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THE RETURNS TO INVESTMENT IN HIGHER EDUCATION

Methods, Data and Policy Implications

INTRODUCTION

The purpose of this chapter is to provide an overview of the rates of return to investment in higher education based on existing data, incorporating where possible a differentiation for socio-economic background. The chapter discusses the shortcomings of the methods and data available. The size and pattern of the returns to higher education are put in the current education policy context.

Before presenting the rate of return evidence, it is essential to understand what these rates are, how they are being estimated and on what kinds of data. The next section presents the available evidence on the returns to higher education; this is followed by the equity dimension. The final section discusses the policy implications of the evidence.

RETURNS SPECIES

There are several types of returns to education, depending on the question one is interested in answering, e.g. how efficient is public spending on education, what is the return to an individual investing in higher education, or how much the state gets back relative to what it spends on education.

Private returns are based on the costs and benefits of education, as those are realized by the individual student, i.e. how much he/she actually pays out of pocket to attend a higher education institution, relative to what he/she gets back, after taxes, in terms of increased earnings, relative to a control group of secondary school graduates who did not pursue tertiary education studies. This is a private spending efficiency question. Private rates of return are used to explain the behavior of students regarding the demand for higher education, or the equity effects of state subsidies to education.

Social returns are based on the costs and benefits of education, as those are realized by the state or society as a whole. The costs are all inclusive, i.e. they refer to what education really costs, rather than just what the students pay out of pocket. Earnings are before tax, as taxes are a zero-sum-game regarding the social calculus. Social rates of return should be based on productivity differentials, rather than earnings. They should also include external effects of education, e.g. a higher education graduate spilling benefits to others by means of being more educated.

M. E. Menon et al. (eds.), Using Data to Improve Higher Education, 121–148.

The social returns to education are used to assess the efficiency of public spending on education, and can be used as a guide on whether to expand or contract a particular university faculty.

Fiscal returns to education are based on a narrow measure of costs and benefits – those relating to the public coffer. They can be used to assess how well the Treasury is doing when spending on education. They relate to the country's public finances and are not estimated as widely as the private and social rates.

Ideally, the benefits part of a social rate of return estimation should include external effects, i.e. benefits that are realized by others than the individual investor. An externalities-inclusive social rate of return is called "wide," vs. the "narrow" social rate of return that includes only benefits internalized by the individual. This distinction is important because, depending on the size of externalities and the differential externalities between levels of education, diametrically opposite policy conclusions could be reached.

The literature contains a plethora of papers purporting to have estimated the returns to education, although the authors have really estimated the wage effect, i.e., the earnings advantage of a particular graduate. A proper rate of return estimation should also take into account the cost incurred for achieving that advantage.

ESTIMATING METHODS

In the empirical literature, two main methods have been used in arriving at rate of return estimates: the "full-discounting" or "elaborate" method, and the "Mincerian" earnings function method. Historically, the elaborate method was used in the beginning of the economics of education in the early sixties, followed by the Mincerian method in the seventies. Both methods try to map observed data, as those illustrated in Figure 1, to a rate of return formula.[1]

The "full-discounting" or "elaborate" method, consists in calculating the internal rate of return based on individual age-earnings profiles that vary over time (*t*), i.e.,

$$\sum_{t=m+1}^{n} \frac{(W_u - W_s)_t}{(1+r)^t} = \sum_{t=1}^{m} (W_s + C_u)(1+r)^t,$$

where (*r*) is the discount rate that equates the benefits from the extra education (proxied by earnings differentials in the economy), to the sum of opportunity costs (foregone earnings of the student while studying), and the direct resource costs of schooling at a given point in time. Thus, $(W_u - W_s)_t$ is the difference in earnings between two levels of education[2] and W_u is the annual earnings of a more educated person.

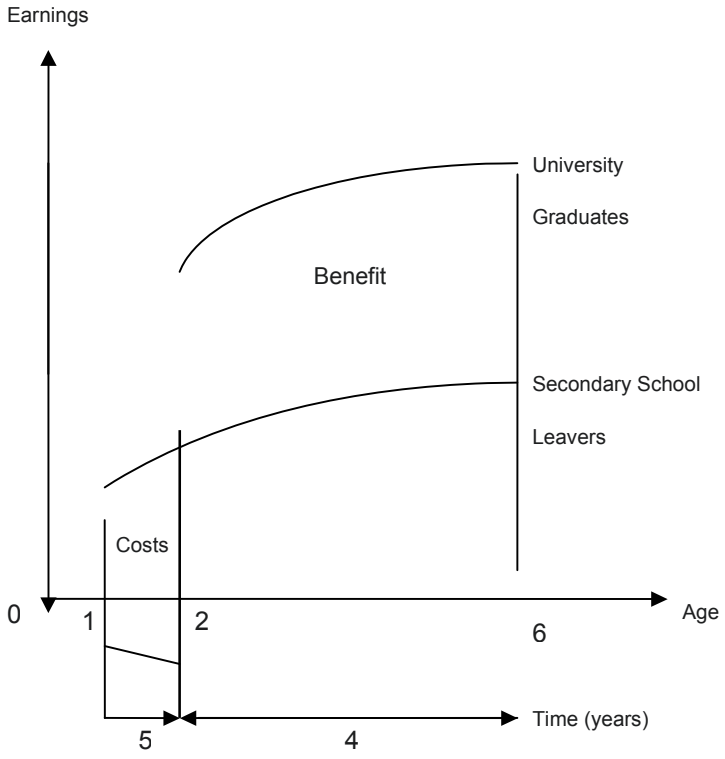

Figure 1. Stylized age-earnings profiles.

