THE LOCAL ECONOMIC IMPACT OF UNIVERSITIES: AN INTERNATIONAL COMPARATIVE ANALYSIS

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Abstract

Nowadays the realization that certain economic units, universities or other objects have impact on the economy of their region comes more and more into prominence. A growing demand appears to generate more precise studies regarding the quantification of economic impact of these entities. The topic of the examination of economic impact is especially interesting and exciting when we can compare regions with different level of development, but with the presence of an internationally successful university. The local economic impact of a large tertiary education institution such as a university is an issue which has attracted considerable attention in literature. Different methods used in literature make results hardly comparable, we use the same method to investigate universities in different countries: in the lack of regional input-output matrices a multiplier based approach for first and second missions (education and research), while an application of Jongbloed's indicator set for third mission. Generally, there are four substantial problems. First, the definition of impact, second, measuring and estimating first-round expenditures and avoiding double-counting, third, estimating the correct value of the multiplier, fourth, the quantification of the third mission activities.

The economic impact study has become a standard tool used by Western universities to persuade state legislatures of the importance of expenditures on higher education. As economic impact studies become a political tool in the review of education, conservative assumptions and methods should be used to promote objectivity in the research process.

The goal of our study is to unravel the effects and impact of the University of Szeged (Hungary) and the University of Lorraine (France) regarding their local economy. The topic is quite unique, as the NUTS2 regions in which the examined universities are located in a lagging behind region compared to national average, but per capita GDP is 3.6 higher in Lorraine. On the other hand these universities have the institutional ranking around the 500th place as published on the Academic Ranking of World Universities and employers of about 7000 employees. The socio-economic welfare of the region supposedly depends on the university in Hungary, nevertheless the same amplitude in France. The goal of the study is to attempt the quantification of this presumption.

As our results show, the impact per student is in the same magnitude in both countries, however third mission is much more implemented in France. The reasons of this difference can be found in historical facts and in different level of economic development.

Keywords: *local impact, university, Hungary, France*

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Introduction

Nowadays the realization that certain economic units, universities or other objects have impact on the economy of their region comes more and more into prominence. A growing demand appears to generate more precise studies regarding the quantification of economic impact of these entities. The topic of the examination of economic impact is especially interesting and exciting when we can compare regions with different level of development, but with the presence of an internationally successful university.

The roles of universities are also changing in time. As Wissema (2009) suggested, there are three generations of universities, while Pawlowski (2009) already mentioned fourth generation universities. The characteristics of these universities are summarized in Table 1.

Table 1. Characteristics of first, second, third and fourth generation universities

Aspect	First generation universities	Second generation universities	Third generation universities	Fourth generation universities
Goal	Education	Education and research	Education, research, and utilization of knowledge	Education, research, R+D+I, utilization of knowledge, and proactive economic development
Role	Protection of truth	The cognition of nature	Creation of added value	Local economic accelerator, strategy determination
Output	Professionals	Professionals and scientists	Professionals, scientists, and entrepreneurs	Professionals, scientists, entrepreneurs, and competitive local economy
Language	Latin	National	English	Multilingual (national and English)
Management	Chancellor	Part-time scientists	Professional management	Professional management and local experts

Source: Based on Lukovics-Zuti, 2013; Lukovics-Zuti, 2014; Zuti-Lukovics, 2014

The local economic impact of a large tertiary education institution such as a university is an issue which has attracted considerable attention in literature. Different methods used in literature make results hardly comparable, we use the same method to investigate universities in different countries: in the lack of regional input-output matrices a multiplier based approach for first and second missions (education and research).

The structure of the paper is the following. In the first part, we take a theoretical overview of the impacts of universities. In the second part, we focus on measurement methods, solutions and problems. The empirical evidence for the two universities are shown in part 3, followed by a conclusion including a summary of open questions.

Theoretical overview

The local economic impact of a large tertiary education institution such as a university is an issue which has attracted considerable attention in literature. Beck et al (1995, 246) define economic impact as „the difference between existing economic activity in a region given the presence of the institution and the level that would have been present if the institution did not exist."
Florax (1992) and with modifications Garrido-Iserte and Gallo-Rivera (2010) showed that the regional and local effects of a university can be observed in many fields beyond economy.

