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Universities As Regional Economy Revitalizing Instrument

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UNIVERSITIES AS REGIONAL ECONOMY REVITALIZING INSTRUMENT

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Abstract:

The decentralising tendency promoted by the Spanish University policy has had, undoubtedly, an important impact on the economy of those regions where a university of new creation has been established. The studies from the economical impact of the University about the geographical area in which it is set out, are an important instrument to justify and stimulate the geographical decentralisation of the higher education, specially when the budgetary rigidities demand to rationalize the public expenses levels to the top. One of the techniques normally used to evaluate the effects of the University on the regional economy, is the one based on the analysis on Input-Output. This analysis estimates the total impact of the expenses, including the direct, indirect and armature effects on the consumption. The Input-Output methodology is precisely, the one used in this project to quantify the impact that the activities from the University of Lleida has had on the territorial economy. The analysis is of a great interest as the area where the University of Lleida is established has some specific and remote characteristics from those seen in a typical urban and industrialized area.

UNIVERSITIES AS REGIONAL ECONOMY REVITALIZING INSTRUMENT.

1. INTRODUCTION.

The existence of a University generates, where it is settled, different effects: political, demographic, cultural, economic and social. These can either be result from the production processes of universities, or from externalities in production or consumption.

In this project what is studied is the economic impacts generated by the presence of a University in a local economy. The University to be analyzed is the University of Lleida, located in the same city of Lleida. The main purpose is to come to the conclusion that how an exogenous impulse to the city generates income and employment to this city. This project is divided into three main parts. The first one describes the different approaches to quantify the impacts. In the second one the input-output methodology is applied to get a conclusion about the economic impact that the University of Lleida generates on the area where it is placed. Lastly, the third one presents the impact on the final demand of this University on the local economy.

2. METHODOLOGICAL APPROACHES OF THE EXPENDITURE IMPACT

Florax (1992) establishes a difference between the effects derived from the presence of a university. Thus, there is a distinction between expenditure and knowledge impacts¹. Expenditure impacts are the effects related to the expenses by the universities, the professors, other staff, students and the visitors of the university. Knowledge impacts refer to the different effects related to the production of knowledge produced by Universities.

To assess the expenditure impacts of universities, which this study is focussed on, different methods are available, among them we could point up²:

2.1) economic base models

2.2) Keynesian multiplier models

2.3) input-output models.

These three methods of analysis are tightly linked and the main differences are based on the grade of sectorial disintegration which can be reached by each one.

2.1) Economic base models.

Tiebout (1962) was the first person who proposed a theoretical frame for these methods. Its main feature is the dichotomy in the economic activity of a region between the service sector (or non-basic) producing for local or regional market and the basic sector producing for export. Regional economic growth is explained by means of the growth of the sector producing for export, that is to say, it greatly depends on the grade of the opening in the regional economy. Exchanges with the exterior create the primary impetus of the growth of economy as a whole. The transmission of the activity effects from the sector for export for the rest of the economy, will be determined by the economic base multiplier which is given by

$$1 + a = 1 / (1 - (Y_s / Y)) \quad (1)$$

Where Y is total production, Y_s service sector production developed for the local demand, Y_s / Y indicates the propensity to local consume and a shows the lineal relation between the *output* of base and service sectors, $Y_s = a Y_b$, where Y_b stands for production of base sector.

This kind of approach was mainly used in the 1960s and 70s (Moore, 1979; Cook Jr., 1970, Mischaikov and Spratlen, 1967). Possibly, the greater restriction of these models is the division between export and non-export sectors. Having into account the nature of the production processes in the universities, it is extremely difficult to determine whether universities are export or service sectors or what is more, a mixture of both. In this sense, ad hoc decisions must be taken when classifying universities into a sector or another.

2.2) Keynesian Multiplier Model

The approach is based on the calculus of the Keynesian multipliers of expenses and incomes in order to estimate the impact derived from the presence of the university in a given area. The impacts analysed are in general related to the effects on the income, the output and employment, which are consequences of the expenditure of professors, staff and students. Keynesian multiplier model has been applied to different studies (Brownrigg, 1974; Greig, 1971; Harris *et al.* 1987; Armstorng, 1993), being the work of Caffery and Isaacs (1971) the starting point. The basic formula of the model is the following:

$$\Delta Y_r = k_r J \quad (2)$$

where ΔY_r indicates the changes of the local gross income being the result of the activity done by the university throughout the year, J shows the initial contribution and K_r indicates the income multiplier.

