for primary education, followed by secondary education, and then lowest for higher education.

For Africa as a whole, Psacharopoulos' review (1984) estimates social returns to higher education to be 32 per cent, and a return to all education of 13 per cent (Kugler and Psacharopoulos, 1989: 359). In his 1994 review, it was estimated at 11.2 per cent for Africa as a whole (Psacharopoulos, 1994). Table 5.7, in the next page, summarises social and private rates of return figures.

Private returns from the 9 countries reviewed range from 5.1 per cent to 46.6 per cent. Estimates from Malawi, Botswana, Lesotho, and Somalia show the highest private rates of return to higher education with 46.6, 38.0, 36.5, and 33.2 per cent, respectively. Estimates from Botswana and Lesotho are based on USAID studies in the two countries. Zimbabwe and South Africa are reported to have the lowest private rates of return of 5.1 and 11.2 per cent, respectively. Bennell (1996) has noted the data quality in most of the countries as being very poor (Bennell, 1996: 185).

University education, from society's view, is said to be the least profitable level of education. The examination of the social returns shows that, once again, Zimbabwe, Zambia, and South Africa have the lowest returns of – 4.3, 5.1, and 6.9 per cent, respectively, although the figure for Zimbabwe is suggested to be a basic reporting error. This is below the 10 per cent level, which is the benchmark put forward by the World Bank.

Table 5.7: Private and social rates of return to education - percentages

Country & Year	Private	Social
<i>Africa</i>		
Botswana (1986)	38.0	15.0
Burkina Faso (1985)	-	21.3
Ivory Coast (1984)	25.1	-
Lesotho (1983)	36.5	10.2
Malawi (1986)	46.6	11.5
Somalia (1983)	33.2	19.9
*South Africa (2000)	11.2	6.9
Zambia (1983)	19.2	5.7
Zimbabwe (1987)	5.1	-4.3
<i>Asia</i>		
Philippines (1988)	11.6	10.5
Sri Lanka (1981)	16.1	-
<i>Latin America</i>		
Brazil (1989)	28.2	21.4
Mexico (1984)	21.7	12.9
Venezuela (1989)	11.0	6.2

Source: Psacharopoulos (1984 and 1994)

* South African returns are from the current study

As already discussed in chapter 3, Bennell (1996) has pointed out that the full method used by Psacharopoulos showed that educational investments are not universally profitable, judging by the low social rates of return. He also points out that the studies carried out in these countries relied on very out of date cross-sectional data, and this seriously biased private and social rates of return to education upwards.

There is a problem in trying to compare rates of return to education between different countries by different disciplines, especially developing countries, because data are very limited and therefore comparison becomes more difficult to make. Psacharopoulos has reported rates of return to higher education by faculty. The results he reports show that Social Sciences, Engineering, and Science subjects have higher

returns relative to other subjects. He also found that humanities and economics sometimes had returns that were higher than engineering subjects, which he explains could result from the lower costs associated with the first two courses. But in contrast, results from this study show that economics has some of the lowest rates of return. Note that these are ex-ante returns and Psacharopoulos' returns are ex-post.

Expected social returns by occupation from this study are compared to the expected social returns in Egypt in table 5.8, even though not all occupational fields calculated for South Africa are available for Egypt.

Table 5.8: Expected Social Rates of Return by Occupation

Occupation	South Africa	Egypt
Physical Science	4.8	14.9
Engineering and Architecture	6.0	20.3
Commerce	7.8	13.3
Fine Arts	8.6	12.2
Social Sciences	6.9	11.8
Economics	5.8	11.0

Egypt figures from McMahon (1987)

Expected returns to higher education in South Africa are shown to be very low in relation to Egyptian educational returns. All Egyptian rates are above 10 per cent (from 11.0 to 26.3 per cent), while all returns to South African investment in higher education are below 10 per cent (from 4.6 to 8.6 per cent). This is a very large difference and could be a result of the different methods used to calculate the returns, the assumptions made, and the passage of time since the Egyptian study was made.

5.5 Some General Problems with Rates of Return Calculations

It has been argued that social rates of return are, most of the time, underestimated because the consumption benefits of education are not taken into account. In addition, there may be non-pecuniary attractions of some occupations that are available are available only to those with higher education. Trotter (1984) points out that “attempts

have been made to include consumption benefits into social rates of return calculation, either by subtracting real consumption components from costs or by adding consumption benefits to wages”. But he notes that either of these two is arbitrary. Also, there are psychic benefits that attach to some occupations which are restricted to only educated job seekers and this tends to distort private rates of return.