Dusek (2003) sorts the impact into input and output side effects (with students on both sides, see Table 2 and 3). He highlights the role of budget links as an important (economic) factor; the

main financial source of the university is the government budget. These classifications are not far from the Segarra I Basco (2003) model, who divided backward and forward effects. Among the forward effect localization factors (instead of attractiveness) he also mentions foreign investment and high-tech companies (that are typical actors of technopolis type clusters).

Table 2. Regional/local impacts of universities on the input side

Actor	Changes
Households	+ income + employment + consumption
Local authority	+ tax base + services
Business	+ volume of business

Source: After Dusek (2003)

Table 3. Regional/local impacts of universities on the output side

Factor	Changes
Human capital	+ qualification + new firms + migration
Knowledge	+ university-business relations + extensive use of resources
Attractiveness	+ location choice of households and firms + cultural and social possibilities
Business	+ research and development, exhibitions

Source: After Dusek-Kovács (2009)

Huggins and Cook (1997) transferred the keywords into drivers and outcomes, and in their approach, one cannot find hard measures on the driver side, while hardly have soft outcomes.

Brown and Heaney (1997) concluded that the input size effects may be better measured than output side effects, while the third mission of universities, the knowledge transfer has mainly social impacts. Notwithstanding, Beck et al (1995) argues that social (human capital) factors must be heeded, unless the major part of impacts would not be incorporated.

Pellenbarg (2005) modified the table of Lambooy to achieve a complete list of economic impacts (see Table 4). However, this classification is a wide mixture of impacts of the three main missions of universities (education, research and university-enterprise cooperation).

Table 4. Regional/local economic impacts of universities

Economic impacts of a university	Example
Employment at the university	Number of university jobs and related institutions
University income	State contributions, fees, benefits arising from entrepreneur activity, etc.
University expenditure	Purchase of goods and services by the university
Income and expenditures of the university employees	Wages and salaries, social security costs

Effects on the job market	Qualified job provision effect upon productivity; flexible working supply of the students
Generation of business	Companies created by university students and employees, with or without employment knowledge and technology
Knowledge marketing	The sale of knowledge in a variety of ways: from ideas, courses and patents

Source: Pellenbarg (2005)

Lengyel (2008) gives a more complex system on economic "effects", including many elements of the previous literature in a well-structured figure.

Garrido-Iserte and Gallo-Rivera (2010) also attached importance to the separation of short and long term effects, and constructed a matrix of impacts with subjective and objective long-term impacts on knowledge.

Brown and Heaney (1997) compare two approaches of the computation: the skill-based approach and the economic-based approach. These approaches are close to the logic of the knowledge and expenditures based classification.

Johnson (1994) argues to divide local and non-local (it is better a choice on which territorial level we identify impacts), direct and indirect impacts, but he also attends to various negative impacts of universities and to the necessity of a net approach (i.e. individuals could spend more, if the government did not tax them to be able to pay the expenditures of universities). The question of gross or net impact can be analyzed from many starting point. Generally, gross impact is easier to define and compute, as such questions arise that in the lack of the university what and where the staff would work, where students would pursuit their studies (if at all), how large the difference of knowledge in the local economy would be or what would be the difference of house prices. The higher is the analyzed territory, the less is the difference between gross and net impact.

The classification of impacts from the point of view that how directly the impact is related to the activity of the university is widely varied in the literature. We can find twofold, threefold, and fourfold classifications. In a larger classification, over direct and indirect impacts, we have induced impacts (Koophaus, 2008), while in the fourfold version, one can also find catalytic impacts (for these impacts see Lukovics-Dusek (2014a) and Lukovics-Dusek (2014b) for university-related research, or Dusek-Lukovics (2011) for business service). The modified version of these classifications stands for universities as:

- direct impact: output, income and workplaces created on-site owing to the investments and operation of the university,
- indirect impact: income and employment generated in the companies providing inputs for the university,
- induced impact: income and employment generated with the multiplier impact owing to spending the incomes,
- catalytic impact: productivity growth achieved through the operation of the university, the income and employment created through the companies settling because of the university and the spending of the visitors arriving because of the university.

