The education premium of the Portuguese higher education graduate

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Abstract

The study of Higher Education Institutions (HEI) impacts, until 1990s, only focused on the short term impacts, i.e. the economic approach. In recent years, there has been a more significant advance about the long term impacts of higher education, especially concerning the human capital.

The human capital analysis, developed by Schultz (1961) and Becker (1993), estimates the increase in productivity and incomes for the individuals due to the acquired knowledge and skills for attending an HEI. Following these authors, Bluestone (1993) suggested that the creation of human capital for higher education graduates can be estimated assuming that the wage is correlated only with the number of official school years.

In this paper, the human capital of the Portuguese higher education graduate is determined, considering that the education premium (the increased wage when compared with secondary education graduates) is due only to the number of years in higher education.

Keywords: Human capital – Education premium – Economic impact – Higher Education Institution

1. Introduction

The study of the impacts of Higher Education Institutions (HEI), until 1990s, only focused on the short term impacts, i.e. the economic approach. In recent years, there has been a more serious advance about the long term impacts of Higher Education (HE), especially on the determination of human capital creation.

Although several authors (e.g. Blackwell et al., 2002, Carr and Roessner, 2002) have recognized the existence and creation of human capital on those individuals that invest in a higher education, they also recognize that this impact is very difficult to quantify. Usually, when the long term impacts are taken into account, only the identification of those impacts was made and no quantification was attempted.

Following the econometric approach developed by Mincer (1958), that establishes a relationship between wage differential and various factors, such as

the number of years of official school, the family background and personal skills, other authors (e.g. Becker, 1993) have presented ways to determine this impact. Bluestone (1993) presented a more straightforward method, suggesting that one can establish the value of human capital for the HE graduates assuming that the increase in the wages is correlated only with the number of official school years. This is a simplified way to determine the human capital, through its more visible form called education premium.

In this paper the formation of human capital for individuals that graduate from a Portuguese HEI was determined, considering that the education premium (the increased wage when compared with the graduates of secondary education) is due only to the number of years they attended the institution. With this assumption, and following Bluestone's model, it was possible to determine the education premium of the students that decide to obtain a higher education degree and remain in a certain region.

The remainder of the paper is organised as follows. In section 2 a brief review about human capital literature is presented. In section 3 the Bluestone's model is revisited. In section 4 an application of this model is described for the case of a Portuguese higher education institution. Section 5 draws the main conclusions of the paper and presents the perspectives of future work.

2. Human Capital

The human capital theory is a concept that appeared in the XVIII century. Its basic premise is that people that constitute the society are a form of capital in which the society can invest in the same way as they invest in physical capital (Williams and Swail, 2005). This theory was greatly developed in the 1960s by Schultz (1961) and Becker (1993, 1st edition 1964).

The human capital analysis attempts to determine the increase in productivity and incomes for the individuals due to the acquired competencies and knowledge and skills for attending an HEI. Therefore, is a supply side approach and is concerned with the education effects on the overall economy, and, in particular, on the individuals' earnings.

Becker (1993) defined human capital as the economic effects on jobs and income due to the investment in education and training.

The main assumption is that education increases efficiency and, as such, the lifelong incomes (Nakabashi and Figueiredo, 2008). This theory sustains that there is a correlation between human capital and economic growth, i.e. higher levels of education can bring higher earnings (Altinok, 2007; Becker, 1983; Desjardins, 2003, Monks, 2000; Perna, 2003; Sudmant, 2002; Rosan, 2002). Becker (1993: 12) reinforces that "probably the most impressive piece of evidence is that more highly educated and skilled persons almost always tend to earn more than others".

In practical terms, through the use of income functions (following Mincer's (1958) approach) there has been an attempt to determine the relationship between education and earnings, and the educations' return rate (Becker, 1993).

These earnings are a measurement of the increase in efficiency for the individual and, as such, of its contribution for the economic development (Williams and Swail, 2005; Strayhorn, 2005).

In terms of measurement, the average school years of the labour force has been used as a good proxy for human capital. Formal education is, from all education forms, the one that has the strongest relative influence in the economic results (Becker, 1993; Desjardins, 2003).