The second problem he highlights is the possibility that wage differentials do not reflect an individual’s productive capacity but are caused by institutional factors that characterise the generally imperfect labour markets in developing countries. Occupational discrimination in South Africa has been found to have reduced historical rates of return for certain groups.

“Some authors tend to reject the existing methods of measuring direct returns to education. They affirm that “expenditure on education does pay because it has been observed that indirect benefits of education are so great that its direct benefits are not necessarily the most important aspect. Economists have shared this view and have been in despair when trying to quantify the indirect benefits to education when analysing the returns to educational investment. Some of the indirect benefits to education observed in the literature are: the spill-over income gains from persons who have obtained higher education to those who have not; the spill-over income gains to subsequent generations from a better educated present generation; the supply of a convenient mechanism for discovering the cultural potential talent; and a means of assuring the occupational flexibility of the labour force; ...”

(Blaug, 1965: 234).

CHAPTER 6

CONCLUSION

6.1 Introduction

If we recall from chapter 1, the objectives of this study are to review previous studies on rates of return to education, especially higher education, mostly in developing countries; to estimate expected private and social rates of return to different degrees at the University of Natal; and to compare the expected rates of return with data which indicates actual rates of return to higher education in South Africa and in other developing countries. The main reason for estimating the rates of return is to find out if it is profitable to invest in higher education and how the returns vary between degree programs, as well as to find out what return to society is provided by higher education.

This chapter presents the conclusions of this study. Section 6.1 gives an overview of the whole dissertation and the conclusion/summary of the findings is presented in section 6.2.

6.2 Overview

In this study the 'short-cut' method to the calculation of rates of return to education has been used. This method is preferable because it is easy to use when resource costs of schooling have to be added to the denominator to calculate the rates of return. The theoretical background to the human capital theory is given in chapter 2. In chapter 3 the concept of rate of return to education has been defined and different methods of calculating the rates of return have been discussed. A review of a number of studies on returns to education has been reviewed in the same chapter.

Chapter four presents the methodology used in the study and the data characteristics, as well as some the limitations. The calculation and discussion of the rates of return to higher education at the University of Natal, Durban are presented in chapter 5. Also in

this chapter are comparisons of the returns to education observed from this study with those observed in other studies in South Africa and in other developing countries.

6.3 Summary of the Results

The main finding from this study is that investing in higher education yields positive rates of return, both private and social. The study provides evidence that broadly supports the assumptions of the human capital model. Students going on to higher education have perceptions of the labour market opportunities that confront them and how these opportunities are related to educational qualifications.

In analysing the UND students' expectations, it is evident that economic considerations directed their decision to engage in higher education, even though there may be some non-economic factors responsible for the decision. The results of this study, judging by private rates of return of around 10 – 12 per cent, indicate that economic factors are likely to have a significant influence on the decision of the student to pursue higher education and also that the students appear to act in a rational economic way, keeping with the propositions of the human capital theory. Private rates of return exceed social rates of return, as it has been observed in previous rates of return studies.

The ex-ante private and social returns to investment in higher education have been presented to provide a more complete picture of costs of and returns to higher education. This project highlights some problems of collecting information about students' perceptions in order to calculate ex-ante rates of return as some of them are not aware of how much they will be earning when they start work. One interesting finding is that the rates of return to male and to female students are not significantly different from one another. This indicates that the students really do not have realistic expectations regarding the structure of labour market rewards by sex; that is, they are either not aware of or do not think they will be affected by labour market segregation by sex. The rates of return by discipline area or course studied (table 5.3) show a

somewhat larger variation, with the highest two groups exhibiting values over twice the lowest group, indicating the students' awareness of labour market structure rewards by discipline. The same variation can be observed when looking at rewards by occupation (table 5.4).

Investment in higher education is seen to be profitable even to the society as a whole, although we would need to know social rates of return to alternative investments, within education and outside of it, to determine whether it is the best use of public financial resources. Positive social rates of return are observed, even though they are not equal to or do not exceed the often accepted 10 per cent minimum. But still, they show that there is some good in investing in higher education. It can be concluded that the positive returns to investment in schooling go a long way to explain or justify the society's faith in education, as well as the individual's desire to get more education.

