RATES OF RETURN ON HIGHER EDUCATION IN GREECE*

By
S. H. Hadjidema
Dept of Economics, University of Piraeus

Abstract

This paper is concerned with cost-benefit analysis of Higher Education in Greece. Estimates are made of the private and social rates of return for both males and demales in five different subject groups, i.e. Economics, Law, Mathematics, Medical Sciences and Technical Sciences. The results show that males generally achieve higher returns than females. The private rates of return vary from approximately 17.3% to 7.4%, whereas the corresponding social rates of return appear to be lower, varying from 13.4% to 5.6%. In contrast with previous studies, the calculated rates of return have included estimates of the activities in the private sector and the black economy. (JEL classification: 912).

1. Introduction

This paper concentrates on some of the issues and policy implications of using cost-benefit analysis for the reallocation of resources within the higher educational system in Greece. It presents the results of such an analysis, expenditure on higher education being treated as a form of investment from which benefits accrue in the future to individuals receiving the higher education and to society as a whole.

In this study, we have attempted to calculate both private and social rates of return for both males and females in five different subject groups at the higher educational level, i.e. Economics, Law, Mathematics, Medical Sciences and Technical Sciences.

* The author would like to thank Dr David J. Pyle (University of Leicester) for helpful discussions and for reading the first draft of this paper.

The calculation of the rates of return to higher education has been based on the following assumptions:

1. All the economic benefits of higher education accrue directly to graduates. That is, we ignore any benefits which could accrue to other factors of production (e.g. non-graduates) through their enhanced productivity caused by their association with "educated" labour (i.e. university graduates). Actually, the education of part of labour is equivalent, from the point of view of the non-educated labour force (non-graduates), with the increase of human capital.

2. There are no economies of scale in operating higher educational institutions. In this study, we examine the average rates of return per graduate. If there are economies of scale in operating universities, the social cost of the marginal graduate could be lower that the average cost and therefore, ceteris paribus, the rate of return would be higher. However, in the present study we ignore such a complication, since Greek universities are operating at their full capacity every year.

3. The capital markets are freely accessible to private individuals. If capital markets are freely accessible to private individuals and if these markets work efficiency, students could finance their higher education through loans[1], if the rate of return is higher than the borrowing interest rate. This assumption is particularly important for the private rates of return calculations, since it affects the foregone earnings (indirect cost) of students.

4. Students are perfectly informed about job opportunities. This assumption implies that university graduates entering the labour force enter jobs with the highest rate of return.

5. Earnings reflect the marginal productivities, that is, earnings reflect a worker's contribution to the national product. This assumption is particularly important for policy conclusions based on the calculation of social rates of return. However, according to Blaug (1965), the rate of return analysis does not assume that labour markets are competitive, rather it affords a test of the hypothesis that labour markets are competitive. He argued that "the notion that a relatively high rate of return to education and training in some professions is due simply to monopolistic restrictions on entry can be verified by a rate-of¬return comparison between professions with similar educational qualifications but different entry restrictions". He also suggested that imperfections in the labour market do not matter for a rate of return analysis and that the only imperfections that really matter are those that are directly related to the educa-

tion received by members of the labour force. For instance, if trade unions raised wages in unionised industries relative to the unorganised sectors of the economy, this would not affect the rate of return to education, because the majority of the union members have received little extra voluntary education. Moreover, if business firms employed university graduates for reasons of prestige and paid them more than they are really worth, this would affect the rate of return to education. However, this seems unlikely to happen since it is inconsistent with profit maximising policies.

6. Both male and female university graduates work for the same length of time, i.e. 35 years, after which time they become eligible for the state pension. This assumption implies that, ceteris paribus, female university graduates leave the job market at a lower age (about two years) than their male counterparts, which reflects the approximate two year obligatory conscription of men.

2. Methodology

All private benefits have been computed by using post-tax (net) life-time earnings differentials between people who have had university education and people who have not had university education but who have completed secondary level education. Similarly, social benefits have been computed by using pre-tax (gross) life-time earnings differentials.

