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Conference Paper · November 2017

DOI: 10.211125/iceri.2017.2297

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ECONOMIC IMPACT AND MULTIPLIER EFFECT OF UNIVERSITY ON ECONOMIC DEVELOPMENT OF THE HOST REGION

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Abstract

Universities are the driving force behind the development of the host region even without their direct involvement in its development. The university brings a finance to a city or region that affects the income of local and regional companies, household incomes and tax revenues. The university purchases goods and services and pays employees for salaries, invests in their equipment, and pays taxes and other contributions. The aim of the paper is to evaluate the short-term economic impact of University of Žilina in the region of Žilina through calculated the output multiplier, the income multiplier, the value added multiplier and the employment multiplier. Part of the contribution is an analysis of the suppliers of University of Žilina, which can obtain the share of goods and services purchased in the region of Žilina or imported from other regions outside the Žilina region. University expenditures to finance goods and services are ranked in multiplier classification.

Keywords: university, regional multiplier, short-term economic impact, regional development.

1 INTRODUCTION

The efficient functioning and prosperity of the university is a matter of regional policy and the university's role in the region is an entry gate for investment. The university is an important part of the region's infrastructure and has potential to initiate changes and transform the economy on a wide scale. [1] University in the city causes the spectrum of economic changes. Local businesses have a higher demand for goods and services, the educational level of the population is increasing, the rate of entrepreneurship is increasing, business productivity is growing, and firms are becoming more innovative. [2]

Economic development is a qualitative change that brings changes in the structure of economy, innovation, institutions, behavior and technology. The objective is to increase competitiveness, which includes stimulation of sustainable development. The main feature of the local economy development is the emphasis on endogenous development using the local potential of human, institutional and material resources. [3]

University has an important impact on the city and the region where they are located. The core roles of universities include education, science and research at a university, and a service for society. Taking into account the role of the university in the region and its output, we can talk about the university's operation in the region. Rehák and Šipikal (2012) distinguish, based on the roles of the university, two universities effects on the region, which can be broken down into forward relationships and backward relationships. Forward relationships represent changes in human capital, changes in the knowledge base, and changes in site attractiveness for businesses and individuals. Backward relationships relate to expenditures of staff, students and university on households, local government and businesses, in the form of changes in their income and changes in employment. [4]

It is possible to distinguish between direct, indirect and induced economic impacts of the university. Direct impacts are the economic impacts that universities generate by paying for the factors of production, goods and services they need for their operations. The growth in demand of university suppliers is also passed on to other companies in the city. The sum of all these effects is the indirect impacts. While the direct impact affects only the sectors supplying their goods and services to the university, the indirect effect extends to other sectors in the city. Induced impacts represent the part of the demand associated with household income of university staff. The wages that employees earn, then spend in the city on various goods and services. If the university ceased to exist, the demand would drop in the sectors where employees of university bought. The overall economic impact of the university is the sum of direct, indirect and induced impacts. The ratio between total impacts and direct impacts is expressed by the multiplier. [2]

1.1 Regional multipliers

In macroeconomy, the multiplier denotes the change in the induced variable per unit of change in the external variable. The multiplier theory was first explained by R. F. Kahn. He pointed to the multiplier effect of any spending in the economy, which causes the chain reaction of spending in other parts of the economy. [5] Authors describe the multiplier differently. They define it as a number [6], the basic tool [7], coefficient, multiplier [8] or factor [5]. These authors explain that each euro of the expenditure will cause a change of more than one euro in GDP and the multiplier has value higher than 1.

The ratio of total economic effect in the region to the original change is called regional multiplier. Multiplier represents the ratio of the total changes that can be expected compared to the input pulse. The multiplier is therefore used to estimate the expected change in the economy that is triggered by the new economic activity or the termination of the existing activity. The most common types of multipliers are the output multiplier, employment multiplier, income multiplier and value added multiplier. Type I multipliers include only direct and indirect impacts. Type II multipliers include direct, indirect and induced impacts. The overall effect can be measured through output, income, value added or employment. From this we can create the basic characteristics of regional multipliers. [2]