The "Mincerian" earnings function method starts by fitting a regression to the data in the form

$$\ln W_i = \alpha + \beta_p D_p + \beta_s D_s + \beta_u D_u + \gamma_1 EX_i + \gamma_2 EX_i^2 + \varepsilon_i$$

where *EX* stands for years of labor market experience, defined as Age – S – School starting age, and *D* is a 0-1 dummy variable corresponding to the subscripted level of schooling (Mincer, 1974). The private rate of return to higher education can then be calculated from the earnings function by the following formula:

$$r_u = \frac{\beta_u - \beta_s}{S_u - S_s},$$

The discounting of actual net age-earnings profiles is the most appropriate method of estimating the returns to education because it takes into account the most important part of the early earnings history of the individual. However, this method requires comprehensive data – one must have a sufficient number of observations in a given age-educational level cell for constructing "well-behaved" age-earnings profiles (that is, not intersecting with each other).

The advantage of the Mincerian way of estimating the returns to education is that it can smooth out and handle incomplete cells in an age-earnings profile matrix by level of education. The disadvantage, of course, is that it requires a sample of individual observations, rather than pre-tabulated mean earnings by level of education.

DATA

The data used for estimating a rate of return to investment in education depend on the type of the returns one is interested in. Private and fiscal rates can be estimated on the basis of observed after-tax earnings in all sectors of the economy and the cost of education to the individual.

In a social rate of return calculation, the costs include the state's or society's at large spending on education. This includes the rental of public school buildings and teachers' salaries. Gross earnings (that is, before taxes and other deductions) should be used in a social rate of return calculation, and such earnings should also include income in kind where this information is available.

A key assumption in a social rate of return calculation is that observed wages are a good proxy for the marginal product of labor. This could be the case in a competitive economy using data from the private sector. Civil service pay scales are irrelevant for a social rate of return calculation as they are unlikely to represent marginal productivity. The pay of civil servants, however, should be used in calculating the private returns to education, as it reflects what people actually get, regardless of productivity.

The "social" attribute of the estimated rate of return refers to the inclusion of the full resource cost of the investment (direct cost and foregone earnings). Ideally, the social benefits should include non-monetary or external effects of education – for example, lower fertility or lives saved because of improved sanitation conditions followed by a more educated woman who may never participate in the formal labor market. Given the scant empirical evidence on the external effects of education, social rate of return estimates are usually based on directly observable monetary costs and benefits of education.

Since the costs are higher in a social rate of return calculation relative to the one from the private point of view, social returns are typically lower than a private rate of return. The difference between the private and the social rate of return reflects the degree of public subsidization of education.

The benefits of education are typically classified into a four-cell matrix, as shown in Table 1 (McMahon, 1997; Wolfe & Zuvekas, 1997). The easiest to document benefits are those in the northwest quadrant, namely private benefits that

manifest themselves in the labor market and can be measured in monetary terms. The hardest to document benefits are those in the southeast quadrant, namely the social benefits that are not directly observed or measured in monetary terms.

Table 1. A classification of the benefits of education.

Benefits type	*Private*	*Social*
Market	– Employability – Higher earnings – Less unemployment – Labor market flexibility – Greater mobility	– Higher productivity – Higher net tax revenue – Less reliance on government financial support
Non-market	– Better consumer efficiency – Better own and family health – Better children quality	– Reduced crime – Less spread of infectious diseases – Lower fertility – Better social cohesion – Voter participation

Sample selection should be random, i.e. being representative of the population as a whole. Data should refer to the individual person, rather than tabulated mean earnings by level of education, as was practiced in the early days of the economics of education. Individual earnings allow for the control of covariates, i.e. factors correlated with education that affect earnings, e.g. differential ability or socioeconomic background.

Randomly generated data, along with covariates, is the exception rather than the rule. It is problematic when the estimated rates of return are based on a survey of firms – rather than households – because firm-based samples are highly selective. In order to control survey costs, such samples focus on large firms with many employees. Second, the questionnaire is typically filled by the payroll department rather than by the individual employee. Typically, this approach leads to the use of samples concentrated only in urban areas.

Data generated by virtue of natural experiment are much better relative to econometric control for covariates, e.g. identical twins separated early in life and receiving different amounts of education. Or, because of a military draft legislation, or month-of-the-year birth date, some people received different levels of schooling than others.