The application of (2) implies the valuation of the parameters included in the income multiplier for the area being studied, which is not easy when it is restricted to an economy within local limits.

2.3) Input-output Models

Input-output models are used whenever a regional input-output table is available, especially because it allows to have disaggregated sectorial information (Schaffer,1983; Lewis, 1988; Harris, 1997). Probably, these kind of models are the most used to analyze the economic impact. By means of this technique, it can be calculated the total effect; direct, indirect as well as induced effects from an initial incentive in the final demand on the production, the added-value, employment and other variables.

Jobs created, professors and other staff incomes, ordinary expenses and investment of the university determine the direct effects derived from the presence of a university. The indirect effects refer to the income and work generated in the local economy as a consequence of the consumption carried out by the university, professors, the rest of the

staff and students when acquiring local goods and services. Finally, as a result of the creation of a direct and indirect income and work in the local economy, it appears some additional and induced effects that are derived from the income and employment multipliers.

Input-output table is based on the equilibrium accounting notion that the gross output of each sector is either sold to other sectors such as intermediate inputs, or it represents an element of final demand (investments, consumption or export). The simple input-output model can be represented algebraically:

$$D_f = (I-A) X \quad (3)$$

Where D_f is a column vector of total final demand; I is the identity matrix; A is the direct or technical coefficient matrix and X is the column vector of total output. In consequence;

$$X = (I-A)^{-1} D_f \quad (4)$$

This equation allows to establish the production at each sector in order to fulfil the objectives of the final demand exogenously determined, given a productive structure reflexed in the technical coefficients. In other words, the change in output is a multiplicative function of the exogenous impulse in final demand and Leontief inverse matrix.

3. THE EXPENDITURE IMPACT OF THE UNIVERSITY OF LLEIDA

The input-output method is the approach used to study the expenditure impact of the university of Lleida on the regional economy. Several reasons defend the choice of this methodology. In the first place, it is one of the techniques most used to evaluate the University effects on the regional/local economy, which facilitate the comparative analysis inter-universities and inter-territories. Secondly, it allows to value the total expenditure impact, including the direct effects, indirect effects and the induced effects of consumption. Finally, the recent appearance of the input-output table of Lleida³ (Ajuntament de Lleida, 1999) referring year 1996, it offers the possibility of having

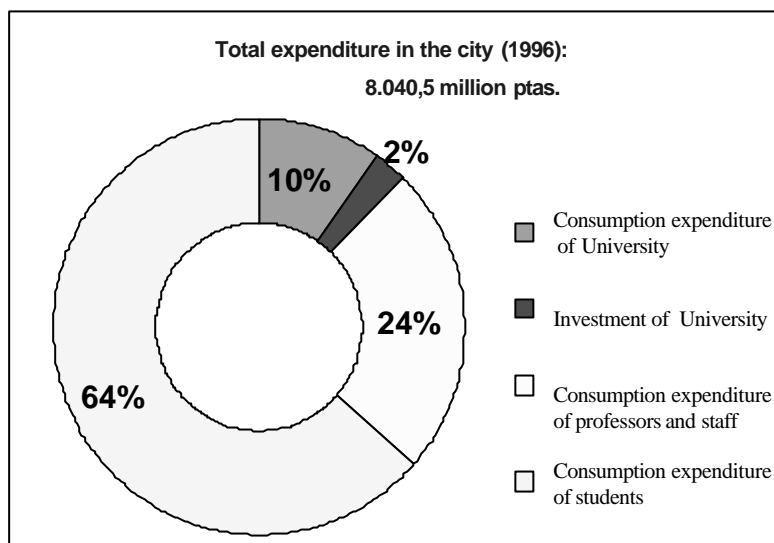
available data which are updated and based on the same geographical area where the University is located.

The original version of the TIO96 consisted of 24 economic sectors and the university was included in the non-sale service sector. Nevertheless, in order to fulfil the application of this study, the university has been withdrawn from that sector, getting in this way a matrix of 25 sectors.

In relation to the University sector, it must be pointed up that in 1996, the University of Lleida had 875 salaried people (professors and STAFF) and 10.980 enroled students⁴. Nevertheless, the study focuses on the expenditure generated by the community only in the city of Lleida. To calculate the real net effect of the expenditure of students in the local economy, Lewis (1988) and Beck et al. (1995) consider it is necessary to estimate the proportion of students who would have studied in other universities if University of Lleida had not existed. This fact is important because only the expenditure of these students creates a real impact on the regional economy. This information as well as the students expenditure in the area, is compiled through a survey done to 1.567 students which shows the amount and the economic sectors among which this expenditure is distributed.