Since the poor system of education and income conditions that were unfavourable to some race groups seem to have been undergoing some transformation, students in these groups do not expect to get any special treatment depending on what race they are. The rates of return by race give mixed results, and most of these returns tend not to be very different for different race groups. This means that the students expect to get the same or very close rewards, depending on what courses they studied or on what occupation they go into.

The difference between private and social rates of return may have negative repercussions. The demand for education is determined by individuals who anticipate high financial returns on their studies. As discussed in chapter 3, even though individuals may not actually calculate rates of return, they are aware that educated people earn much more than the less educated; that employers usually give preference to those with qualifications; and that the state helps by paying part of the costs of education, especially higher education. On the other hand, the supply of educational places is largely the function of the government, which is under considerable pressure to expand the system. But doing so may worsen the problem of unemployment among higher education graduates. This then leads to the suggestion that the government

should give greater weight to prospective employment opportunities when planning educational expansion.

APPENDICES

Appendix 1

SCHOOL OF ECONOMICS AND MANAGEMENT

A STUDY ON EXPECTED RATES OF RETURN TO EDUCATION

Please note that only full-time students who are South African residents should complete this questionnaire. ALL QUESTIONS MUST BE ANSWERED.

(Use the boxes provided)

1. How old are you?

2. Sex: 1 Male 2 Female

3. Race: 1 White 2 Black 3 Indian 4 Coloured 5 Other

4. Year of study: 1 First year 2 Final year

5. Which Degree are you studying?

- 1 Bachelor of Social Science
- 2 Bachelor of Science
- 3 Bachelor of Science, Engineering
- 4 Bachelor of Commerce
- 5 Bachelor of Law
- 6 Bachelor of Arts

6. What is your major area of study or intended major?

7. What made you choose this degree? (choose the most important one)

- 1 passion
- 2 parents chose it for me
- 3 jobs are available
- 4 pays well
- 5 Other reasons (please specify)

8. (a) Where do you hope to work after completion of your studies? (choose one)

- 1 the government sector
- 2 the private sector
- 3 self employed
- 4 don't know

(b) What do you hope to work as?

(i.e. occupation)?

9. How confident are you of getting a job when you graduate?

- 1 100%
- 2 75%
- 3 50%
- 4 25%
- 5 0%

Please don't leave questions 10-13 unanswered. If you do not know, just estimate.

10. After completing your studies, what monthly income (after tax) do you expect to earn in your first year of employment?

11. How much monthly income (after tax) would you expect to earn if you did not have a university degree, that is, if you had only completed secondary education?

12. Do you receive any allowance, bursary or scholarship? If yes, please state how much per month.

13. Do you expect to earn any money during this year from part-time employment?

- 1 Yes
- 2 No

If yes, please estimate your average monthly earnings after tax (“don't know” not allowed).

14. What is the principal source of finance for your studies?

- 1 Bursary or Scholarship
- 2 a loan
- 3 personal savings
- 4 family funds
- 5 employer

15. (a) Approximately how much does it cost **per annum** for:

	<i>Amount</i>
Tuition fees	R.....
Other fees	R.....
Books	R.....
Travel to and from university	R.....
Total	R.....

15 (b) How much of the above total do you or your family pay? R.....

16. How many years do you expect to work after graduating?

--	--

17. Where do you live during the semester?

- 1 halls of residence
- 2 in a rented flat/house (away from your family)
- 3 at home with family
- 4 other, specify.....

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18. Who pays most or all of your food and accommodation costs?

- 1 yourself or your family
- 2 sponsor
- 3 employer

--

@@@@@@@@@@@@@@@@THANK YOU@@@@@@@@@@@@@@@@

Appendix 2

STANDARD OCCUPATIONAL CODING SCHEME

1 LEGISLATORS, ADMINISTRATORS and MANAGERS

11. Legislators and Senior Government Officials

- 111 Members of Parliament & Other Legislators
- 112 Senior Government Executive Officials
- 113 Traditional Chiefs & Village or Community Leaders
- 114 Politicians & Senior Administrators of Special-Interest Organisations
- 119 Legislators & Senior Government Officials Not Elsewhere Classified

12. Company Directors and Corporate Managers

- 121 Company Directors, General Managers & Non-Government Chief Executives
- 122 Production & Operation Managers
- 123 Other Department Managers
- 129 Company Directors & Corporate Managers Not Elsewhere Classified