1.1.1 Output multiplier

For the output multiplier, the overall effect is measured by sector output coefficients. Results of output multiplier for each type of expenditure represent total additional output in all sectors of the economy in the region concerned, including additional household consumption. This additional production is caused by the total direct cost. In interpreting the outcome of the output multiplier, it should be noted that the results include total production, including intermediate consumption. For this reason, this type of multiplier is often criticized for giving overrated results. [2]

1.1.2 Income multiplier

The income multiplier of a particular sector is defined as the total value of employee income needed to satisfy the additional final demand unit after outputs of the sector. The results of this multiplier represent the overall increase in incomes of employees in the economy of the respective region. These are additional revenues from the employees work on the production of induced outputs. Additional production is the result of the total direct expenditure. [2]

1.1.3 Value added multiplier

The results of the value added deal with the overall increase in value added in the region's economy from additional production. According to Raabová (2010), gross added value is closely related to Gross Domestic Product (GDP). The simplified interpretation, we can assume that the increase in gross value added in the region is approximately equal to the increase in GDP. The consequence of increasing gross value added does not include intermediate consumption, but only the added value of the products sought. [9]

1.1.4 Employment multiplier

The employment multiplier shows the increase in total output not in the form of cash but in the form of the number of employees. The results of this multiplier show how many new jobs are created in the economy by realizing direct spending in the region. Through this multiplier, it is possible to estimate how the impact on total employment in the analyzed region will increase the output of the analyzed industry or investment (opening a new university faculty, etc.). The multiplier counts full-time jobs. This number may not coincide with the real status of physical workers in the economy because entrepreneurs can respond to increased demand differently (eg. paying overtime to existing employees or part-time employment). [2]

1.2 Impact of selected universities on the host city and region

Many higher education institutions use the study of economic impacts as a tool to explore their impact within their local and regional economies. The economic impacts of the university can be considered either as impacts on knowledge creation, research and development, or as a consequence of direct and indirect spending on the surrounding economy [10]. In the following, we will present some brief examples of studies to point to areas where universities document their importance for the development of a host city or region.

University of Gloucestershire is located in England. It is located in three campuses in Cheltenham and Gloucester. It plays an important role in maintaining and enhancing the economic prosperity of Gloucestershire. At the turn of the year 2013/2014, the university spent £ 23.2 million on goods and services. The supply chain of the university covers a wide range of economies. The university has suppliers across the country. A large part of the goods and services were purchased from local suppliers. More than half of the supplies purchased by the university were from suppliers located in the southwestern part of England. 20% of expenditures were spent by the university in the cities where they reside. The largest part of the expenditure concerned administrative and support services, followed by technical, scientific and technical services. [11]

University of Cardiff has a significant socio-economic impact in Wales and overall in the United Kingdom. It contributes to areas such as employment, funding research and providing education and learning. (Cardiff University, 2016) Expenditures of university has brought jobs to other parts of the economy. Expanding the impact of the university is determined by the kinds of goods and services the university purchases from its suppliers. In 2013/2014, 75% of the university supplies were purchased from suppliers from Wales in this period, 25% from suppliers were from other cities in England. As part of the University's expenditure in 2013/2014, output multipliers have been calculated to show that every 1 million of university-income-related GDP will bring about a further 1.01 million pounds of secondary production in Wales and a further 0.34 million GDP in the rest of England. [12]

University of Strathclyde in England has an impact on the city of Glasgow, the Scottish economy and the economy of the whole of the UK (UK). The university has effects that we can divide into direct impacts (GBP 135 million), impacts on suppliers (GBP 13.9 million), staff impact (GBP 9.1 million), and capital expenditure impact (6.2 million GBP). To calculate the impact of employee expenditures, employees split into resident and non-resident and they estimated the proportion of their spending in Glasgow. The university supports directly and indirectly 2 022 jobs. To calculate multiplied effects, the authors of the impact study do not use a separate I-O model, but they use the Scottish economy multipliers. For Glasgow, the estimated multiplier is 1/3 of the Scottish economy multiplier. [2]