The contradictory and sometimes misleading mélange of the impacts can be well shown by juxtaposing those of the Garrido-Yserte–Gallo-Rivera (2010) and the French school represented by Gagnol-Héraud (2001) and Baslé-Le Boulch (1999).

In this confusion, we would recommend to use induced impact to all effects that are generated by the multiplication process. In the Lukovics-Dusek classification, the separation of direct and indirect impacts is artificial (practically, we separate personal expenses from purchase of assets and investment, its cause can be the local analysis: on-site created income is always local – nevertheless not necessary locally spent). The catalytic impact of Lukovics-Dusek, the indirect impact of Gagnol-Héraud and the induced impact of Garrido-Yserte–Gallo-Rivera have almost the same content. While it not widespread in the literature, the catalytic expression better describe the content of this category than indirect or induced (induced seems to be the worst choice).

Methodology

The main methodological possibilities are the use of input/output matrix based models or the Keynesian multiplier model family. As up-to-date local or at least regional level input/output matrices are not available, we could not use the first type of models. The use of input/output models are typical in the USA where such matrices are accessible in state level. The simplicity of the multiplier method makes it so popular, as a relatively narrow scale of data is necessary. In our comparison, we will follow a version of regional multiplier model. The method we applied in Figure 3 and 4 is modification of Caffrey – Isaacs (1971) and Bridge (2005) models, we can also call as a simplified ACE model in the terminology of Garrido-Yserte–Gallo-Rivera.

The territorial scope of our analysis was local. In Szeged, the university is dominantly in the city (with one small faculty out of the city), in France we had the possibility for the survey only in Metz, and so a regional estimation of the impact of one campus would not be meaningful. Using a larger territorial scope would increase the absolute gross impact, but per capita or per GDP impact may be smaller.

Whenever it was possible, we used data for 2014.

In our paper, we followed the computations made in our earlier works (see Kotosz, 2013 or Zuti-Lukovics, 2015), using the same methodology, model and primary research agenda, so our results are fully comparable. The methodological background of the two-step estimation is described in Bleaney et al (1992) and Felsenstein (1997).

The multiplication effect is the function of the following factors:
- Personal income tax rate (average rate) [t]
- Value added tax (average rate) [n]
- Marginal propensity to consume [c]
- Local consumption proportion of students [d]
- Local consumption proportion of employees [e]
- Local consumption proportion of the college [b]
- Local consumption proportion of the local economy [f]

Armstrong-Taylor (2000) and Lengyel-Rechnitzer (2004) supposed a fix amount of spending of visitors and an equivalent local consumption proportion of students, employees and the college. Instead of the latest, we applied a two-step estimation, so different proportions could be used. Thereby the formula of the multiplier is:

$$\frac{1}{1-f \cdot c \cdot (1-t) \cdot (1-n)}$$

Expenditure data of the universities can be reached from public information. In the case of multi-campus institutions, allocation of expenditures by campus has been based on our estimation (when expenditures cannot be definitely allocated, we used keys related to relevant activities: number of students, number of academic/non-academic staff, area). We supposed an additional income of 20% of employees. Estimation of visitors' expenditures is based on conferences and other events attracting visitors.

To map expenditures of students, we asked them to fill in a questionnaire (in 2014 in Szeged, and in 2015 in Metz). This element was based on a representative sample, we multiplied the sample mean by the number of students enrolled at the university/campus.

To estimate the locally true consumption function, we can follow two different ways. From one part, we can use national statistics, as by empirical evidence (see Árvai-Menczel 2001, Vidor 2005) local and national functions are not significantly different. From the other part, local sample surveys can also serve as starting point. Our computations also showed that cross-sectional and time series data give largely different results, between 0.45 and 0.7 in both countries While Dusek (2003) found a high marginal propensity to consume in his survey of students (over 0.7), our results in Hungary are mostly below 0.5, while in France around 0.5. As a consensus, we used 0.6.