With regard to the professors and other staff expenditure, it must be taken into account that 18,5% of the staff of the University of Lleida lives outside the studied area, commutings, that is people who live in a place whereas they work in a different one. In this case, some studies- Lewis (1988), Armstrong (1993) and Greig (1971) show that the fact of including the commutings salaries enlarges excessively the expenditure effects of the University in the area of placement and suggest that these salaries should not be included since they do not have impact on the local economy. Bearing this premise in mind and starting from the budgets of the University of Lleida we get the number of the staff salaries and wages. A marginal propensity to the consumption of 0,88⁵ is applied to that number in order to get the amount of expenditure made by the professors and staff of the University of Lleida in the city.(Data collection in graphic 1.)

Graphic 1. Typology of Expenditure of the University Community.

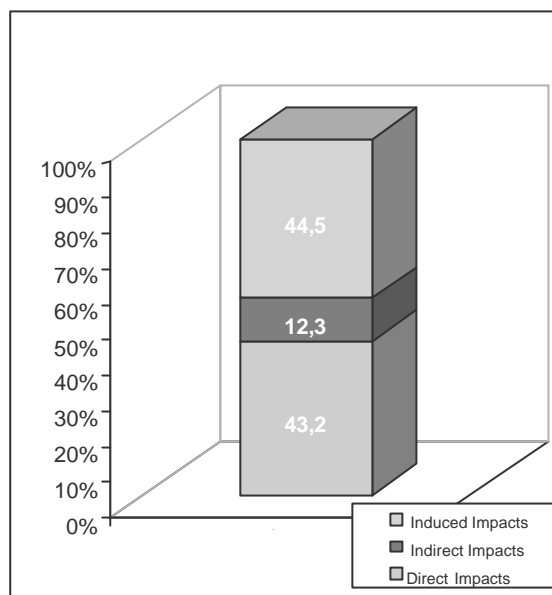


Source: own elaboration.

The main question in this part is the study of the impact which assumes the increment in a unit⁷ of the final demand of the University on the whole of production income and employment of the local economy.

3.1. Impact on the production

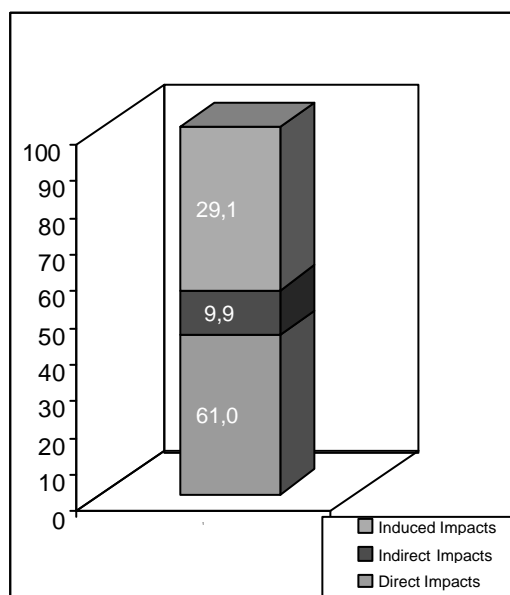
From the sum of the column of Leontief inverse matrix, it is obtained the output multiplier⁸ for each sector, in the case of the University sector this multiplier amounts to a value of 2,3145 , from which 43,2% belongs to direct impacts, 12,3% to indirect impacts and 44'5% to induced ones (graphic 2). From this value, 43.6% is attributed to the own University sector (belonging, practically in its entirety, to the final demand) and the rest, 56'4% are part of the production of the other sectors (basically other services, energy, transport and communications and recovery and amends).

Graphic 2. Impacts on production

Source: own elaboration

3.2. Impact on the income

The income multiplier⁹ for the university is 1,6399, a higher value in relation to the mean of the whole sectors (1,2727). From these, 61% belong to direct impacts, 9,9% indirect impacts and 29,1% induced impacts (see graphic 3).

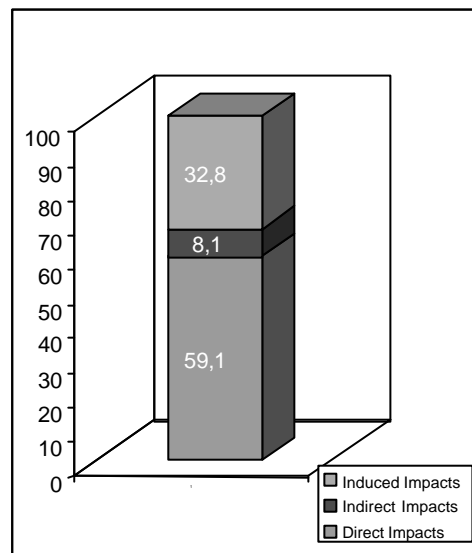
Graphic 3. Impacts on the income.

