Measuring the economic impact of an HEI in a deprived region of Portugal

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Abstract

This paper describes an economic impact study conducted for a Portuguese Higher Education Institution - the Polytechnic Institute of Bragança, located on the region of Bragança, a very isolated and deprived region of northeast Portugal.

Two approaches were followed. The traditional economic approach – based on the study of Caffrey and Isaacs (1971) - to determine the economic impact that arises from the expenditure of the IPB and its individuals; and the skills-based approach – based on Becker (1993) and Bluestone's (1993) works – to measure the creation of human capital and the enhancement of local individuals' life quality. To achieve these purposes it was necessary to conduct surveys among the faculty, staff, students and graduates of the IPB, as well as to collect data from IPB's records and official sources.

Following these two approaches, the total impact of the IPB in the region was determined, reaching 55 and 61 million euros, respectively.

Keywords: Economic impact – Higher Education Institution – Job creation – Human capital

1. Introduction

Higher education institutions (HEIs) are institutions of great financial and social importance for the hosting regions, granting educational, economic, social and cultural opportunities that would not be there otherwise, thus recognized as regional development mechanisms. HEIs not only create opportunities and jobs that contribute for the global economic activity of the region but they can also attract outside resources and investments (Charney and Pavlakovich-Kochi, 2003; Carr and Roessner, 2002; Smith, 2006). HEIs are a source of qualified workers, with valuable competences for local employers, generate new technologies through research and development and enhance local life quality through volunteer community service, among other contributions (Clinch and Gerlowski, 2002; Greenspan and Rosan, 2007).

HEIs grant the regions where they are located with a considerable return on revenues and employments, among other effects (Yserte and Rivera, 2008). In order to estimate the influence of HEIs it is appropriate to do an economic impact analysis.

This impact analysis measures the economic impact that arises from the presence of the HEI in the region. It estimates the additional impact that occurs above the economic activity level that would happen, if the HEI would not exist there (Elliott et al., 1988). Other authors (e.g. Jefferson College, 2003) justify this perspective because the majority of the revenues of the HEI come from outside of the region and are maintained in the region and added to the local economic activity. This means that if the HEI did not exist, these resources would also be spent outside of the local economy.

HEIs can promote regional development in the following ways: with the inflow of money into regional economy; with the creation of human capital; with the enhancement of life quality; and with long term changes to the regional economy. Yserte and Rivera (2008) sustain that the impacts of HEIs in a region can be determined according to two approaches: through the HEI inputs, i.e., the impact upon expenses and through the HEI outputs, i.e., the impact upon knowledge (figure 1).
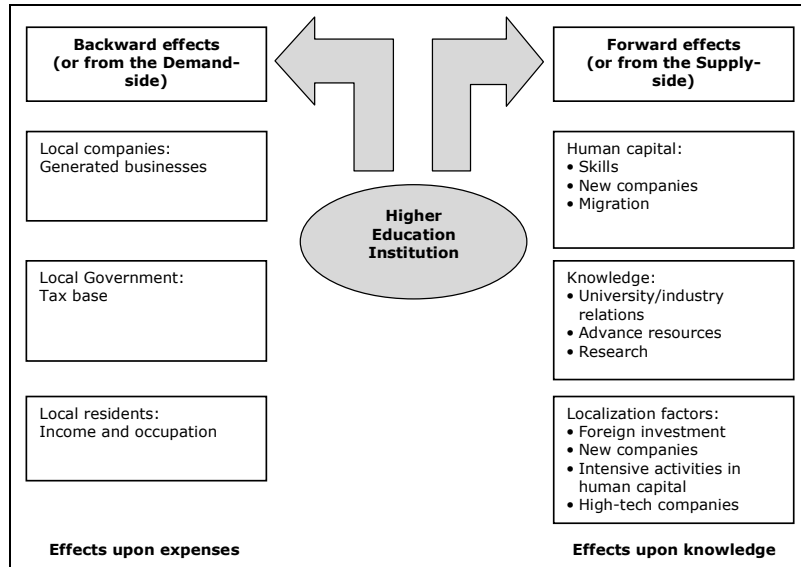

Figure 1 – The impact of Higher Education Institutions
Source: Yserte and Rivera (2008: 5).

According to the structure presented in figure 1, two approaches can be followed. The first approach - the traditional economic approach or demand-side approach – based on the study of Caffrey and Isaacs (1971) was used to determine the impact on jobs created which would not otherwise exist, arising from the capital and revenue expenditure of the IPB. These would also include the jobs created and sustained by the incomes earned and subsequently spent locally by staff and students.