Impact study of *University of North Carolina in Aleshville* in USA showed that the total impact of the university is 268 million USD. The university supports 2,592 jobs, increasing local household revenues by 105.5 million. USD and generates tax revenues of 14.7 million. USD for local and state government and \$ 21 million USD for the federal government. The major part of the impact is the result of the university's own expenditures. 51% of jobs, 65% of the income of workers and 57% of tax revenues is a result of alone university expenditures. Expenditure linked to the university's existence in the city supports the existence of 442 jobs in retail, 266 real estate services, 246 jobs in accommodation and catering services, and 243 jobs in health and social services. The REMI model is used to quantify influences. Besides the classical input-output model, it also includes models that analyze the population and the labor market; capital claims; wages, prices and profits and market shares. The model predicts the development of a regional economy that would occur without change, and compares it with the development of the economy that would have occurred if the university had disappeared in the region. [13]

2 METHODOLOGY

The primary objective of the contribution is to determine the total economic impact of the University of Žilina (from now on referred to as UNIZA) expenditures on goods and services for the year 2015 in the Žilina region and to express the multiplier effect of the university on the region. In order to meet the primary objective of the contribution, it was necessary to achieve several sub-objectives. We set these goals as follows:

- analysis of total costs of UNIZA - determination of supplier structure according to supplier's headquarters (regional, national and foreign suppliers);
- analysis of regional expenditures of UNIZA - determination of the structure of regional expenditures by Statistical classification of economic activities in the European Community (from now on referred to as NACE);
- identifying and determining the value of regional multipliers (output multiplier, income multiplier, employment multiplier and value added multiplier) for each NACE economic activity.

When calculating the value of regional multipliers, the assumption was that households are considered to be a sector within the region. Household expenditure was therefore included in the overall impact

on regional development. To achieve the primary goal of the contribution, the type of regional multipliers, which can be called Type II multipliers, total multipliers or multipliers derived from the closed model, was used. The value of regional multipliers for individual economic activities of NACE was calculated and provided by the Technical University in Košice for Žilina region. UNIZA cooperates with this university within the project of R&D Support Agenda - University and Economic Development of Regions.

The first step in drawing this paper was to familiarize and define the theoretical foundations of solved problems of universities and their economic impact on regional development. When studying literature was used method of excerpt and compilation method. The main resource for UNIZA's 2015 analysis of expenditures was the expenditure database generated from SAP accounting software. [14] In the database of purchased goods and services in 2015, the following data are available: identification numbers, names and addresses of UNIZA's suppliers, text labels, and number of UNIZA's invoices paid in 2015.

3 RESULTS

UNIZA annually implements expenditures on goods and services from domestic and foreign suppliers. The structure of suppliers by head office and the structure of expenditures by economic activity was found based on an analysis of the UNIZA's expenditures on goods and services in 2015.

In 2015, UNIZA purchased goods and services from 2 596 suppliers. 1821 (70.15%) suppliers have had residences in Slovakia and 775 (29.85%) suppliers have had residences abroad. Within domestic suppliers it is possible to talk about two types of suppliers: regional and national. All regional suppliers of UNIZA have had residence in the Žilina region. National suppliers of UNIZA include suppliers based in Slovakia but outside the region of Žilina. UNIZA had the 732 (40.2%) of regional suppliers and the 1,089 (59.8%) of national suppliers in 2015 of the total of 1 821 domestic suppliers.

The analysis of UNIZA's expenditures in 2015 showed that 25.8% of the total UNIZA's expenditures was spent on goods and services purchased from suppliers based in the Žilina region. The individual regional expenditures were divided into 65 groups and then 21 sections according to the NACE economic activities. The share of each expenditure divided to NACE sections on the total amount of UNIZA's regional expenditures was subsequently quantified. Figure 1 represents the structure of UNIZA's regional expenditures by the NACE economic sections.

UNIZA had not spent regional expenditures on goods and services in 2015 included in the following NACE economic sections:

- Agriculture, forestry and fishing;
- Mining and quarrying;
- Financial and insurance activities;
- Activities of households as employers; undifferentiated goods - and services - producing activities of households for own use;
- Activities of extraterritorial organisations and bodies.

UNIZA's expenditures on goods and services included in the above-mentioned NACE sections were spent for the purchase of goods and services from national or foreign suppliers.