Source: own elaboration.

3.3. Impact on employment

To analyse the capacity of expanding employment from different sectors of the area of Lleida, the means used is the employment multiplier¹⁰. The employment generated by the university in the area of Lleida, when its final demand increases a million pesetas is 0'2996 posts, from which 59'1% belong to direct impacts, 8'1% indirect and 32'8% induced impacts (graphic 4). The capacity of the University is lower than the mean value for all sectors (0,5502), but higher than other service sectors such as commerce, hotel business, transport and communication and financial services.

Graphic 4. Impacts on employment.



Source: own elaboration

From the analysis of the previous multipliers it can be stood out that the university sector, as the economic sector of the area of Lleida, show a strong capacity of generating induced impacts. The reason is that the output that produces is a final consumption output, without the need of using intermediate inputs but with a high content of added value.

4. IMPACT ON THE FINAL DEMAND OF THE UNIVERSITY

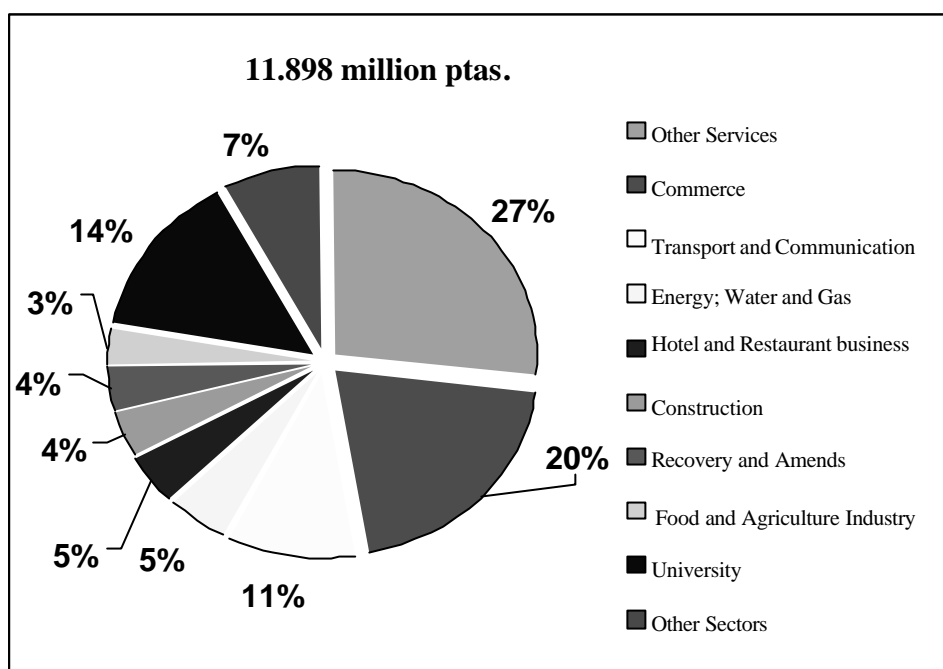
The aim of this part is applying the multipliers obtained in the previous parts to the final demand of the university, demand valued in 8.040,5 million pesetas, this application allows us a better approach to the true impact of the University (see graphic 1).

In this case, the production level obtained is 11.898 million pesetas, from which 3.857,5 million pesetas belong to indirect impacts. At the same time, the sectors with a greater impact are, other services (27%) commerce (20,1%), University (14,3%), transport and communication (10,5%), energy, gas and water (4,8%), hotel and restaurant business (4,6%), building industry (3,9%), recovery and amends (3,8%) and food and agriculture industry (3%) (see graphic 5)

The income generated by means of the University is approximately 7.675,2 million pesetas, being more benefited such sectors as: other services (29,4%), commerce (22%), university (22,1%) transport and communication (8,5%), financial services and firms (3,5%), hotel and restaurant business (2,9%), energy, gas and water (2,8%) and building industry (2,6%) (see graphic 6).