Another problem occurs when rate of return estimates are based on samples that include civil servants. On average, the inclusion of civil service pay flattens the earnings differentials giving lower returns among those working in the public sector (Psacharopoulos, 1983). Of course, in many countries – although fewer now than in the past – the majority of university graduates end up in public sector

employment. However, civil-service-pay based rate of return estimates are useful in private calculations regarding the incentives set by the state to invest in education.

Covariates

Beyond education, there is large list of factors that may affect earnings, such as differential ability. The undisputable and universal positive correlation between education and earnings can be interpreted in many different ways. The causational issue on whether education really affects earnings can only be answered with experimental data generated by assigning at random different people to various levels of education. Given the fact that moral and pragmatic considerations prevent the generation of such pure data sets, researchers have used indirect inferences or natural experiments. Examples of a natural experiment in this context is identical twins who were separated early in life and received different amounts of education (as to control for differences in genetic ability) or differential date of birth and eventual educational attainment. Estimates of the returns to education based on twins samples have corroborated the statistically significant link between education and earnings (Ashenfelter & Krueger, 2004; Ashelfelter & Rouse, 1998).

EVIDENCE

Before presenting the formal rate of return estimates to higher education, let us list two major benefits enjoyed by higher education graduates. As shown in Table 2, there is a negative relationship between holding a university degree and being unemployed. On average, those who have not completed upper secondary education are two and a half times more likely to be unemployed relative to tertiary education graduates.

Table 2. Unemployment rate by level of education (%).

Country	*Below upper secondary*	*Upper secondary*	*Tertiary*
Australia	7.0	4.3	3.0
Canada	10.9	6.5	5.2
France	12.1	7.5	6.1
Germany	18.0	10.2	5.2
Japan	6.7	5.4	3.7
U.K.	6.9	3.9	2.4
USA	9.9	6.1	3.4
OECD mean	10.2	6.2	4.0

Source: OECD (2005), Table A8.4a, p. 113-114
Note: Number of 25-64 year olds who are unemployed as a percentage of the labor force aged 25-64.

Not only higher education boosts employment chances, but once employed graduates have a clear earnings advantage (Table 3). In the United States, the earnings of tertiary education graduates are two and a half times higher than those of high school dropouts.

Table 3. Relative earnings of the population 25-64 year old with income from employment by level of education (Index).

Country	*Below upper secondary*	*Upper secondary*	*Tertiary*
Australia	77	100	132
Canada	79	100	136
France	84	100	150
Germany	87	100	153
Korea	67	100	141
U.K.	69	100	162
USA	70	100	183

Source: OECD (2005), Table A9.1a, p. 130.
Note: Index base, upper secondary education = 100.

There have been several compilations of the returns to education, both at the World scale[3] and for several OECD countries.[4] Annex tables A-1 to A-4 present as a master reference the returns to higher education in a large number of countries classified across several dimensions. The basic pattern that emerges is that:

– The returns to education are higher in developing relative to advanced industrial countries – a reflection of the relative scarcity of human capital in poor countries.
– The private returns exceed the social returns – a reflection of the public subsidization of higher education.
– The returns to higher education have been rising in most dynamic economies in recent years – a reflection of the demand for more educated manpower to complement advances in technology.
– There exists wide differentiation of the returns by university faculty – a reflection of the relative demand and supply for graduates.

Most of the estimates presented in the Annex master tables are dated, and many have been based on very selective samples to be representative of the true recent trends. Table 4 presents private rates of return for a number of OECD countries using a uniform methodology (the Mincerian earnings function) and data set (mainly the European Community Household Panel). Private returns in most countries are of the order of 4-7 percent, and are especially high in Ireland, Luxembourg and Portugal. These private rates certainly exceed the private returns to alternative investment opportunities in OECD countries, e.g. Bank deposits.

Table 4. Private returns to investment in higher education, 2001.

Country	*Rate of return (%)*
Austria	5.9
Belgium	7.0
Denmark	5.8
Finland	6.8
France	5.8
Germany	4.3
Greece	4.8
Ireland	10.7
Italy	5.1
Luxembourg	10.5
Netherlands	5.7
Portugal	14.8
Spain	5.7
Sweden	4.8
U.K.	5.1
USA	7.0

Source: OECD (2006), Table 4.
Note: Studies duration for Belgium, Luxembourg, Portugal and USA not available in original, assumed to be 4.5 years.

The OECD has recently produced comparable narrow social rates of return estimates for some of its member countries (Table 5). These rates range from 4-8 percent in most countries, and are especially high in Finland and the United States.[5]

Again, these rates compare well to any measure of the social opportunity cost of capital in the countries concerned.

Table 5. Social rates of return to higher education, 2002.

Country	*Rate of return (%)*
Belgium	5.6
Denmark	4.8
Finland	11.0
Italy	8.4
Netherlands	8.4
Norway	6.8
Sweden	5.2
Switzerland	6.1
United States	12.4

Source: OECD (2005), p. 143, Tables A9.9 and A9.10, males.