The second approach – the skills-based approach or supply-side approach – based on Becker (1993) and Bluestone's (1993) works, measures the creation of human capital and the enhancement of local individuals life quality, through the community use of the HEI's initiatives, buildings and other facilities.

These two approaches estimate the impacts according to the demand-side (traditional approach) and the supply-side (skills-based approach). Several authors (e.g. Blackwell et al., 2002; Carr and Roessner, 2002; Lantz et al., 2002) recognize that a study that considers only the demand-side will underestimate the real impact of the HEI in a region. And, although usually an economic impact analysis is restricted to the demand-side one should try to complete the analysis with the supply-side impacts.

As such, this paper describes the analysis of the economic impact of a Portuguese Higher Education Institution. Specifically, the economic impact of the Polytechnic Institute of Bragança (IPB) on the region of Bragança, a very isolated and deprived region of northeast Portugal, was determined. To do so, and to adequately estimate the impacts resulting from both approaches, it was necessary to conduct surveys among the staff, students and graduates of the IPB. The total effects are reflected on the regional GDP, on employment, on the enhancement of human capital and on a range of community benefits.

This paper is organized as follows: firstly, a brief review on the traditional approach (or demand-side) and on the skills-based approach (or supply-side) are presented. Afterwards, the analysis of the economic impact of the Polytechnic Institute of Bragança is explained. Finally, the main conclusions are drawn.

2. The traditional economic approach or demand-side approach

In the traditional approach, to estimate the contribution of HEIs to local economy one can measure the effects on employment and local revenues that are created by the spending of the institution and the individuals that are directly related to it (Brown and Heaney, 1997). This approach considers solely the economic flows, without considering them as an investment, i.e., it considers only the revenues obtained from the monetary spending in the region and not the results obtained with that spending (Arizona State University, 2003).

This approach estimates the impact based on the export effects, which are the enhancement of the economic activities due to non-local sources (Blackwell et al., 2002).

The economic impact of an HEI on the demand-side perspective results from three parts: the direct, the indirect and the induced economic effects (Yserte and Rivera, 2008). The direct economic effects are the direct spending from the faculty, staff and students and from the institution itself in the region (Elliott et al., 1988). The indirect and induced economic effects are difficult to determined and, as such, a multiplier is applied to the direct effects in order to estimate these last two (Carr and Roessner, 2002; Elliott et al., 1988; Smith, 2006).

The majority of the economic impact studies (e.g. Carrol and Smith, 2006; Charney and Pavlakovich-Kochi, 2003) follows the guidelines defined by the work presented in the American Council on Education (ACE) by Caffrey and Isaacs (1971). In fact, Blackwell et al. (2002) and Elliott et al. (1988) refer to this model as the base of the HEI's economic impact analysis. The ACE model is developed in section 2.1.

2.1 The American Council on Education Model (ACE)

The ACE model was developed in 1971 by Caffrey and Isaacs and, just after 15 years of its presentation, was used by the majority of the North American universities, being now applied all around the world. The more recent studies that use this model demonstrate its continuous success and quality on the economic analysis (Yserte and Rivera, 2008).

The ACE model studies the impacts on local business, local government and local individuals (figure 2). It aims to identify who is spending, how much is spending, and what goods are being bought and from where. To do so, it considers five sources of direct impact: the institutions, the faculty, the staff, the students and the visitors spending.
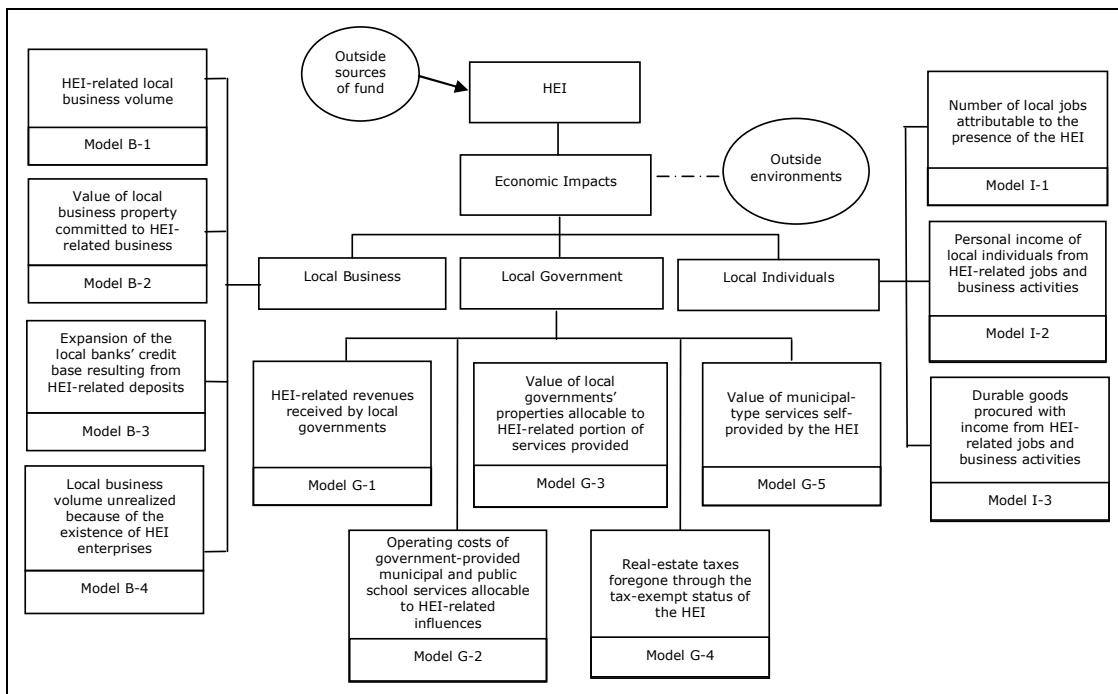