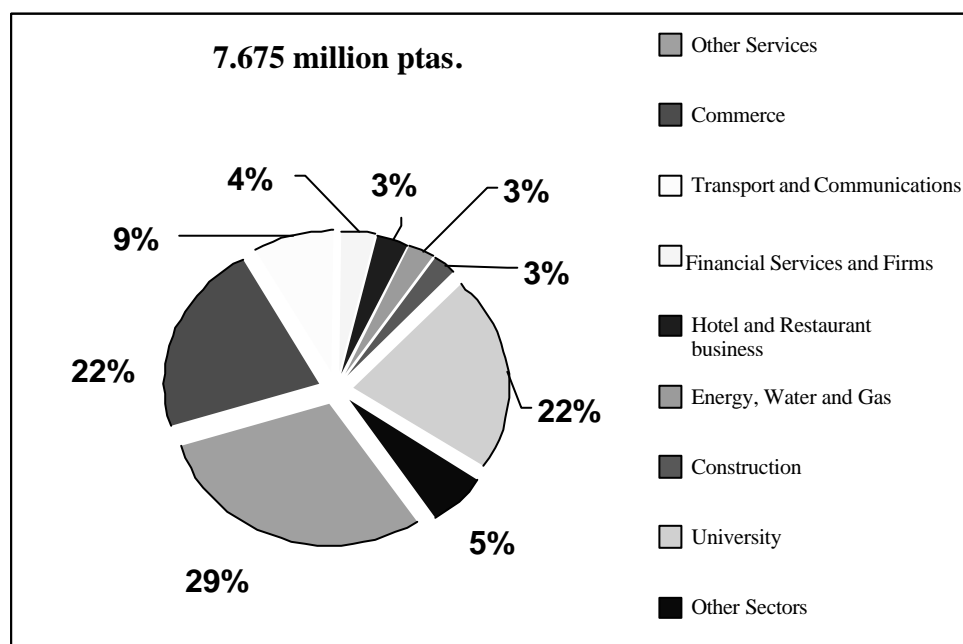
The employment created for this level of final demand is 1.288 posts, outstanding other services (24,3%), University (23,4%), commerce sector (23,2%), transport and communication (7,5%) and financing service and firms (3,1%), non-sale services (2,2%) and building industry (1,9%) (see graphic 7).

Graphic 5. Impact on the production.

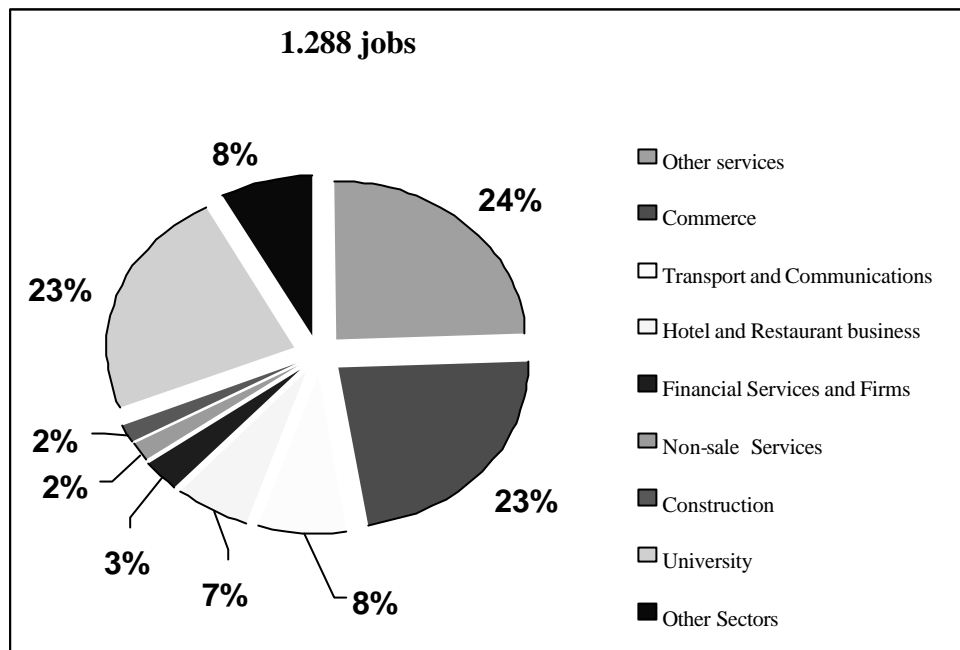


Source: own elaboration.

Graphic 6. Impact on the income.



Source: own elaboration

Graphic 7. Impact on the employment.