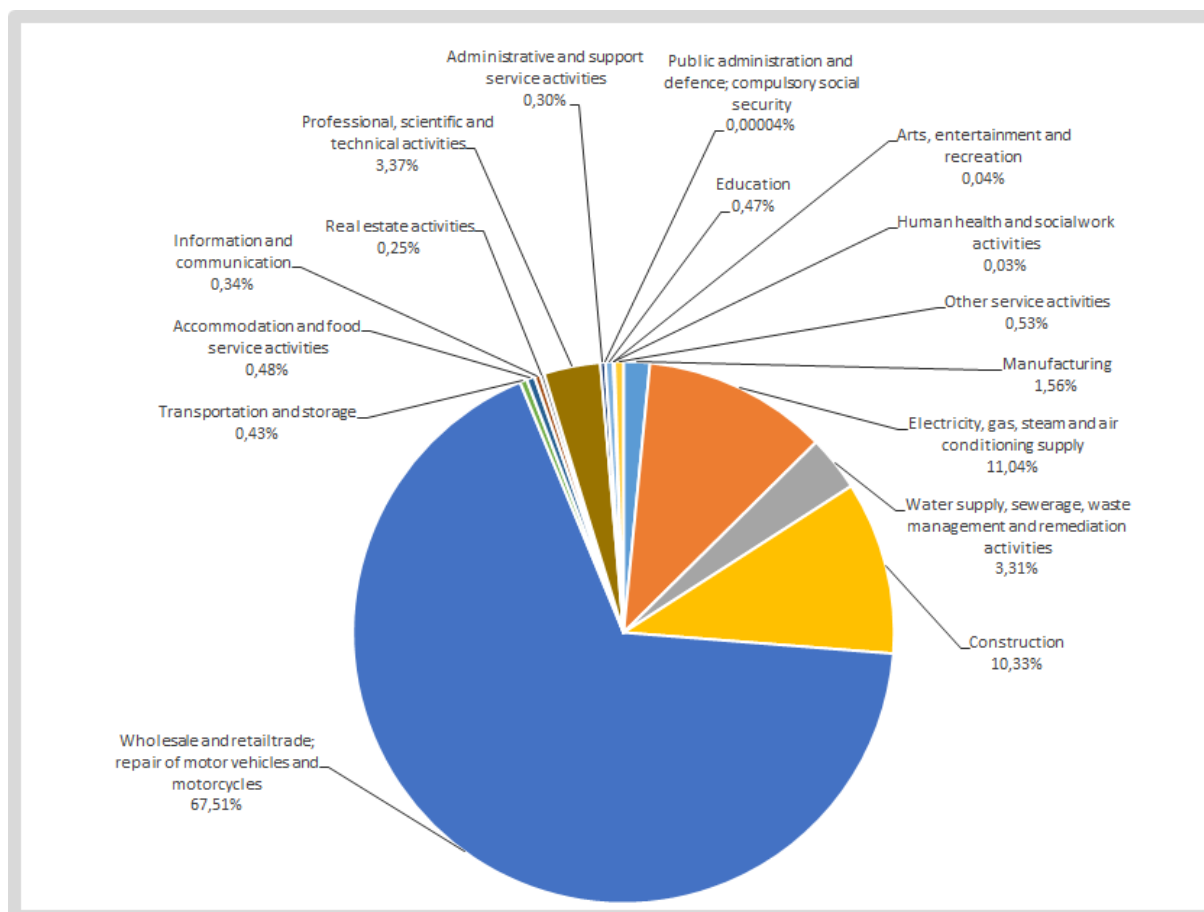


Figure 1. The structure of UNIZA's regional expenditures by the economic sections NACE Rev. 2

The largest share of expenditures (67.51%) of UNIZA's total regional expenditures in 2015 consisted of expenditures on goods and services includes in the NACE section "Wholesale and retail trade; repair of motor vehicles and motorcycles". The second largest share of expenditures (11.04%) of UNIZA's total regional expenditures in 2015 was for the purchase of goods and services within the section "Electricity, gas, steam and air conditioning". There are activities related to the supply of electricity, natural gas, steam and hot water through the constant infrastructure of electrical lines and pipes included in this group. Nearly the same share of regional expenditures (10.33%) was spent for the purchase of goods and services included to the NACE economic section "Construction".