13. Small Business Managers and Business Supervisors

- 130 Small Business Managers & Managing Supervisors

2 PROFESSIONALS

21 Physical Scientists

- 211 Geologists & Geophysicists
- 212 Chemists
- 219 Physical Scientists Not Elsewhere Classified

22 Life Scientists

- 221 Biologists, Botanists, Zoologists & Related Professionals
- 222 Pharmacologists, Pathologist & Related Professionals
- 223 Agronomists & Related Professionals
- 229 Life Scientists Not Elsewhere Classified

23 Health Diagnosis and Treatment Professionals

- 231 Medical Doctors
- 232 Dentists
- 233 Veterinarians
- 234 Pharmacists
- 239 Health Diagnosis & Treatment Professionals Not Elsewhere Classified

24 Architects, Engineers and Related Professionals

- 241 Architects, Town & Traffic Planners
- 242 Civil Engineers

- 243 Electrical Engineers
- 244 Electronics & Telecommunications Engineers
- 245 Mechanical Engineers
- 246 Chemical Engineers
- 247 Mining Engineers, Metallurgists & Related Professionals
- 248 Cartographers & Surveyors
- 249 Architects, Engineers & Related Professionals Not Elsewhere Classified

25 Teaching Professionals

- 251 College, University & Higher Education Teaching Professionals
- 252 Secondary Education Teaching Professionals
- 253 Vocational & Technical Education Teaching Professionals
- 259 Teaching Professionals Not Elsewhere Classified

26 Mathematicians, Statisticians and Computing Professionals

- 261 Mathematicians. Statisticians & Related Professionals
- 262 Computer Systems Designers & Analysts & Computer Programmers
- 269 Mathematicians, Statisticians & Computing Professionals Not Elsewhere classified

27 Business Professionals

- 271 Accountants
- 272 Personnel & Occupational Specialists
- 273 Public Relations Officers
- 279 Business Professionals Not Elsewhere Classified

28 Social Science and Related Professionals

- 281 Economists
- 282 Psychologists
- 289 Social Science & Related Professionals Not Elsewhere Classified

29 Miscellaneous Professionals

- 291 Lawyers, Judges & Other Legal Professionals
- 292 Librarians, Archivists & Related Information Specialists
- 293 Authors, Journalists, & Other Writes
- 294 Religious Professionals
- 299 Professionals Not Elsewhere Classified

3 TECHNICIANS AND ASSOCIATE PROFESSIONALS

31 Physical and Engineering Science Technicians

- 311 Physical Science Technicians
- 312 Civil Engineering Technicians.Quantity Surveyors & Clerks of Works
- 313 Electrical Engineering Technicians
- 314 Electronics & Telecommunications Engineering Technicians
- 315 Mechanical Engineering Technicians
- 316 Chemical Engineering Technicians
- 317 Mining & Metallurgical Technicians
- 318 Draughtspersons
- 319 Physical & Engineering Science Technicians Not Elsewhere Classified

32 Computer Associate Professionals

- 321 Computer Assistants
- 322 Computer Equipment Operators
- 329 Computer Associate Professionals Not Elsewhere Classified

33 Optical and Electronic Equipment Operators and Controllers

- 331 Photographers & Image & Sound Recording Equipment Operators
- 332 Broadcasting & Telecommunications Equipment Operators
- 333 Medical Equipment Operators
- 334 Aircraft Pilots
- 335 Air Traffic Controllers
- 339 Optical & Electronic Equipment Operators Not Elsewhere Classified

34 Life Science and Health Associate Professionals

- 341 Life Science Technicians
- 342 Agronomy & Forestry Technicians
- 343 Farming & Forestry Advisors
- 344 Veterinary Technicians
- 345 Nurses And Midwives
- 346 Modern Health Associate Professionals, Except Nurses, Midwives & Veterinary Technicians
- 347 Traditional Medical Practitioners & Faith Healers
- 349 Life Science Health Associate Professionals Not Elsewhere Classified

35 Primary and Pre-Primary Education Teachers

- 351 Primary Education Teachers
- 352 Pre-Primary Education Teachers
- 359 Primary & Pre-Primary Education Teachers Not Elsewhere Classified

36 Finance and sales Associate Professionals

- 361 Insurance Brokers & Agents
- 362 Estate Agents
- 363 Travel Consultants & Organisers
- 364 Buyers
- 365 Technical & Commercial Sales Representatives
- 366 Appraisers, Valuers & Auctioneers
- 367 Securities & Finance Dealers & Brokers
- 369 Finance & Sales Associate Professionals Not Elsewhere Classified