Source: own elaboration

5. CONCLUSIONS

As it has been mentioned before, there are different methods to analyse the expenditure impact of the University on the regional economy. One of the most used methods is that based on the input-output model. It provides us with disintegrated sectorial information as well as it allows to calculate the total effects of an incentive in the final demand on the production, income and employment.

From the study of the expenditure impact of the university of Lleida on its area of influence and through the input-output method, it is concluded that the service sector is the main receiver of direct and indirect effects which is stemmed from the existence of the university of Lleida and from its total expenditure in the region. The subsectors more benefited are, particularly, other services, commerce and hotel and restaurant business. Although the impacts on the industrial sector are less quantitative, different branches such as energy, gas and electricity, paper and graphic arts, and textile and dressmaking stand up.

The calculus of the multipliers reveals that the induced effects mostly promote the impact of the university. Likewise, the University shows more capacity of backward

linkages than forward linkages. This is due to the fact that the output generated by the University is not acquired in the market by the firm as an input, that is the reason why it does not appear as a countable register. However, the firms take advantage from the knowledge effect generated by the University when it employs people with higher levels of qualification and formation, helping in this way to increase its productivity level. At the same time, the services contracted to the University by the rest of sectors (research projects, permanent formation, etc), still stand for a low significant percentage within the amount of its turnover.

Definitively, the presence of the University of Lleida, has managed to consolidate the city as an area of services. In this sense, the university has been one of the engines to develop the tertiary sector of the area, which is also one of the most expansives for the last 10 years contributing with 59,2% of the total VAB of the city.

In conclusion, it is proper to point out that in the future, the results related to the analysis of the expenditure impact of the universities are tied to two determining factors. In the first place, the restrictive budget policy, generated by the necessity of a cut back in the budgetary deficit, will become a greater competition to obtain additional funds to finance any public expense. Secondly, transferring competences related to higher education to autonomous countries may mean an advantage or disadvantage with regard to the facility of obtaining financing, depending on the particular policy that each region adopt in relation to its universities. In this sense, according to the report of the Sindicatura de Comptes de Catalunya on the fiscal year 1997, there are great differences in relation to the subvention granted to the different catalan universities¹¹.

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1. Apart from this distinction, there are types of alternative classifications which distinguish between short and long range impacts (Caffery e Isaacs, 1971) direct and indirect effects (Bonner, 1968) or/and demand vs. supply effects (Anselin et al., 1987).
 2. Along with these methods, there are others used at the regional level such as multi and interregional econometric models or integrated ones (see Isaaev et al. 1982 or Nijkamp et al.1986).
 3. By mentioning Lleida, it embraces the villages of Alamús, Albatarrac, Alcoletge, Alpicat, Artesa de Lleida, Puigverd de Lleida, Torrefarrera and Torre-serona.
 4. The number of students is the corresponding to the natural year 1996, obtained through the balanced mean of the different academic years 1995/1996 and 1996/1997, summarized in graphic 1.
 5. Calculus based on the Economic Report done by Banco Bilbao Vizcaya in 1998.
 6. The structure of this expenditure, that is to say the allowance to different economic sectors, has been done on the basis of the statistics on the mean annual expenditure of the Catalan homes, which is done by the Catalan Statistics Institute.
 7. In all cases the increase of a unit is of a milion pesetas.
 8. This multiplier shows the capacity of linkage to other economic sectors when the output demand is expanded in a unit. For this reason, the sum of the columns is done in order to get the matrix $(I-A^*)^{-1}$ Being A= matrix enlarged with technical coefficients.
 9. The income multiplier is calculated from $^{\wedge}Mr = ^{\wedge}v (I-A^*)^{-1}$, being $^{\wedge}v$ = diagonal matrix of the values $(VAB_1 / PE_1, \dots, VAB_n / PE_n)$, A^* = matrix of technical coefficients enlarged with the private consumption.
 10. The employment multiplier is obtained from $^{\wedge}MI = ^{\wedge}l (I-A^*)^{-1}$, being $^{\wedge}l$ = diagonal matrix of the values $(\text{employment}_1 / PE_1, \dots, \text{employment}_n / PE_n)$, A^* = matrix of the technical coefficients enlarged with the private consumption.
 11. Current transferences per student by the Catalan government (La Generalitat de Catalunya): University of Barcelona (363.486 pesetas), Autonomia University of Barcelona (384.906 pesetas), Politecnica University of Catalunya (442.557), Rovira and Virgili University (373.807 pesetas),

University of Girona (334.146 pesetas), University of Lleida (364.631 pesetas) and Pompeu Fabra University (781.604 pesetas).