The earnings data used come from pay scales in occupations in the Public Sector (civil servants and school teachers), the Public Power Corporation, the Greek Banks, the National Health System and the Institution of Social Security. Earnings have been adjusted where deviations from the private sector pay scales are obvious.

The private cost stream includes private opportunity costs, i.e. the net income foregone during school attendance, and the incidental school-related costs incurred by individuals. The social cost stream consists of the direct costs, i.e. the government's expenditure on higher education, the social opportunity cost, i.e. the gross income forgone during studies and the incidental school-related costs.

The data used for the calculation of the direct costs (government expenditure) come from the Ministry of Education and Religion. The calculation of the indirect costs has been based on the opportunity cost, i.e. earnings of people with secondary level education in the first years of their employment, including

in the cost measures the subsidies to schooling and the average income per student during his/her schooling. Finally, the calculation of the incidental school-related costs has been based on a small survey which was carried out for the purpose of this study.

Once the estimates of the benefit and cost streams have been made they can be summarised by calculating the internal rate of return. In this study all social returns have been computed by using pre-tax (gross) earnings, as taxes are a transfer from the point of view of society at large and all private returns by using post-tax (net) earnings. Moreover, the private cost stream does not include the value of direct costs, since they are provided free by the State. The indirect costs (social opportunity cost and private opportunity cost) and the incidental school related costs are included in both the private and social cost calculations. For the above reasons, a divergence between the social and the private rates of return can arise. Other rate of return classification have been made as well, for example by both sex and by subject group.

All costs are brought forward to year 0, which is the starting year of the working life, and all benefits are discounted back to the same point in time, as shown in Figure 1.

The rates of return to investment in higher education may be found by solving the following equation for r:

$$\Sigma C_i * (1 + r)^{-p} = \Sigma D_i * (1 + r)^{-t} + L_i * (1 + r)^{-34}$$

where:

- i is the subject group (i = 1, 2, 3, 4, 5),
- C_i is the cost (of the subject group i),
- ρ is the year of studies [p = -n, -(n-1), ..., -1],
- D_i is the differential between wages earned by a University graduate (of the subject group i) and those earned by a secondary school graduate,
- t is the year of the working life (t = 0, 1, 2, ..., 34) and
- L_i is the differential of the lump sum received at the end of the working life (of the subject group i).

3. The Results

3. 1 Basic Estimates of Private and Social Rates of Return

One of the first distinctions made in the literature of rate of return analysis is that between private and social rates of return. Considering the significance of rate of return analysis for private behaviour, the individual (student) is conceived as choosing between two lifetime income profiles, one with immediate but relatively lower earnings which then increase only gradually over time, the other with no earnings for several years followed by steeply rising earnings after graduation. It seems unlikely that students would voluntarily choose additional education unless it promised a rate of return significantly in excess of the yield on alternative investment opportunities. Previous studies have argued that students choose more education or one subject group rather than another as if they were making a rational investment response to expected monetary and psychic returns. In addition, the social rate of return provides a summary of the measurable economic effects of higher education and hence gives an indication to the government of the resources needed to meet the individuals' demand for higher education. Differences in the rates of return between subject groups might be interpreted as evidence of a need to alter the distribution of resources between uses.

The results of our calculations by sex and subject group are presented in Table 1. These estimates include the activities in the private sector, as well as estimates of earnings in the black economy involved in some professions. These results are based on several assumptions made about the black economy and the activities in the private sector. The vast majority of our assumptions about the size of the black economy are based on the book "The Black Economy in Greece" by Professor Pavlopoulos (1987) which is the only existing documented study for Greece. The reliability of our results depend upon his findings, since our calculations are made using the figures given in this publication about the black economy in different professions in Greece. The lack of other sources of information on the black economy has given us no other option. Therefore, it should be noted that the estimates of the rates of return based on this information about the earnings may be quite sensitive to these assumptions. For this reason, we have carried out sensitivity tests by changing our assumptions about the size of the black economy and the extent of the activities in the private sector. The effects of different assumptions on the calculated rates of return are found rather significant.