Due to the lack of reliable geographical knowledge of students, we preferred to choose the local level as the city where the university is located (Szeged and Metz). By extending the geographical area, higher rates a local consumption data is taken, increase is not proportional with distance.

The local consumption proportion of students varied around 70-80% based on our survey data (in accordance with previous data). This number is always higher than the rate of local students, which is around 30-40%. In our estimations, we used the value of 0.7 in Metz, and 0.8 in Szeged, as the results of the surveys.

Estimation of employees' local consumption proportion is one of the most problematic point of the process, as in neither cities we had not right to ask employees by a questionnaire similar to students' one. As a result of the suburbanization process, we supposed that local consumption proportion is lower than students', we used 75% in Szeged, but only 60% in Metz.

Local consumption proportion of the university is typically restricted by national law. Well-known estimation problems arises with the limitation of local level (see e.g. Székely 2013), but this question is beyond the goals of the paper. We analysed the official documents of the universities and estimated these impacts by separating local and non-local items. We used a 70% value for Szeged and 80% for Metz.

For the average tax rates, we used recent estimations of the Hungarian National Bank for Hungary, and Ministry of Finance data for France. While VAT rates are similar (16% in France, and 20% in Hungary), NUTS3 level average personal income tax rate is only 6% in Lorraine, while the national statistics of Hungary was 20.1% (for methodology, see Benczúr-Kátay 2010). This difference can be explained by inclusion of social security contributions.

Generally, in scientific papers on impact studies, there are only theoretical comparisons of previously applied methods, but we cannot find international comparative studies where invariable method has been used. Even with deficiencies, we can internationally compare the impact of the analyzed universities.

Empirical evidence and results

Even if the theoretical background is not unanimous, but well-known, estimation methods are wrought and discussed (see Siegfried et al, 2006 for a general comparison), and many international empirical example can be found in the literature (Armstrong 1993, Blackwell et al 2002, Bleaney et al 1992, Bridge 2005, Brownigg 1973, Caroll-Smith 2006, Cooke 1970, Huggins and Cooke 1997, Jabalameli et al 2010, Lewis 1988, Love and McNicoll 1988, Ohme 2003,Pellenbarg 2005, Robert-Cooke 1997, Simha 2005, Tavoletti 2007), until 2010 only one finished case study was known for Hungary, the case of the University of Győr (Széchenyi István University) (Dusek-Kovács, 2009). Some steps were also made in Pécs (Mezei, 2005), but this research has not reached the level of having at least one numerical result. An intensive phase of research started after 2010, the first results have been published in Kotosz (2012) and Kotosz (2013) for small colleges and in Zuti-Lukovics (2015) for the University of Szeged. In Dusek-Lukovics (2014) we can also find an example impact study of a research-oriented object.

In France, three scientific impacts studies are known, for the case of Strasbourg (Gagnol-Héraud, 2001), for Rennes (Baslé-Le Boulch, 1996), and for the University of Littoral (Mille, 2004). These papers can handle only partially the questions, without an expressed amount of euros (francs) as impact (except for Baslé-Le Boulch, 1999) where multiplier effects are also determined.

The higher education system in the two countries are similar in the sense that originally they are based on state-owned/state-financed universities, complemented by smaller private schools where education is more accentuated than research. As a soviet heritage in Hungary, an independent academic research center network survived. In France, research centers are integrated in the universities, often creating a matrix system of education and research. Education divisions may run under different names (faculties, education and research units, institutes). While in the Hungarian system, faculty positions are also divided to be lecturers and researchers, France academic staff members are lecturer-researchers.