The OECD also presents returns from another point of view, that of the state as collector of taxes. The provision of education at all levels entails loss of taxes from those who are in school or at the university. It also entails higher tax revenue from those who graduate and have higher incomes. As shown in Table 6, the result in all countries is a gain from the fiscal view point (Table 6).

Table 6. Fiscal rates of return in OECD countries by level of education, 2002 (%).

Country	*Rate of return (%)*
Belgium	5.6
Denmark	4.8
France	6.7
Finland	4.8
Italy	9.5
Netherlands	10.7
Norway	4.1
Sweden	1.7
United States	12.3

Source: OECD (2005), p. 143, Tables A9.7 and A9.8, males.

EQUITY

Beyond the private and social efficiency questions, the returns to education can be used to answer equity questions. For example, in the United States there has been increased wage inequality between 1973 and 2005, and this has been attributed to the increase in the returns to investment in higher education (Lemieux, 2006). This in turn is due to the increased demand for skilled workers (Chinhui, Murphy, & Pierce, 1993; Hauser, 1973).

Higher Education Access

To start with, higher socioeconomic (SES) students, as measured by the education of their parents, have a much better chance of entering higher education (Table 7).[6]

Higher education students come from a higher socioeconomic status relative to the rest of the population. The representation index shown in Table 8 is the ratio of the proportion of students whose father has a university degree and the proportion of university degree holders in the population. A value of 1 means equal representation. The higher the index, the more "inequitable" the system. Tables 9 and 10 document a similar "inequitable" situation in Greece and the U.K.

Table 7. Impact of parental education on access to tertiary education (%).

Country	*Parental education*	
	Below upper secondary education	*Tertiary education*
Australia	20.0	39.2
Belgium	15.3	49.7
Canada	23.7	57.2
Germany	16.0	38.4
Ireland	12.0	57.4
Netherlands	12.8	42.6
New Zealand	21.4	45.3
Sweden	18.7	40.2
United Kingdom	16.5	47.0
United States	19.7	64.2

Source: OECD (2001).
Note: Percent of the population 16-65 years who have completed tertiary education, by level of educational attainment of parents.

Table 8. Representation of university students by father's SES, 2005.

Country	*Higher SES representation index*
Germany	2.1
Spain	1.5
France	2.0
Ireland	1.1
Italy	1.8
Netherlands	1.6
Austria	2.6
Portugal	5.4
Finland	1.8

Source: Eurostudent (2005).

Table 9. The inequity of university access, Greece.

Father's occupation (1)	*Labor force share (%) (2)*	*Student entrants share (%) (3)*	*Representation index (4)*
Executive and managerial	21.8	26.0	1.2
White collar worker	31.4	48.0	1.5
Manual worker	29.4	14.0	0.5
Farmer	16.5	5.0	0.3

Source: Psacharopoulos and Papakonstantinou (2005).
Note: Col. (4) = [Col. (3) / Col. (2)]

Table 10. Probability of attaining a university degree by father's occupation, U.K.

Father's occupation	*Probability of child attaining a university degree (%)*
Professional	42
Non-manual worker	27
Unskilled manual	5

Source: Dutta, Sefton and Weale (1999).

One reason for such differentiation is that those coming from higher SES families are better able to pay and prepare for university entry (Table 11).

Table 11. Private expenditure per university student by family income, Greece.

Family income	*Expenditure (€ /year)*
Top 20%	4,215
Bottom 20%	3,467

Source: Psacharopoulos and Papakonstantinou (2005).

Family Background

Another equity issue is how people from different socioeconomic status benefit from public spending on education. Do those who come from poorer families benefit more relative to the offspring of richer families? There are two analytical tools for answering this question – one involving rate of return estimates, and the other the incidence of public spending and benefits on higher education by income group.

Casual empiricism might suggest that what appears to be a return to investment in education is in fact a rent derived from one's socio-economic origins. At the theoretical level, this issue was addressed early on by Becker (2009) who noted that if parents' education influences children's earnings, this is due to the fact that wealthier parents invest more in the education of their children. Thus, the effect of

family background is nothing other than an intergenerational effect of human capital.

Returns to education by SES can be estimated by using the full discounting method within groups of people of different socioeconomic background. A second best is using the Mincerian earnings function, adding an SES independent variable, or interacting it with higher education.

The available literature is not very forthcoming on the returns to higher education by socioeconomic background, although there exist several estimates for the returns to education on average by SES. If the returns in general are increasing by the level of SES, the same pattern should be observed if the researchers had broken down the sample by SES and estimated the returns to higher education within SES groups. Tables 12 and 13 show that in several countries those coming from a superior socioeconomic background enjoy much higher returns.

Table 12. Returns to education by socioeconomic status (%)

Country /Ed. level	*Lower SES*	*Higher SES*
Overall		
Brazil	11.4	13.9
Israel	8.9	13.8
Kenya	6.5	16.7
Tanzania	6.7	9.6
Greece	4.8	5.7
U.K.	3.1	8.4
USA	8.1	9.2
Post-compulsory		
Spain	4.3	6.6
Higher education		
France	16.3	20.9

Source: Patrinos (1992, 1995). Spain from Vila and Mora (1998).