Education as an investment is analysed through the relation between the benefits and the costs, being this relation the concept of return on investment – ROI (Clarck et al., 1998). Even though the cost of studying in a higher education institution is high, the benefits from that investment are expected to be high enough to compensate that cost (Bryant, 2001). However, the time period for those benefits to outweigh the costs can take several years to happen after graduation. That time period is often difficult to determine and the majority of the studies (e.g. Bluestone, 1993; Portugal, 2004) assume that the students find a job right after graduation.

Beside the above mentioned benefits, individuals with higher educational levels enjoy other advantages: can obtain jobs faster; have more and better job experiences; have higher job stability; have more capabilities and knowledge to apply in a labor environment; are more productive and have higher wages (Bryant, 2001; Clarck et al., 1998; Thomas e Zhang, 2004).

One shortcoming of this approach, pointed out by Blackwell et al. (2002), is related to the data used in the calculations. In fact, when one tries to estimate human capital, according to higher lifelong returns, the innate differences of capabilities or skills of the individuals are not included. Actually, it is likely that not all the earnings associated to a higher education degree are due to the education itself, but also to the innate capabilities of the students (Becker, 1993; Lindahl and Regnér, 2002). However, there are still no developments in this area, and, as long as there are no evidences about which acquired skills or competences make the difference, the number of school years is still a good proxy. Therefore, a way to determine the human capital value in the market is correlating the individuals' incomes with their level of knowledge and school years. Moreover, it is not at all clear the implicit assumption that education has a similar effect on all individuals.

Moreover, although the existence of benefits from investing in human capital has been largely recognized, it is still very difficult to accurately determine the return coming from that investment. One way to gain some insight of the magnitude of that impact is by estimating the increase in the regional earnings as a result of the higher education (Sudmant, 2002; Williams and Swail, 2005).

Theoretically, the earnings are determined by the individual's productivity and it is expected that the differences in productivity are due to personal differences in educational investments. As such, it is expected that additional school years increase labour productivity (Jefferson College, 2003; Perna, 2003).

3. The Bluestone's model

Bluestone (1993) is referred to as the pioneer on the studies about HEI's long term impacts, or supply-side impacts, in a region, in which the human capital has a great importance. The Bluestone's model was first developed and applied in the Boston region, estimating the impact of the Massachusetts University.

This study analysed the institution's impact according to three economic contribution for the region where it is located: "*(1) the additional income that UMass/Boston students generate within the state as a result of their university education (2) the added state income and sales taxes revenue generated for the state government as a result of the additional income earned by these students, and (3) the "export base" income and tax revenue generated from non-resident tuition, fees, and living expenses; gifts and unrestricted funds from non-Massachusetts sources; student federal grants-in-aid; non-Massachusetts sponsored grants and contracts; and federal endowment income* (Bluestone, 1993: 3)."

Bluestone estimated future potential earnings of the higher education graduates that remain working in the region as a measurement of the long term economic impact of higher education.

Although there are some critics to the Bluestone's model, such as the fact that it does not control the innate capability of the workers (in other words, it is not capable to determine if a worker earns more because it has a certain education or simply because he is intrinsically better worker), and also because it is necessary to guarantee that the graduates remain in the region, none of the authors (e.g. Blackwell et al., 2002) was able to incorporated the differences associated with the individual capabilities.

The main advance in this approach was the attempt to estimate not just the total value of the institution but the regional economic activity enhancement as a result of the activities of the institution. Bluestone was able to estimate the human capital creation using the wage differential as a proxy (Blackweel et al., 2002). It also determines the impact on government's revenues by comparing the amount spent by the government in financing the institutions and the amount received in the form of taxes paid due to the additional income of the graduates of that HEI (Bluestone, 1993) - if the graduates will earn more they will also spend more and, as such, the regions will benefit of a higher business activity, benefiting also the government because it will receive more taxes (on income or sales). Bluestone (1993) assessed if the government's investment in higher education has a satisfactory rate of return, by analysing the government spending and the government revenues in the form of taxes over income and sales.

In order to facilitate the presentation of Bluestone´s model, two subsections will be considered: the first concerns the ROI of the students and the second the ROI of the government.

3.1. Return On Investment (ROI) from the graduate's perspective

Theoretically, the rational individual evaluates the future earnings of his educational investment and chooses the educational program that will maximize the return of the investment (Becker, 1993).