Figure 2 – The ACE Model
Source: Adapted from Caffrey and Isaacs (1971: 10).

As presented in figure 2, the ACE model estimates the HEI's impact on the following regional elements: local business, local government and local individuals. To use this model the necessary data is mostly obtained through surveys, from the institutions' records and from official sources.

Figure 3 presents a simpler version of ACE model that estimates only the HEI's economic impact over local business (model B-1 of figure 2). Due to several critics that the model received, the main one being its complexity, some authors (e.g. Carrol and Smith, 2006; Yserte and Rivera, 2008) used only model B-1 as represented on figure 3.
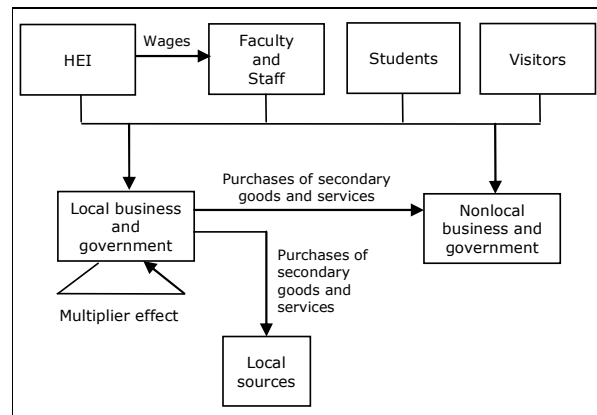
Figure 3 – The monetary flow related to the HEI that influences local business volume – Model B-1
Source: Adapted from Caffrey and Isaacs (1971: 6).

The ACE model, in its complete version, received some critics because it did not estimate the long term impacts. Although Caffrey and Isaacs (1971) already recognized the existence of those impacts, it is not possible to join in the same model the short-term and the long-term impacts, since they have different perspectives, being one from the demand-side and the other from the supply-side.

In order to complete an HEI analysis the long-term impacts have to be considered. These impacts can be studied and estimated according to the supply-side approach, as described in section 3.

3. The skills-based approach or supply-side approach

The skills-based approach is based on the human capital concept (Schultz, 1961; Becker, 1993), which sustains that education, due to the competences and skills acquired, increases efficiency and, therefore, the lifelong incomes. This approach estimates the higher productivity and the higher earnings that HEI graduates benefit as well as the qualitative benefits that arise from a population with a higher educational level (Arizona State University, 2003; Brown and Heaney, 1997; University of Colorado, 2006).

Some authors (e.g. Baum and Payea, 2005; Blackwell et al., 2002; Desjardins, 2003; Moretti, 2005) recognize among the qualitative benefits, a correlation between higher education and better health, intellectual stimulus, higher civic participation, lower criminal rates or even decreasing smoking rates.

To none of this effects can be attributed a direct monetary value, even though they all contribute to the growth and economic activity of a region. The problem with supply-side models is not related to the identification of the effects or its influence, but to their quantification.

Therefore, though the estimates on return on education that focus only on wage increase are limited and must probably underestimate global return, it is one of

the more objective measures (Smith, 2006). In fact, in terms of measurement, formal school years have the strongest relative influence on economic results of the labour force and have been used as a good proxy for human capital (Becker, 1993; Desjardins, 2003).