Table 13. The returns to education by father's occupation (%)

Father's occupation	*USA*	*France*
Laborer	6.2	11.9
Farmer	6.4	–
White collar	–	12.9
Manager	7.6	–
Professional	7.2	–

Source: USA from Cohn and Kiker (1986), Table 3. France from Vawda (2003), Table 1.

Several studies have included measures of family background in the Mincerian earnings function, finding minimal effects on the returns to education. For example, Altonji and Dunn (1996), using sibling pairs from the United States Panel Study of Income Dynamics, find mixed evidence on whether parental education

raises the return to education. Using a sample of Australian twins, Miller, Mulvey and Martin (1995, 2006) find no evidence that the returns to education are overestimated by the non-inclusion of family background factors.

Papanicolaou and Psacharopoulos (1979) in the U.K., Patrinos (1995) in Greece, Mora (1999) in Spain and Ichino and Winter-Ebmer (1999) in Germany included an SES and education interaction term in the Mincerian earnings function and found a positive coefficient. This means that a higher SES is associated with a higher rate of return to investment in education.

It should be noted, however, that Card and Krueger (1990) find that holding school quality constant, there is no evidence that parental income or education affects state-level returns to education. But Newman (1991) using Israeli data found that the returns to schooling are higher to those coming from more favorable socioeconomic backgrounds.

Socioeconomic privilege confers many direct benefits, both through a home culture which tends to reinforce the goals of formal education and through the capacity to fund access to education in private schools and post-compulsory education (Dearden, 1998; McPherson & Schapiro 1991, 2000).

Particularly in the post-compulsory phase, systems of educational finance also have an impact on outcomes by virtue of how they distribute the costs of human capital investment between different parties. Overall outcomes for any individual depend not only on the benefits of educational attainment, but also on how much of the cost of that education is born by the individuals who benefit.

Overall, the expansion of tertiary education in OECD appears to have had little impact on the *relative* prospects of young people from less advantaged backgrounds. This is hardly a surprising finding. Parental and school influences are extremely important determinants of participation at the post-compulsory level. In most countries tertiary education requires prior qualifications – generally at upper-secondary level – so that attainment in the compulsory phase of education, as much as anything which occurs subsequently, is a key to tertiary participation. Therefore, the expansion of capacity at the tertiary level will not, in itself, have much impact on these factors. The challenge to public policy of delivering equality of opportunity in tertiary education is sizeable, and falls not only on the system for tertiary education itself, but also on support for children and their families, reaching back to pre-schooling and into compulsory and upper-secondary schooling.

A number of research studies demonstrate that children who grow up in a low-income family typically have lower educational achievements and, subsequently, lower returns to education than children who grow up in a wealthy family (Haveman, Wolfe & Spaulding, 1991). Their findings are consistent with the findings of Card (1999), who associates the mother's higher educational level with a child's higher returns to education.

Wilson (2001) finds that "higher parental education is negatively related to income for late teens and early 20s but positively related at older ages." Her conclusions are supported by the evidence that children of higher-educated parents typically attend college after graduating from high school, and while their initial

earnings are lower during years spent studying, their returns to education significantly increase after they receive a college degree. Wilson also concludes that growing up in a low-income family and having a working mother are associated with lower returns to education. In addition, she determines that "having a higher-educated mother or one that works, increases the likelihood of graduating" (Wilson, 2001).

Incidence of Public Spending

This entails comparing the taxes families of rich and poor students pay, to the education benefits these groups appropriate by attending a subsidized public higher education system. This is called the "distributive incidence" of education subsidies, or who really pays and who really benefits from public education expenditure.

Hansen and Weisbrod (1969) were the first to study the issue exploring the income redistribution effects of the financing of public higher education in California. Since eligibility for the higher-subsidy institutions was positively related to family income, and since university attendance increases as family income rises, the result was that the distribution of subsidies actually favored upper income families. These subsidies were compared with state and local taxes paid. The results showed that families with children enrolled in public higher education received a positive net transfer (subsidy less taxes paid) and that these net transfers were an increasing share of family income. The regressive nature of public financing of higher education has since been documented in many other countries (Vawda, 2003; Yang, 2002).

POLICY

What does the above review mean for designing efficient and equitable higher education policies, bearing in mind the state of available data and methodological shortcomings?

Based on the existing evidence, it is clear and definitive that higher education has a value, both to the individual who invests in education and to society at large. The state of our knowledge today is that the evidence on the private value of higher education is more robust than the social value. This asymmetry has implications for public education finance policies.

Based on Blondal, Field and Girouard (2002) it is possible to construct a summary table on the private and narrow social returns to higher education in a number of OECD countries (Table 14), along with the influence of various components in arriving from the private rate to the social rate. Thus we could conclude that the private and social returns are around the 10% mark, the narrow social rates being lower than the private rates by two percentage points.