There are a few interesting points to observe in Table 1. In all cases the private rates of return are higher than the social rates of return. This divergence between the social and private rates of return arises for the following reasons. First, only a part of the cost of schooling is borne by the individuals themselves, the rest being borne by the state and therefore the social costs per graduate appear to be higher than the private costs per graduate. Second, the post-tax earnings differential combined with post-tax foregone earnings affect the rate of return in an ambiguous way. Specifically, a decrease in the earnings' component of the rates of return calculations caused by taking the post-tax (net) earnings differentials instead of the pre-tax (gross) earnings differentials would, assuming no effect on costs, tend to make the private rates of return higher than the social rates of return. On the other hand, a decrease in the costs' component caused by taking the post-tax foregone earnings instead of the pre-tax forgone earnings, again assuming no effect on the rest of the costs' components, would lead to lower private rates of return than social rates of return. The overall effect of these two opposing factors is thus unclear. However, in addition on the costs side, the direct costs which are only included in the social costs, make the private rates of return higher than the social rates of return. Indeed the cost corrections are much stronger than the tax ones so that the private rates of return are always higher than the social rates of return.

Moreover, the rates of return for males are higher than for females. This happens because the male earning differentials are higher than those of the female population. The higher male earning differentials accrue from the fact that the self-employed male university graduates usually work more hours than the female ones, since women conventionally spend more time looking after the family[2]. This difference is more substantial in some professions than others depending on the extent of the activities of the self-employed university graduates.

3.2. Sensitivity Analysis of Results

We have also calculated rates of return for different subject groups without taking into account activities in the private sector. This allows us to make comparisons between rates of return which include the activities in the private sector with those excluding the private sector. Moreover, the rates of return excluding the private sector are directly comparable with those calculated by Psacharopoulos and Kazamias (1985). The data for these calculations are based on university graduates who are employed mainly in the public sector, the public

enterprises and the Greek banks and who do not extend their activities into the private sector. The results of these calculations are given in Table 2.

Unlike the results given in Table 1, the results in Table 2 suggest that women achieve higher rates of return than men. In these sectors, university graduates' salaries are the same for both males and females. However, in the private sector, male non-graduates' salaries are higher than those of female non-graduates, therefore our calculated male annual average earnings are higher than the female ones. Hence, the earnings differentials of males (between university graduates and non-graduates) appear to be lower than those of females, thus resulting in lower rates of return for males than for females. The same point has been made previously by Woodhall (1973) in a study of women's education, as well as by Psacharopoulos (1991).

Moreover, in the case of the economists and the male lawyers, the social rates of return appear to be slightly higher than the private rates of return. This means that the difference between the social and private costs (the social cost being higher than the private cost) is not offset completely by the additional taxation which the state receives from the higher salaries of the university graduates compared to those of non-graduates.

The results obtained for most of the occupations considered seem to be similar to those estimated by Psacharopoulos (1982) in 1977, as well as to those published by Psacharopoulos and Kazamias (1985). Specifically the male private rates of return calculated by Psacharopoulos were 5.4% for Economists and 2.1% for Mathematicians, whereas the social rates of return for males in the same professions were 4.4% and 1.8% respectively. In the case of Lawyers, Psacharopoulos calculated quite high rates of return, the highest indeed among all the professions considered, i.e. the social rate of return for male lawyers was found to be 12%, whereas the private rate of return was calculated to be 13.8%. Our rates of return for male lawyers are much lower viz 4.9% for the private rate of return and 5% for the social rate of return, and these are also lower than those of doctors. Since Psacharopoulos was unable to offer any reasonable explanation for his high rates of return for lawyers, we might expect to find lower values, as is indeed the case. It is possible that there may have been a greater demand for lawyers at that point in time than at present. Moreover, in the case of Engineers, Psacharopoulos calculated again high rates of return, i.e. 12.2% private rate of return and 8.2% social rate of return for male engineers. During the last few years of the military dictatorship (1967-1973) and the first few years of democratic government there was a lot of investment in construction. This would have