This perspective, followed by other authors (e.g. Perna, 2003; Ruby, 1995; Strayhorn, 2005; Thomas and Zhang, 2004) estimates the difference, in present value terms, of the lifelong earnings between a higher education graduate and individuals with different educational levels. Usually the comparison is made between higher education and secondary education graduates. To accurately estimate the value, several costs must be considered: the cost that a graduate must incur during his degree, such as tuitions, books, and others and, moreover, the lack of any income for not working over the period of study.

3.2. Return On Investment (ROI) from the government's perspective

Bluestone's model estimates the education premium for the graduates as well as estimates the return on investment for the government, since it considers that an increase in the educational level will also have an impact on tax revenues.
This last part is obtained by estimating the present value of the differential in taxes received over income and sales during the labor life of the graduate of higher education (HE) when compared with an individual with only secondary education (SE). This result is then compared with the investment the government made in the higher education student throughout the degree, usually of four years, which is often determined by dividing the HEI annual budget by the number of students. From this comparison the internal return rate is obtained (Guichard and Larre, 2006; Rubi, 1995).

In the estimation of the return from the taxes over income, it was assumed that if all the other conditions remain the same, those that earn more will pay more taxes (Arizona State Board of Directors for Community Colleges, 1995). In the same line of thought, those that earn more will have more expenses and spend more.

4. The case of a Portuguese higher education institution

According to Bluestone's model presented previously, in order to estimate the human capital impact of an HEI in a specific region it is necessary first to establish the earning differential between HE graduates and SE graduates and then the present value of the taxes differential paid during their working life.

In order to describe the application of this method, a region and an HEI from the northeast of Portugal were selected. The region was Bragança and the HEI was the Polytechnic Institute of Bragança (IPB).

The value-base considered was the average wages in Bragança, for the year 2007, obtained in the National Institute of Statistics, as presented in table 1.

Table 1 – Average monthly wages per educational degree, in 2007

	SE degree	HE degree
Bragança	816.61 €	1,214.79 €

Source: National Institute of Statistics (INE, 2008).

4.1. Return On Investment (ROI) from the graduate's perspective

To determine the return on investment of the HE graduate it was necessary first to estimate his earning premium. This can be done by estimating the wage differential during 40 years of labour, assuming that this differential is only due to the different educational levels. Other assumptions were made in order to allow future comparisons with other studies: in both cases an equal 40 year labour period and also that a job will be find out as soon as they graduate. It should be noted that usually there is a search period for the first job of 8 to 15 months in Portugal.

Table 2 – Present value of lifelong net income of both educational levels

	(1) Monthly wage	(2) Average monthly wage (14 months[a])	(3) Real discount rate[b] (i)	(4) Discount factor $\left[\dfrac{1-(1+i/_{12})^{-40years\times12}}{i/_{12}}\right]$	(5) Present value (2x4)
HE graduate	1,214.79 €	1,417.26 €	2.0%	330	468,010 €
SE graduate	816.61 €	952.71 €	2.0%	330	314,607 €

(a) The monthly wage was adjusted for the Portuguese reality of 14 months of payment.
(b) Average inflation rate of 3.0% and a nominal interest rate of 5.0% (Data available in the Portuguese Central Bank).

Source: Own elaboration.

In table 2 it is described the lifelong earnings of both educational graduates. A HE graduate will receive, during his working life, in present value terms, 468,000 euros, while a SE graduate will earn, on the same time period, 314,600 euros.

To obtain the education premium it is necessary to estimate the cost that a HE graduate will support during his four years of degree, assuming that he will not fail any year (table 3). All the values were based on a student attending an HEI in the north of Portugal, specifically an IPB student, according to an extended survey obtained in 2007 (Fernandes, Cunha and Oliveira, 2008).

Table 3 – Cost of a higher education degree

	(1) Monthly opportunity cost	(2) Monthly expenses (except room and board)	(3) Monthly fiscal benefit	(4) Monthly cost (1+2-3)	(5) Factor de actualização $\left[\dfrac{1-(1+i/_{12})^{-4years\times12}}{i/12}\right]$	(6) Total cost in present value (4x5)
HE graduate	952.71 €	257 €	54 €	1.156 €	46	53,288 €

Source: Own elaboration.

In table 3 it can be observed that an individual that studies in an HEI for four years will spend, in present value, 53,288 euros. In this calculus the following is included: (a) the opportunity cost of attending a HE degree that corresponds to a secondary education wage that is lost every month; (b) the monthly expenses directly related with the attendance of the HE degree, such as tuitions and books. The expenses with room and board were excluded since a secondary education graduate will also have this expenses; (c) the fiscal benefit was deducted, since Portugal has an annual tax reimburse policy of 645 euros per student.