Table 14. Rates of return to higher education, 1999-2000 (%)

Country/ Adjustment	*Private pretax return*	*Taxes impact*	*Unemploy-ment risk*	*Tuition fees*	*Public student support*	*Fully adjusted private rate*	*Narrow social return*
Canada	8.4	-0.5	1.3	-2.3	1.8	8.7	6.8
Denmark	7.9	-2.1	1.0	-0.1	4.8	11.5	6.3
France	13.3	-1.6	2.4	-1.1	1.3	14.3	13.2
Germany	7.1	-1.5	1.1	-0.3	2.7	9.1	6.5
Italy	8.0	…	0.3	-0.8	0	7.5	9.7
Japan	8.0	-0.3	0.9	-2.0	1.3	7.9	6.7
Netherlands	11.7	-2.0	0	-0.6	2.9	12.1	10.0
Sweden	9.4	-1.5	1.2	-0.7	3	11.4	7.5
U.K.	18.1	-2.1	1.6	-2.7	3.6	18.5	15.2
USA	18.9	-2.3	0.9	-4.7	2.1	14.9	13.7
Average	11.4	-1.5	1.1	-1.5	2.4	11.6	9.6

Source: Based on Blondal et al. (2002), Tables 3 and 4.

Taking these results at face value, it means that in spite of the explosion of higher education in Europe and the high risk of unemployment among graduates, higher education continues to be a profitable investment opportunity, both privately and socially. This conclusion is based on the assumption that the 10% mark is well above the yield of alternative private investment opportunities (say Bank deposits), and the social opportunity cost of capital. This is a conclusion based on the criterion of efficiency.

Bringing in a concern for equity, the above review suggests that higher education public funding should not be equal across the board, e.g. tuition free for all students, regardless of their socio-economic background. Lower SES students (defined with an objective criterion, such as the tax return of the father) should receive a higher subsidy relative to those coming from more affluent families, the latter required to pay tuition fees. Although such policy is both efficient and equitable, it is very difficult to gain political acceptance (Psacharopoulos, 2003).

The most efficient and equitable financing mechanism for higher education might be to provide the initial fund for a student loan scheme. Student loans contribute to efficiency because they provide incentives to students to choose subjects leading to employment, and study harder. They also contribute to equity, in the sense that those who will later enjoy higher incomes throughout their lifetime will pay themselves for their education, rather than the general taxpayer.

In funding higher education, two additional issues should be taken into account – externalities and other levels of education.

What if the yet unmeasured social externalities of a higher education graduate far exceed the narrow social returns to education? Such case would call for a massive public subsidization of higher education. But higher education is not the only ladder of an education system. What if the social returns (narrow or social) for the lower levels of education exceed those of higher education? This is still an open debate in the empirical literature (Psacharopoulos, 1996).

Public finance priority should be given to the lower levels of education, e.g., to assist those from a lower socioeconomic background to complete secondary school in an industrial country, or primary school in a developing country. Indeed, the lower the level of education assisted by public funding, the higher the efficiency and equity benefits. "Lower" education level means going down to pre-school, as forcefully argued by Nobel Laureate James Heckman (Heckman & Masterov, 2005).

Since the early days of the economics of education, the issue of a possible trade off between efficiency and equity in education arose (see special issue of the *Journal of Political Economy*, 1972). This debate continues today. By attempting to serve equity, education resources might be used in activities that are less efficient. On the other hand, a possible efficiency-equity trade off exists only in cases where, at the initial conditions, education resources are used in a fully efficient way – hardly the case in the actual world.

The consensus today is that all education systems operate at a point X in Figure 2, i.e., well inside the efficient production possibility frontier AB. So there is room for implementing policies that move towards points to Z or Y, i.e., improving both efficiency and equity (Psacharopoulos, 2006).

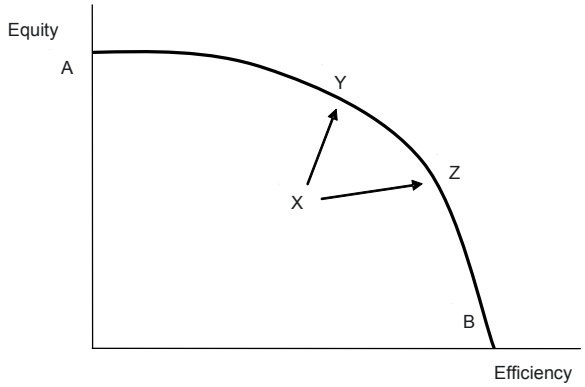

Figure 2. The efficiency-equity trade-off.

Combining efficiency and equity objectives introduces the issue of relative weights one should attribute to the two components of social welfare. How does one arrive at the values of the efficiency and equity weights? This relates to the political economy of distribution and is left to politicians and voters.

In today's world there is an inertia syndrome in the public funding of education. Most education budgets are managed by inertia, i.e., allocations in a given year are more or less equal to last year's allocations adjusted for inflation. This is tantamount to the absence of any policy to serve society's efficiency and equity objectives. As our knowledge progresses on what are the most effective ways to improve social welfare by education, so our policies should be continuously fine tuned to the most effective modes of public funding for education.