37 Administrative Associate Professionals

- 371 Administrative Secretaries & Assistants
- 372 Legal & Related Business Associate Professionals
- 373 Bookkeepers & Accounting Professionals
- 374 Statistical, Mathematical & Related Associate Professionals
- 379 Administrative Associate Professionals Not Elsewhere Classified

38 Creative and Performing Artists and Sportspersons

- 381 Artists, Painters & Sculptors
- 382 Decorators & Commercial Designers
- 383 Radio Television & Other Announcers
- 384 Musicians
- 385 Athletes & Related Sportspersons
- 389 Creative & Performing Artists Sportspersons Not Elsewhere Classified

39 Miscellaneous Technicians and Associate Professionals

- 391 Building, Fire, Safety, Health & Quality Inspectors
- 392 Clearing & Forwarding Agents
- 393 Social Workers, Welfare Workers & Community Development Workers
- 394 Customs, Tax & Related Government Associate Professional
- 395 Police Inspectors & Detectives
- 399 Technicians & Associate Professionals Not Elsewhere Classified

999 Intended Occupation not yet known

NB: *The rest of the codes have been left out because they are not relevant to Degree holders.*

Appendix 3

CLASSIFICATION OF SUBJECT OF TRAINING

01 General Training Programs (including Literacy)

- 011 Literacy Training
- 012 Other General Training

02 Education Training

- 021 Pre-School/Kindergarten Teacher Training
- 022 Primary Teacher Training
- 023 Secondary Teacher Training
- 024 Refresher Teacher Training
- 025 Technical/Vocational Teacher Training
- 026 Adult Education Teacher Training
- 027 Other teaching/training programs

03 Fine and Applied Arts Programs

- 031 Visual and plastic arts'. carving, sculpture and pottery courses
- 032 Spinning and weaving handcrafts courses
- 033 Music courses
- 034 Drama courses
- 035 Jewellery Making Courses
- 036 Other fine and applied Arts courses

04 Programs in Languages

- 041 Setswana Language courses
- 042 English Language courses
- 043 Other Language courses
- 044 Interpreters and Translators general courses

05 Other Humanity

- 051 History courses
- 052 Christian Religion and Culture courses
- 053 Islamic Religion and Culture courses
- 054 Other Religion and Theology courses
- 055 Other Humanities courses e.g General Arts Degree

06 Social and Behaviour Science Programs

- 061 Economics/Economic and Regional Planning Programs
- 062 Political Science Programs
- 063 Sociology/Anthropology Programs
- 064 Geography Programs
- 065 Psychology Programs
- 066 Social Welfare/Social Work Programs
- 067 Community Development Programs
- 068 Other Social and Behavioural Science Programs

07 Commercial, Clerical, Business and Public administration Programs

- 071 Typing/Shorthand/Secretarial Programs
- 072 Business machine operation and data entry
- 073 Clerical/Clerical Induction programs
- 074 Bookkeeping course
- 075 Accountancy/Auditing courses
- 076 Financial Management (other) courses
- 077 Labour Studies, Including Personnel Administration
- 078 Manpower Planning Courses
- 079 Materials Management Courses
- 080 Co-operative Management Courses
- 081 Public Administration Courses(Incl. Local Gvt.,Social Security,Tax)
- 082 Insurance Programs
- 083 Banking Courses
- 084 Marketing/Sales courses
- 085 Business/Commercial Administration Courses
- 086 Management, General Courses
- 087 Other Commercial, Clerical, Business and Public Admin. Courses

09 Programs in law

- 091 Magistrates Programs
- 092 Other (Professional) Law Programs

10 Natural Science Programs

- 101 Biological Science Programs
- 102 Botanical Science Programs
- 103 Zoological Science Programs
- 104 Geological Science Programs
- 105 Chemistry Programs
- 106 Physics Programs
- 107 Weather Forecasting Programs
- 108 Other Natural Science Programs

11 Mathematics and Computer Science Programs

- 111 Mathematics Programs
- 112 Statistics Programs
- 113 Operations Research Programs
- 114 Computer Science Programs
- 115 Other Mathematical Programs e.g. Demography