The higher education in Hungary went through determining changes in the 1990s, which on the whole had an impact on the entire Hungarian society. Since the regime change the number of students has risen significantly, has nearly quadrupled. This tendency was noticeable both in the OECD and in the EU countries. However, in Hungary after the 2005/2006 academic year a decrease can be perceptible regarding the number of students. On the basis of data of 2008 we lag behind all the examined OECD countries, concerning the number of state-funded students per one million inhabitants. While this datum in Hungary was 21 324 heads until in Germany 24 639 heads and in Norway 38 409 heads (Harsányi-Vincze 2012). Since 2011 in Hungary the administration of higher education's institutions has transformed appreciably, and with this the organizational and administrational autonomy of the institutions, too. First, the appointment of rectors and economic directors was become the authority of the ministry, after that, budget commissioners were ordered to the institutions. In 2014 chancellery system was implemented.

The French higher education system had not realize such shocks, and the number of students has a growing trend with more than 2,400 thousand students in 2014.

The University of Szeged was founded in 1872, and has about 30,000 students and 12 faculties. After various historic events, in 2000 it unifies almost all faculties working in the city. The Faculty of Medicine integrates a clinical center (hospital) with activities that cannot be separated (financially) from the university. Szeged has around 170,000 inhabitants, in a region which is among the 20 poorest regions of the European Union (measured in per capita GDP).

The first university in Metz was founded in 1970 based on smaller higher education institutions already existing in the city. In 2012, the universities of the Lorraine region have been

unified to create the University of Lorraine which is the second largest university of France (by the number of students). The university has more than 50,000 students, 13,000 of them located in Metz where 6 faculties can be recognized. As our research concerns only the city of Metz, university budget items had to be divided by keys. The city of Metz has about 120,000 inhabitants, in a region less developed than the French average (but over the EU average).

The main findings of our research for Szeged and Metz can be summarized in Figure 3 and Figure 4, respectively.
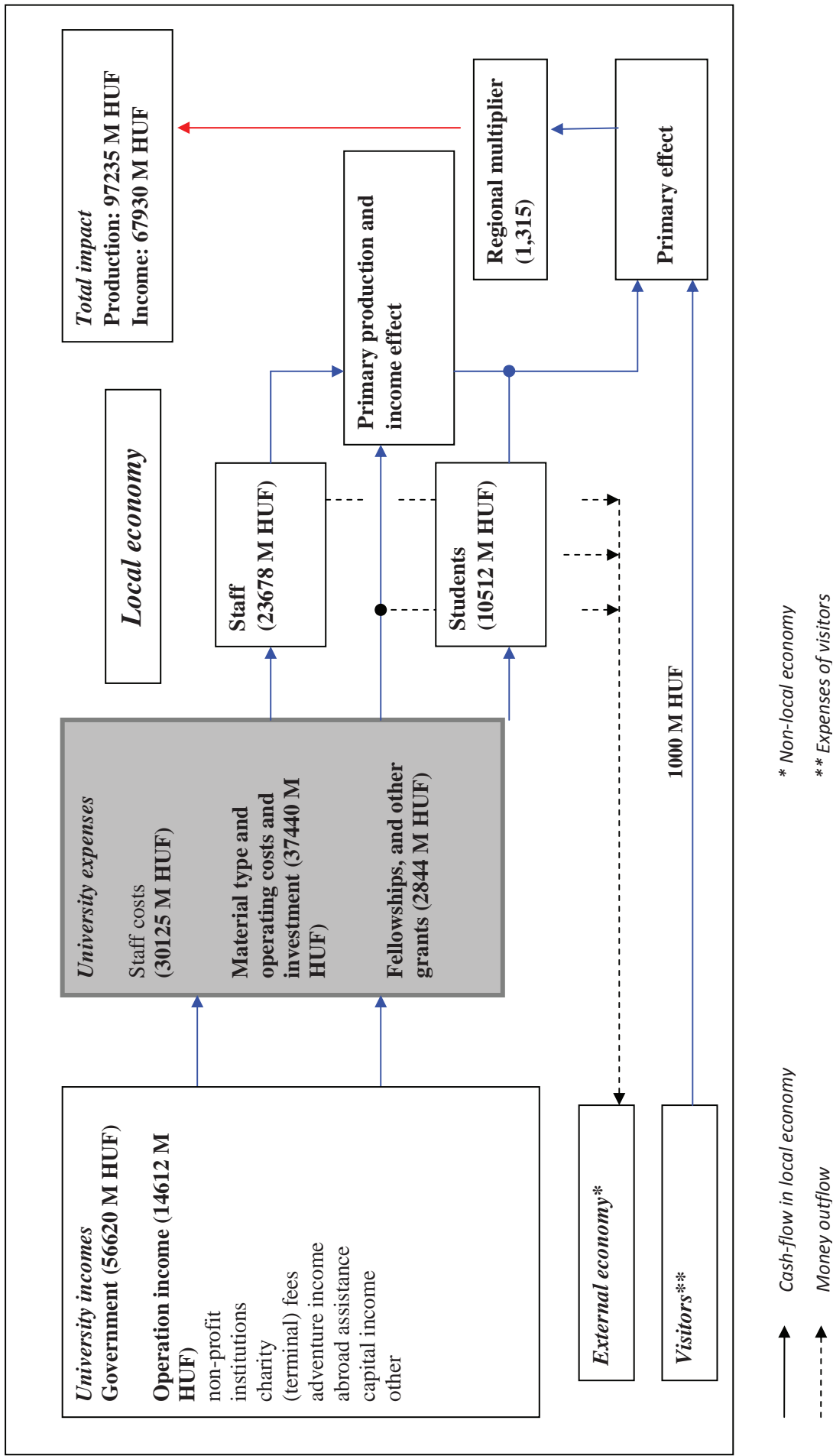
Total impact
Production: 97235 M HUF
Income: 67930 M HUF