NOTES

[1] See Psacharopoulos and Mattson (1998).

[2] In this example, subscripts *u* and *s* stand for university and secondary education, respectively.

[3] Psacharopoulos (1972a,1972b,1972c, 1973, 1981, 1985, 1989, 1994), Psacharopoulos and Patrinos (2004a).

[4] Asplund and Pereira (1999), De la Fuente (2003), Blondal et al. (2002), OECD (2005, 2006).

[5] Rates of return in Tables 4 and 5 are not directly comparable as they are based on different years, datasets and methodology.

[6] See also Haveman and Wolfe (1985), White (1982).

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APPENDIX

Table A-1. The returns to higher education (%).

Country	*Year*	*Private*	*Social*
Argentina	1989	14.9	7.6
Australia	1976	21.1	16.3
Austria	1981	4.2	
Belgium	1960	8.7	6.7
Bolivia	1990	19.0	13.0
Botswana	1983	38.0	15.0
Brazil	1989	28.2	21.4
Burkina Faso	1982		21.3
Canada	1994	13.0	
Czech Rep.	1997	8.9	
Chile	1989	20.7	14.0
China	1993	15.1	11.3
Colombia	1989	21.7	14.0
Costa Rica	1989	12.9	9.0
Cyprus	1979	5.6	7.6
Denmark	1964	10.0	7.8
Dominican Republic	1989	19.4	
Ecuador	1987	12.7	9.9
El Salvador	1990	9.5	8.0
Estonia	1995		10.3
Ethiopia	1996	26.6	11.9
France	1976	20.0	
Germany (West)	1978	10.5	
Ghana	1967	37.0	16.5
Greece	1993	8.1	5.7
Guatemala	1989	22.2	
Honduras	1989	25.9	18.9
Hong Kong	1976	25.2	12.4
Hungary	1993	13.4	2.6
India	1995	18.2	
Indonesia	1989		5.0
Iran	1976	18.5	13.6
Israel	1958	8.0	6.6
Italy	1969	18.3	

Ivory Coast	1984	25.1	
Japan	1976	8.8	6.9
Korea	1986	17.9	15.5
Lesotho	1980	36.5	10.2
Liberia	1983	17.0	8.0
Malawi	1982	46.6	11.5
Malaysia	1978	34.5	
Mexico	1992	15.7	11.1
Morocco	1970		13.0
Nepal	1999	12.0	9.1
Netherlands	1965	10.4	5.5
New Zealand	1991	11.9	9.5
Nicaragua	1996		14.7
Nigeria	1966	34.0	17.0
Norway	1966	7.7	7.5
Pakistan	1991	31.2	
Panama	1989	21.0	
Papua New Guinea	1986	23.0	8.4
Paraguay	1990	13.7	10.8
Peru	1990	40.0	
Philippines	1988	11.6	10.5
Puerto Rico	1959	29.0	15.5
Sierra Leone	1971		9.5
Singapore	1998	18.7	13.9
Somalia	1983	33.2	19.9
South Africa	1980		11.8
Spain	1991		13.5
Sri Lanka	1981	16.1	
Sudan	1974	15.0	4.0
Sweden	1967	10.3	9.2
Taiwan	1972	15.8	17.7
Thailand	1989	11.8	
Tunisia	1980	27.0	
Turkey	1987	16.2	8.5
Uganda	1965		12.0
U.K.	1986		6.5
U.K.	1995	16.2	11.4
United States	1987		12.0
Uruguay	1989	12.8	10.3

Venezuela	1989	11.0	6.2
Vietnam	1992	3.0	6.2
Yemen	1985	56.0	24.0
Yugoslavia	1986	5.3	3.1
Zambia	1983	19.2	5.7
Zimbabwe	1987	5.1	-4.3
Mean		16.061	8.475

Source: Psacharopoulos and Patrinos (2004b), Czech Republic from Klazar, Sedmihradsky and Vancurova (2001), U.K. 1995 from Dutta el al. (1999).

Table A-2. Returns to investment in higher education over time (%).

Country	*Year*	*Private*	*Social*
Australia	1969	13.9	
Australia	1976	21.1	
Brazil	1970	13.9	
Brazil	1980	16.0	
Brazil	1989	28.2	21.4
Canada	1960	17.4	14.9
Canada	1985	14.0	12.1
Chile	1960	6.8	11.6
Chile	1985	6.9	10.3
Chile	1989	20.7	14.0
Cyprus	1975	8.6	9.7
Cyprus	1979	5.6	7.6
France	1962	9.3	
France	1976	20.0	
Germany	1964	4.6	
Germany	1978	10.5	
Great Britain	1971		10.0
Great Britain	1971		7.0
Greece	1962	14.0	13.7
Greece	1977	5.5	4.5
India	1965	16.2	10.3
India	1978	13.2	10.8
Indonesia	1978		14.8
Indonesia	1989		5.0
Iran	1972		15.0
Iran	1976		13.6
Japan	1967	10.5	
Japan	1980	8.3	
Mexico	1963	29.0	23.0
Mexico	1984	21.7	12.9
Pakistan	1975	27.0	
Pakistan	1979	6.3	
Papua N.G.	1979	11.4	1.0
Papua N.G.	1986	23.0	8.4
Peru	1972		16.3
Peru	1985		9.3
Peru	1990	39.7	
Philippines	1971	9.5	8.5
Philippines	1985	14.0	13.3
Philippines	1988	11.6	10.5
South Korea	1967		5.0
South Korea	1986		15.5
Spain	1981	10.1	
Spain	1991	11.0	