Smith (2006) argued that it is almost impossible to create a supply-side model that can estimate the total impact objectively, but some estimates can be made such as the one developed by Bluestone (1993). This approach, although based on the human capital concept, was greatly developed and applied by Bluestone (1993) to HEIs.

Bluestone (1993) considered that the traditional economic approach was very limited since there is an increase in skills, from attending higher education, which generates more qualified workers that earn more than they would earn had they not graduated and, as such, pay more taxes.

This method also received some critics, because some HEIs can be tempted to use this approach to present higher economic results and, therefore, it must be conducted with caution (Carrol and Smith, 2006). Thus, to prevent an inflated estimate, both approaches are presented separately and conservative assumptions were always chosen.

3.1. The Bluestone's model

Bluestone (1993) presented a method that completes the traditional economic approach, including the long term effects that arise from a more educated population. To measure long term economic impact of higher education, Bluestone considered that future potential earnings of higher education graduates, that remain working in the region, were a good proxy.

This model attempts to estimate the regional economic activity enhancement, based on the assumption that if the graduates earn more, they will also spend more and, as such, the regions will benefit of a higher business activity. On the other hand, the government will also benefit because it will receive more taxes (on income or sales). Bluestone was able to estimate the return on investment (ROI) for the graduates that remain in the region and also for the government.

To determine the graduates' ROI, Bluestone estimates the difference in present value of the lifelong earnings between higher education (HE) and secondary education (SE) graduates. The opportunity cost that HE graduates must support throughout the degree (and not earning any income), as well as the cost of studying (such as tuitions, books, and others) should be included, to accurately estimate the ROI.

The government's ROI is obtained by comparing the investment the government made in the student's higher education degree, with the lifelong income and sales taxes differential between HE and SE graduates (Guichard and Larre, 2006).

4. The case of the Portuguese higher education institution

In this paper the case of the Polytechnic Institute of Bragança (IPB), located in the northern region of Portugal, was studied, using the two approaches described in the previous sections.

4.1. The demand-side analysis

On the demand-side analysis the economic impact, i.e., the region economic activity enhancement related to the expenses of the institution and of the individuals directly related to it, was estimated.

The necessary data to apply the ACE model was obtained from surveys to faculty, staff, students and graduates from the IPB. The results reflect the answers obtained from 166 responses from the faculty (42%), 105 from the staff (44%), 1343 from the students (26%) and 126 from the last 20 years' graduates (1.5%) (Fernandes, Cunha and Oliveira, 2008).

The application of ACE model allowed estimating the following values, resumed in table 1.

Table 1 – IPB's economic impact, according to the ACE model

Impact on Local business	
B-1: HEI-related local business volume	54,948,182 €
B-2: Value of local business property committed to HEI-related business	3,736,476 €
B-3: Expansion of the local banks' credit base resulting from HEI-related deposits	5,779,045 €
B-4: Local business volume unrealized because of the existence of HEI enterprises	0,0 €
Impact on local government	
G-1: HEI-related revenues received by local governments	241,390 €
G-2: Operating costs of government-provided municipal and public school services allocable to HEI-related influences	1,931,540 €
G-3: Value of local governments' properties allocable to HEI-related portion of services provided	Not available
G-4: Real-estate taxes foregone through the tax-exempt status of the HEI	29,340 €
G-5: Value of municipal-type services self-provided by the HEI	294,760 €
Impact on local individuals	
I-1: Number of local jobs attributable to the presence of the HEI	2,393
I-2: Personal income of local individuals from HEI-related jobs and business activities	30,636,970 €
I-3: Durable goods procured with income from HEI-related jobs and business activities	1,263,470 €

Source: Own elaboration.

Table 1 describes the IPB's economic impact according to the ACE model. IPB's impact over local business reached 54.9 million euros, over local business property was 3.7 million euros, and the expansion of local bank's credit base was 5.8 million euros.

The IPB's impact upon local government represented by the revenues the government received related to the IPB was 241 thousand euros. Local government also supported some costs due to the presence of this public HEI in the region: in operating costs was over 2.0 million euros and close to 30 thousand euros were not collected due to IPB's tax exemption. Model G-3 could not be estimated since it was not adequate to the Portuguese reality.

The impact of the IPB upon local individuals was estimated in almost 2,400 jobs created. The individuals earned 30.6 million euros due to activities related to the IPB and 1.3 million euros of durable goods were acquired with those incomes.

In total, the economic impact estimated on the demand-side approach according to the ACE model was approximately 62.0 million euros. This amount corresponded to an increase of 9.8% of the regional GDP. The number of jobs created is 7.5% of the local active population.