led to an increased demand for engineers and may explain why Psacharopoulos found much higher rates of return for engineers than our estimates. In fact, in recent years, the investment in construction has been reduced substantially due to the recession in the Greek economy. Finally, in the case of Doctors, Psacharopoulos calculated negative rates of return. Our estimates are considerably higher, indeed quite different from those calculated by Psacharopoulos. The rise in the doctor's salaries in the public sector over the last few years, resulting from the government's attempt to attract more doctors in the public sector and improve the health provision, might explain the higher rates of return in our calculations.

However, excluding the activities in the private sector appears to be a rather unrealistic approach, since a large number of people in these occupations do extend their activities into the private sector, where they achieve higher salaries. For that reason, we have attempted to calculate rates of return by taking into account their activities in the private sector (Table 1). To test the sensitivity of our conclusions on this point, we have also calculated rates of return by taking only half of the increases for the higher earnings in the private sector and half of the percentage increases for the black economy. The estimates obtained by using these assumptions allow us to compare these results with the previous ones (Tables 1 and 2) and test their sensitivity to different assumptions. The results of these calculations are presented in Table 3. The results presented in Tables 1, 2 and 3 suggest that the rate of return estimates are quite sensitive to the assumption made about the activities in the private sector and the black economy.

Finally, we have tested the sensitivity of our rates of return results by assuming that only two-thirds of the earnings differentials are associated with degree education [Ziderman (1973)]. This implies that the lifetime earnings pattern of a university degree holder would have exceeded that of a non-university graduate (because of this superior ability, family background, etc.) by an amount equal to one-third of the earnings differential between university graduates and non-graduates. Moreover, an adjustment for the effect of economic growth has been made by adding an expected rate of productivity growth[3] 1.7 percent to the estimated rates of return [Psacharopoulos (1973)]. The results of these adjustments are given in Table 4. These results are different in magnitude from those in Tables 1 and 2, as expected. However, in all cases, the order of rates of return in the various professions has not been changed.

4. Conclusions

The overall implications of this work can be summarised as follows. The levels of investment in higher eduction in Greece give private rates of return varying from approximately 17.3% for male doctors to 7.4% for female engineers and corresponding social rates of return of 13.4% to 5.6%. The observation that the private rates of return are higher than the social rates of return in all areas is again consistent with previous studies in Greece and elsewhere. The results suggest that more resources should be devoted to training doctors[4] and possibly economists, while reducing the level of support for engineers. A more detailed study may identify whether specific areas of engineering should be concentrated upon at the expense of others. In addition, to ensure maximum benefit from this investment in higher education and to make future decisions on resource allocation more reliable, the government should take further steps to reduce the scale of the black economy.

Appendix

TABLE 1

Rates of Return in Higher Education in Greece, 1988

Subject group	Private Rates of Return		Social Rates of Return	
	Male	Female	Male	Female
Economists	14.4	10.5	12.4	9.1
Lawyers	13.0	11.5	11.5	10.2
Mathematicians	12.8	11.1	10.5	9.4
Engineers	9.6	7.4	7.4	5.6
Doctors	17.3	16.9	13.4	13.2

TABLE 2

Rates of Return in Higher Education in Greece, 1988
(excluding the activities in the Private Sector and the Black Economy)

Subject group	Private Rates of Return		Social Rates of Return	
	Male	Female	Male	Female
Economists	4.2	5.3	4.5	5.3
Lawyers	4.9	6.4	5.0	6.1
Mathematicians	1.6	4.6	1.4	4.2
Engineers	2.0	3.4	1.4	2.5
Doctors	5.9	8.6	5.0	7.0

TABLE 3

Rates of Return in Higher Education in Greece, 1988
(including half of the activities in the Private Sector and half of the Black Economy)