The education premium, or the earning differential between a HE graduate and a SE graduate, is presented in table 4.

Table 4 – Education premium of a HE graduate

	(1) Lifelong income differential (40 years)	(2) HE cost (four years)	(3) Education Premium (1-2)
HE graduate	153,400 €	53.288 €	100,100 €

Source: Own elaboration.

Table 4 shows that the net income differential in 40 years of working life, between a HE graduate and a SE graduate, reaches 100,100 euros, when both live in Bragança. The internal rate of return for a higher education graduate that will remain in Bragança after graduation, without considering increasing differential incomes over the years, is, therefore, 10.3%.

4.2. Return On Investment from the government's perspective

Previously the educational premium for the HE graduates was determined. It is then necessary to determine the taxes over the additional income in order to estimate the return on investment on the government perspective. This can be done by comparing the amount that the government spent with each student's graduation and the taxes it will receive during the graduates working life.

The application of Bluestone's approach implies that a student will take four years to graduate and will not fail any year, and, as such, the government will support only four years of higher education.

The income taxes paid by a HE graduate and by a secondary education graduate is presented on table 5.

Table 5 – taxes paid by the higher education and secondary education graduates

	(1) Average monthly Income (14 month)	(2) Tax rate (c)	(3) Monthly tax (1x2)	(4) Discount factor $\left[\dfrac{1-(1+i/12)^{-40\text{years}\times12}}{i/12}\right]$	(5) Taxes paid (3x4)
HE graduate	1.417,26 €	18.49%	262 €	330	86,516 €
SE graduate	952,71 €	16.04%	153 €	330	50,466 €

(c) The tax rate was adjusted to the annual average income, according to article 68º of the Portuguese Tax Code.

Source: Own elaboration.

As can be observed in table 5, for 40 years of labor, a HE graduate will pay in income taxes a present value of 86,500 euros (at a tax rate of 18.48%) while a SE graduate will pay almost 50,500 euros (at a tax rate of 16.04%). The differential tax paid is, in present value, 36,050 euros.

Table 6 presents a summary about the earnings, tax paid and net income of a HE graduate and a SE graduate.

Table 6 – Earnings and tax paid during 40 years of working life

	Lifelong income	Tax paid	Net income
HE graduate	468,010 €	86,516 €	381,500 €
SE graduate	314,607 €	50,466 €	264,140 €

Source: Own elaboration.

On table 6 the values show that a HE graduate will receive during his working life 468,000 euros that totaling more 153,000 euros than a SE graduate. However, after taxes, the income net value is 117,350 euros.

Since the government spends, during the four years of graduation 13,600 euros per student (Fernandes, Cunha and Oliveira, 2008), this means that the government has a return on its investment of 21,000 euros (table 7).

Table 7 – Return on investment

	(1) Tax paid	(2) Tax differential	(3) Cost per student	(4) Government's return (2-3)
HE graduate	86,516 €	36,050€	13.600 €	22,450 €

Source: Own elaboration.

Table 7 illustrates that the government has a return for its investment in the students HE degree, in the form of returns on income taxes. In fact, the government's return rate reaches 9.4%, which is considerably high for a public investment.

5. Conclusion

In this paper, the analysis of the human capital created due to the higher education obtained by the Portuguese students, was estimated.

Following Bluestone's model, it was possible to determine that the government recovers its investment during the HE graduate active life. In fact, the government will receive an additional tax income of 36,000 euros per HE graduate and reach an internal return rate of 9.4% on the educational investment.

On the other hand, a HE graduate from the IPB can expect an education premium of 100,100 euros (64,000 euros after taxes) during his working life, when compared with a SE graduate. This education premium represents a 10.3% internal return rate on the students' investment.

It should be noted that the number of students that graduate from the IPB and remain in the region of Bragança every year reached, in 2007, 462 graduates (Fernandes, Cunha and Oliveira, 2008). The total number of graduates will generate, in the form of taxes 10.4 million euros, and will benefit from an education premium totaling 30 million euros during their active life. Thus, the economic impact on the region due to the presence of the Polytechnic Institute and on tax revenue is quite considerable, particularly for an underdeveloped region as Bragança.

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