Local economy

Regional multiplier (1,315)

Primary effect

Primary production and income effect

Staff (23678 M HUF)

Students (10512 M HUF)

University expenses

Staff costs **(30125 M HUF)**

Material type and operating costs and investment (37440 M HUF)

Fellowships, and other grants (2844 M HUF)

University incomes
Government (56620 M HUF)

Operation income (14612 M HUF)

non-profit
institutions
charity
(terminal) fees
adventure income
abroad assistance
capital income
other

External economy*

Visitors**

1000 M HUF

* *Non-local economy*

** *Expenses of visitors*

—— *Cash-flow in local economy*

----- *Money outflow*

Figure 3: Cash-flow à Szeged

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University incomes
Government (112 M EUR)

Operation income (11 M EUR)
non-profit
institutions
charity
(terminal) fees
adventure income
abroad assistance
capital income
other

University expenses

Staff costs
(90 M EUR)

Material type and operating costs and investment (33 M EUR)

Fellowships, and other grants (1 M EUR)

Local economy

**Staff
(52 M EUR)**

**Students
(5 M EUR)**

Primary production and income effect

**Regional multiplier
(1,496)**

Total impact
**Production: 140 M EUR
Income: 119 M EUR**

Primary effect

External economy*

Visitors**

1000 M HUF

Cash-flow in local economy

Money outflow

* Non-local economy
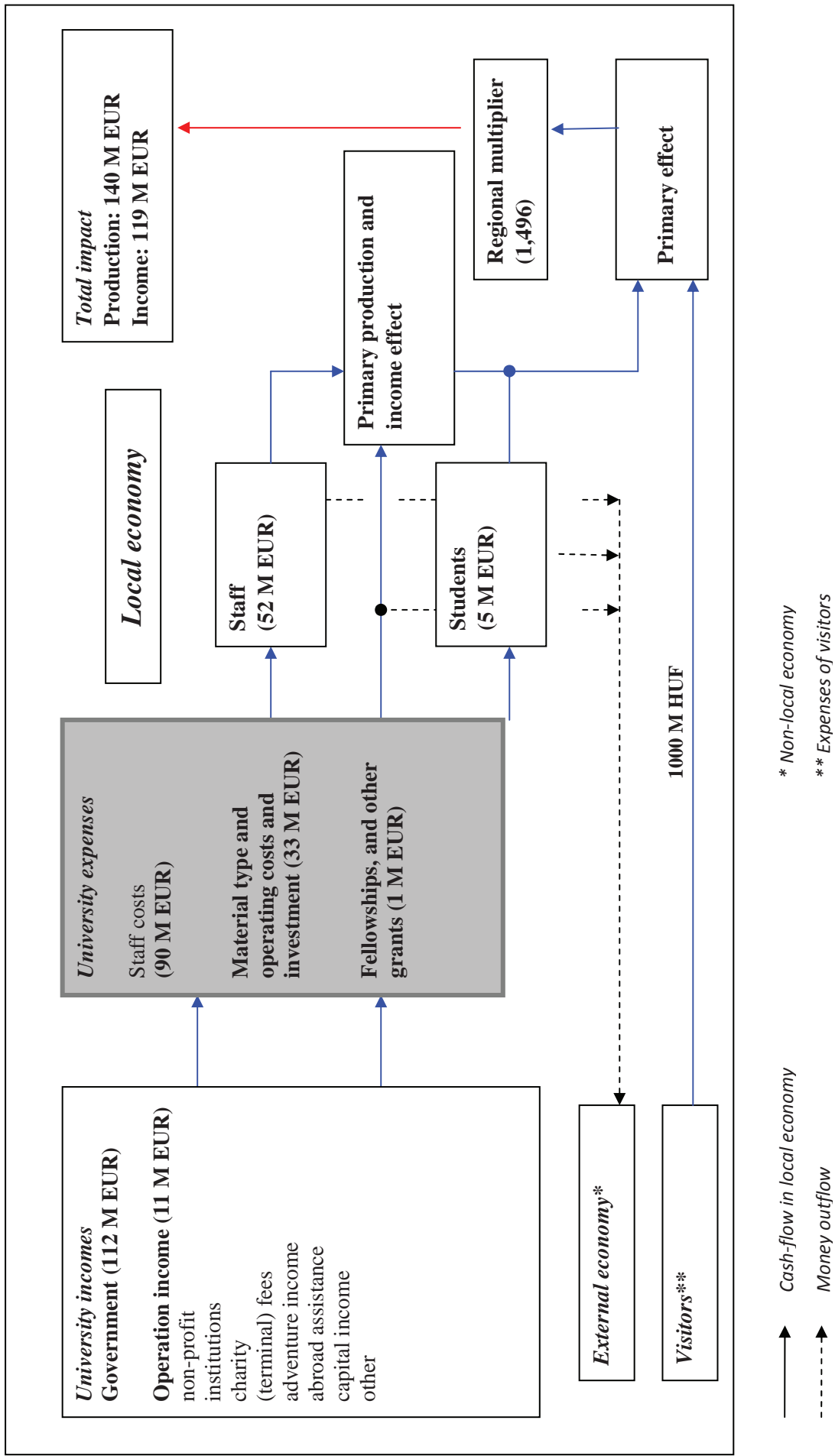
** Expenses of visitors

Figure 4: Cash-flow à Metz.

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Conslusion

The total impact per student is in the range of 15-50 thousand euros in the USA, in the range of 10-20 thousand euros in Western Europe, while between 5 and 10 thousand euros in Eastern Europe by benchmark studies. The result of 10.800 EUR in our target cities can be explained by the fact that the University of Szeged has a clinical center where medication activities requires expenditures in the order of education and – out of clinical – research of the whole university.

In the percentage of the regional GDP, the impact in the USA is generally in the range of 0.1-3.0%, while in Europe only 0.02-0.10%. Our results of 4% in Szeged and 0.02% in Metz are extremities. The first can be explained by the clinical center, while the second would be higher, if we consider the whole University of Lorraine (around 0.1%).

It is important to see that direct and multiplied (induced) income impact of these universities are in the order of the sum of money invested by different levels of governments. Thereby their third mission activities and/or catalytic impacts are crucial in their local/regional added value. It is proven by Varga (2001) that agglomeration matters, the impact of third mission activities is larger in large universities than it could be explained by their relative size.

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