12 Medicine and Health Related Programs

- 121 Paramedical Training Programs
- 122 Basic Nursing Programs (e.g. MCHA, nursing assistants, Red Cross)
- 123 Advanced Nursing including Midwives Programs
- 124 Nursing Instructors/Nursing Officer Programs
- 125 Rural Medical Aid Programs
- 126 Medical Assistant Programs
- 127 Assistant Medical Officer Programs
- 128 Medical Officer Programs (M.D.,B.M.)
- 129 Medical Specialist Programs
- 130 Other Medical, Dentistry Programs
- 131 Public Health/Sanitation Programs
- 132 Pharmacological training
- 133 Laboratory Tech (Medical) Course
- 134 Radiological Programs
- 135 Physiological Programs
- 136 Physiotherapy Programs
- 137 Ophthalmology Programs -
- 138 Other Health Related Programs

14 Construction Trades

- 141 Painting/Signwriting Programs
- 142 Carpentry/Joinery Programs
- 143 Masonry and Bricklaying Programs
- 144 Plumbing and Sheetmetal Programs
- 145 Electrician Programs
- 146 Other Construction Trades Programs

15 Other craft Trade and Industrial Programs

- 151 Pattern making training
- 152 Fitter/Turner training
- 153 Machine tool repair/fitting
- 154 Welding and Fabricating
- 155 Blacksmith Courses
- 156 Other Metal Trades
- 157 Motor Mechanics

- 158 Refrigeration and Air Conditioning training
- 159 Radio Services
- 160 Other Electronics Programs incl. Telecommunications
- 161 Shoe making/Leather Trades training
- 162 Tailoring/Textile Trades
- 163 Printing/Bookbinding/Graphic Arts course
- 164 Food Processing Trades
- 165 Laboratories Technician/Assistant courses
- 166 Diamond Cutting/Polishing/Valuing
- 167 Other Craft, trade and industrial Programs

17 Engineering and Allied Programs

- 171 Civil Engineering
- 172 Mechanical Engineering (incl. marine)
- 173 Electrical Engineering
- 174 Chemical Engineering
- 175 Mining/Metallurgy Engineering
- 176 Sanitation & Water Engineering
- 177 Radio/Electronics/Computer Engineering
- 178 Agricultural Engineering
- 179 Aeronautical Engineering
- 180 Other Engineering Courses
- 181 Drafting, Surveying & Cartographic Course

19 Architectural and Town Planning programs

- 191 Architectural Programs
- 192 Town Planning Programs
- 193 Quantity surveyors/Building Economists
- 194 Valuation Programs
- 195 Land Management Programs

20 Agriculture, Forestry and Fishery Programs

- 201 General Programs in Agriculture
- 202 Crop Breeding/Husbandry Programs
- 203 Crop Protection Programs
- 204 Horticulture Programs
- 205 Soil Science Programs
- 206 Range and Pasture Management Programs
- 207 Livestock Management Programs
- 208 Animal Health/Veterinary Science Programs
- 209 Animal Health/Husbandry Programs
- 210 Irrigation Programs
- 211 Agro-mechanics programs
- 212 Forestry Programs
- 213 Beekeeping Programs

- 214 Wildlife Protection and Management Programs
- 215 Fisheries Programs
- 216 Other Programs in Agriculture

22 Home Economics and Domestic Science Programs

- 221 Nutrition Programs
- 222 Childcare Programs
- 223 Consumer Food Research Programs
- 224 Other Home Economic/Domestic Science Programs

23 Transport and Communication Programs

- 231 Driving skills and Motor vehicle Operation Programs
- 232 Aircraft Operation Programs
- 233 Telecommunications Operation Programs
- 234 Postal Service Operations Programs
- 235 Railway Operations Programs
- 236 Shipping & Harbours Operation Programs
- 237 Other transport and communication Programs

24 Service Trades Programs

- 241 Hotel and Catering Programs
- 242 Hotel Management Programs
- 243 Tourist Trade Programs
- 244 Police Work Programs
- 245 Prison Service Programs
- 246 Fire Fighting/Protection Programs
- 247 Defence Force Programs
- 248 Other Protection Service Programs
- 249 Diplomacy training programs
- 250 Immigration Service Training
- 251 Other Service Trades Programs

26 Programs in mass Communication and Documentation

- 261 Journalism Programs
- 262 Librarianship Programs
- 263 Radio/Broadcasting Programs
- 264 Photography Programs
- 265 Film making Programs
- 266 Museum Curator/Conservation Programs
- 267 Other Communication and Documentation Programs

Other Programs

- 271 Physical Education/Sports Programs
- 272 Political Education Programs
- 273 other training not elsewhere classified
- 999 Not Stated

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