Taiwan	1970	18.4	15.0
Taiwan	1972	15.8	17.7
Thailand	1970	14.0	11.0
Thailand	1985	21.9	13.5
Tunisia	1977	24.1	
Tunisia	1980	27.0	
United States	1939		10.7
United States	1987		12.0
Uruguay	1972	5.4	
Uruguay	1979	20.0	
Uruguay	1989	12.8	10.3
Venezuela	1957	27.0	23.0
Venezuela	1989	11.0	6.2
Yugoslavia	1969	2.6	2.8
Yugoslavia	1986	5.3	3.1

Source: Psacharopoulos and Patrinos (2004b), Spain from Vila and Mora (1998).

Table A-3. Change in the returns to higher education over time (%).

Country	*Period (years)*	*Private*	*Social*
Australia	7	7.2	
Brazil	19	14.3	
Canada	25	-3.4	-2.8
Chile	29	13.9	2.4
Cyprus	4	-3.0	-2.1
France	14	10.7	
Germany	14	5.9	
Greece	15	-8.5	-9.2
India	13	-3.0	0.5
Indonesia	11		-9.8
Iran	4		-1.4
Japan	9	-5.5	
Mexico	21	-2.0	-10.1
Pakistan	4	-9.3	
Papua N.G.	7	11.6	7.4
Peru	13		-7.0
Philippines	17	2.1	2.0
S. Korea	19		10.5
Spain	10	0.9	
Taiwan	2	-2.6	2.7
Thailand	15	7.9	2.5
Tunisia	3	2.9	
USA	48	1.3	-8.2
Uruguay	17	7.4	
Venezuela	32	-16.0	-16.8
Yugoslavia	17	2.7	0.3
Mean	15.0	1.0	-8.25

Source: Based on Psacharopoulos and Patrinos (2004b).

Table A-4. Returns to higher education by subject (%).

Subject/Country	*Private*	*Social*
Agriculture		
Brazil	16.0	
Colombia	22.3	16.4
Greece	3.1	2.7
India	16.2	
Iran	27.4	13.8
Malaysia	9.8	
Norway		2.2
Philippines	5.0	5.0
S. Korea	16.0	
Thailand	19.0	8.2
Social Sciences		
Brazil	8.0	
U.K.		13.0
Canada	10.8	8.8
S. Korea	16.6	
Arts		
Canada	4.0	3.8
Norway		4.3
U.K.	26.0	7.0
Canada	0.7	-0.1
France	2.9	
India	14.3	12.7
Iran	20.0	15.3
Thailand	15.9	11.2
Venezuela	8.0	
Economics		
Belgium		9.5
Brazil		16.1
Canada	13.1	11.4
Colombia	32.7	26.2
Denmark		9.0
Greece	5.4	4.4
Iran	23.9	18.5
Norway		8.9
Philippines	14.0	10.5
S. Korea	20.6	
Sweden		9.0
Venezuela	15.7	
Engineering		
Canada	23.0	11.7
Brazil		17.3
Canada	14.0	10.7
Colombia	33.7	24.8

Denmark		8.0
France	17.5	
U.K.	9.0	5.5
Greece	12.2	8.2
India	21.2	16.6
Iran	30.7	18.2
Malaysia	13.4	
Norway		8.7
Philippines	15.0	8.0
S. Korea	20.0	
Sweden		7.5
Thailand	22.0	10.7
Venezuela	20.3	
Law		
Belgium		6.0
Brazil		17.4
Canada	13.6	11.6
Colombia	28.3	22.7
Denmark		10.0
France	16.7	
Greece	13.8	12.0
Norway		10.6
Philippines	18.0	15.0
Sweden		9.5
Thailand	15.4	12.2
Venezuela	14.1	
Medicine		
Australia	12.2	
Belgium		11.5
Brazil		11.9
Canada	21.6	17.2
Colombia	35.6	23.7
Denmark		5.0
France	12.6	
Malaysia	12.4	
Norway		3.1
Sweden		13.0
Thailand	13.8	5.4
Sciences		
Belgium		8.0
Brazil	20.0	
France	12.3	
Greece	2.1	1.8
U.K.	10.0	6.5
Norway		6.2
Thailand	19.5	9.5
Venezuela	10.9	

Source: Based on Psacharopoulos and Patrinos (2004b,) U.K. engineering from Wilson (1983).

Note: Law includes law and economics, medicine includes health sciences, engineering includes architecture.

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