Subject group	Private Rates of Return		Social Rates of Return	
	Male	Female	Male	Female
Economists	9.9	8.4	8.5	7.3
Lawyers	9.5	9.2	8.7	8.3
Mathematicians	7.4	7.8	6.1	6.8
Engineers	6.4	5.6	4.8	4.2
Doctors	13.2	13.8	10.4	11.0

TABLE 4

Rates of Return in Higher Education in Greece, 1988
(adjusted for alpha-coefficient and economic growth)

Including the activities in the Private Sector
and the Black Economy

Subject group	Private Rates of Return		Social Rates of Return	
	Male	Female	Male	Female
Economists	12.1	9.0	10.5	7.9
Lawyers	11.2	9.9	10.0	8.9
Mathematicians	10.1	8.9	8.3	7.7
Engineers	8.3	6.4	6.4	4.9
Doctors	15.3	14.9	12.1	11.8

Excluding the activities in the Private Sector
and the Black Economy

Subject group	Private Rates of Return		Social Rates of Return	
	Male	Female	Male	Female
Economists	3.9	4.7	4.2	4.8
Lawyers	4.4	5.7	4.5	5.4
Mathematicians	1.5	4.0	1.3	3.7
Engineers	1.9	3.0	1.4	2.2
Doctors	5.4	7.7	4.7	6.4

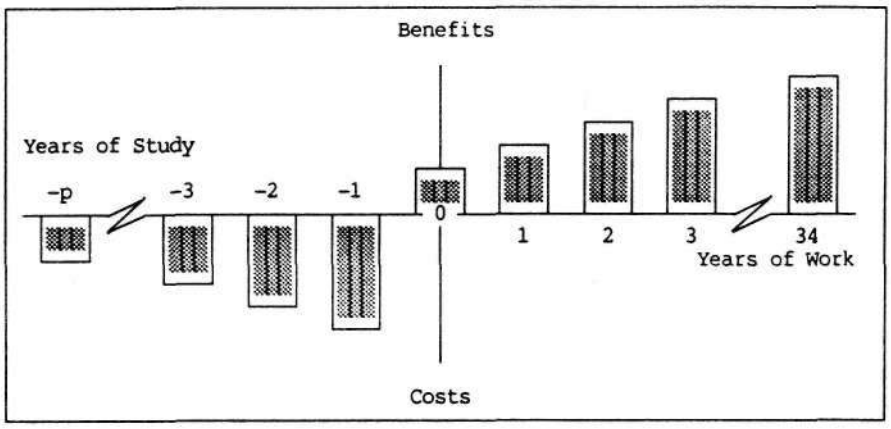

Figure 1: A Cost-Benefit Comparison

Footnotes

1. There is the legal frame for this and we assume that students could take the advantage.

2. This could be considered as a social benefit.

3. i.e. calculated average annual rate of growth of real GDP.

4. Based on their rates of return and on the need for quality improvement of hospitals where they are trained.

References

Blaug Mark (1965), "The Rate of Return on Investment in Education in Great Britain", The Manchester School, 33 (3), 205-51.

Pavlopoulos P. (1987), "The Black Economy in Greece", Institute of Economic and Business Research, Athens.

Psacharopoulos George (1973), "Returns to Education: An International Comparison", Elsevier Scientific Publishing Company, Amsterdam.

Psacharopoulos George (1982), "Earnings and Education in Greece, 1960-77", European Economic Review, 17, 333-347.

Psacharopoulos G and Kazamias A. M. (1985), "Education and Growth in Greece: Socio-Economic Research of the Third Level Education", National Centre of Social Research, Athens.

Psacharopoulos George (1991), "Earnings and Education in Venezuela: An Update from the 1987 Household Survey", Economics of Education Review, 10 (1), 29-36.

Woodhall Maureen (1973), "The Economic Returns to Investment in Women's Education", Higher Education, 2, 275-300.

Ziderman Adrian (1973), "The Profitability of Private Investment in University Education in Britain", Oxford Economic Papers, 262-274.