4.2. The supply-side analysis

The supply-side analysis begins by determining the earning differential between HE and SE graduates and the taxes differential paid during their working life, both in present value terms. The value-base considered was the average wages in Bragança, for the year 2007, obtained in the National Institute of Statistic (table 2).

The return on investment of HE graduates was estimated by comparing the wage differential during 40 years of labour, assuming that this difference is only due to different educational levels, and the cost that HE graduates support during the four years degree, assuming that they will not fail any year. The cost a student will support for attending the IPB was obtained from a survey conducted in 2007 (Fernandes, Cunha and Oliveira, 2008). Table 2 describes the results, namely the income differential through the working life, the cost of attending HE degree and the earning differential for HE graduates, as well as the ROI.

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

	Monthly wage[a]	Lifelong income (in present value)	Degree cost (in present value)	Net earning	ROI
HE graduate	1,214.79 €	468,010 €	53,288 €	100,100 €	10.3%
SE graduate	816.61 €	314,607 €	0 €		--

(a) Available at INE (2008).

Source: Own elaboration.

Table 2 demonstrates that an IPB graduate will earn more 153,400 € during his working life than SE graduate. The amount an IPB graduate spends to study was determine considering: (a) the opportunity cost of attending the HE degree that corresponds to the lost of a SE wage every month; (b) the monthly expenses directly related with the attendance of the degree, such as tuitions and books;

(c) the deduction of fiscal benefits that HE graduates benefit. The net differential between HE and SE graduates reaches 100,100 euros in 40 years of work, corresponding to an internal rate of return of 10,3%.

The return on investment for the government was determined by comparing the amount the government spent during the four years degree and the taxes it will receive during the graduates 40 years of working life. Table 3 summarizes the analysis.

Table 3 – Earnings and tax paid during 40 years of working life

	Lifelong income	Tax paid	Tax differential	Cost per student	Government's return (2-3)	ROI
HE graduate	468,010 €	86,516 €	36,050€	13,600 €	22,450 €	9.4%
SE graduate	314,607 €	50,466 €				

Source: Own elaboration.

Table 3 presents the lifelong income of HE and SE graduates and also the taxes both will pay. HE graduates will pay 86,516 euros during their working lifes while SE graduates will pay 50,466 euros, i.e., SE graduates will pay less 36,050 euros. The analysis of the government's investment relates only to the tax differential. Since HE students will cost the government 13,600 euros, the government will have a net revenue of 22,450 euros. This corresponds to an internal rate of return of 9.4%.

In total, on the student's perspective, the 2007 graduates from the IPB that will remain in the region have a direct impact of 30.5 million euros (considering the 462 graduates of the year 2007 that will remain in Bragança according to Fernandes, Cunha and Oliveira, 2008). According to the Portuguese Central Bank, that states that 50% of the national GDP is based on salaries and compensations and assuming that proportion for the municipalities, the GDP generated by the existence of the IPB reaches 61.0 million euros. This amount represents 9.7% of regional GDP. On the government's perspective, during 40 years of labour those graduates will pay in the form of taxes, in the region of Bragança, 10.4 million euros.

5. Conclusion

Currently it is recognized that public HEIs are not only learning, research and innovation centres but also important development and economic growth mechanisms, being critical for the regions' future success (Charney and Pavlakovich-Kochi, 2003; Lantz et al., 2002).

These institutions generate important economic benefits for the economy were they are located and for the governments that support them (Lantz et al., 2002). The investment in higher education allows a great return to local community, through income and jobs created; to the individuals, through higher lifelong incomes and other benefits; and to the government, with higher tax revenues (Baum and Payea, 2005; Clinch and Gerlowski, 2002).

To determine the IPB's economic impact on the surrounding region, two separate approaches were followed: on the demand-side, based only on the spending of the institution and the individuals directly related to it, and on the supply-side, based on the long term incomes of the graduates.

From the analysis conducted it is possible to sustain that the IPB has a major impact on the region of Bragança. The demand-side approach was followed according to the ACE model (Caffrey and Isaacs, 1971) and a total economic impact of 62.0 million euros was obtained, which lead to the creation of 2,400 jobs. This approach also estimated the cost the region has with the presence of the IPB, reaching 2 million euros. However, even though the region has a cost with the IPB, in the overall perspective, the economic activity generated by the IPB is 9.8% of the Bragança regional GDP.

Furthermore, according to the supply-side approach, based on the Bluestone's model, the individuals that remain in the region will generate 61.0 million euros of economic activity that correspond to 9.7% of regional GDP and will pay back to the government 10.4 million euros, in the form of taxes.

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