UNIZA implemented 3.37% of the total regional expenditures for the purchase of goods and services included to the NACE economic section "Professional, scientific and technical activities". The goods and services purchased in this section were classified according to the specific economic activities of NACE as follows:

- Legal and accounting activities and activities of head offices; management consultancy;
- Architectural and engineering activities;
- Scientific research and development;
- Advertising and market research;
- Other professional, scientific and technical activities and veterinary activities.

3.31% of UNIZA's regional expenditures were spent on the purchase of goods and services included in the economic section "Water supply, sewerage, waste management and remediation activities".

The goods and services included in the NACE section "Manufacturing" are divided into a large number of groups according to the specific NACE economic activities. It is possible to divide the UNIZA's regional expenditures in 2015 for purchase of goods and services to the following specific groups: Manufacture of textiles and leather and related products; Printing and reproduction of recorded media; Manufacture of chemicals and chemical products; Manufacture of fabricated metal products;

Manufacture of furniture and other manufacturing; Repair and installation of machinery and equipment. The share of UNIZA's expenditures of total regional expenditures in this sector was 1.56%.

UNIZA had implemented less than 1% of total regional expenditures for the purchase of goods and services included to this NACE economic sections: Other service activities (0.53%); Accommodation and food service activities (0.48%); Education (0.47%); Transportation and storage (0.43%); Information and communication (0.34%); Administrative and support service activities (0.30%); Real estate activities (0.25%); Arts, entertainment and recreation (0.04%); Human health and social work activities (0.03%).

The lowest share of UNIZA's regional expenditures (0.00004%) was expended for the purchase of goods and services belonging to the NACE section "Public administration and defence; compulsory social security". This section includes services of state character, which are usually performed by the public administration.

Based on the created structure of UNIZA's regional expenditures in 2015 by the NACE economic activities and sections, the total economic impact of UNIZA's expenditures in Žilina region was quantified. This economic impact was quantified based on the calculation and application of multipliers in the context of the Žilina region: output multiplier; income multiplier; employment multiplier and value added multiplier.

Output multiplier: The total value of UNIZA's regional expenditures in 2015 (25.8% of the total UNIZA's expenditures in 2015) had caused the total additional production of 33.5 million EUR in all of the NACE economic sectors in the Žilina region in 2015.

Income multiplier: The total growth of employees' incomes in the economy of the Žilina region in the year 2015 was 5.4 million EUR. This increase was based on the work carried out on additional production. This additional production was caused by the total value of UNIZA's regional expenditures in 2015.

Employment multiplier: The 262 new full-time jobs were created in the economy by the total UNIZA's regional expenditures in Žilina region in 2015. The creation of new jobs in 2015 had depended on the additional production in the each economic sector.

Value added multiplier: The total increase of added value in the Žilina region's economy caused by the additional production was 14.1 million EUR. The additional production output is induced by all the production levels, including final household consumption.

2 CONCLUSIONS

The aim of regional policy is to achieve a more efficient interregional distribution of economic activity. An analysis of short-term economic impacts enables us to determine the important role of the university in the local economy of the host city Žilina. The article tries to estimate the multiplier effect of UNIZA's expenditures on the economic growth and expansion of the region. In analyzing the impact of the university, it is clear that the existence of a local university is a real magnet of income for the host city and the region. The multiplier effect is an important indicator that demonstrates the importance of existence of a single university in the Žilina region. To quantify the economic impact of universities, it is necessary to define individual multipliers for different geographical areas. In addition to direct effects, multipliers allow indirect and induced impacts to be estimated. The assessment of economic impacts through multipliers is based on several assumptions. We are thinking about constant yields on the scale and fixed technologies. An increase in local output produces a proportional increase in input output.

UNIZA is one of the largest employers in its host city of Žilina. In 2015, UNIZA also had other important economic impacts. These impacts were reflected in the demand for goods and services offered by local and regional firms, employment growth, local household incomes, and within the tax revenues of local governments. The share of supplies from local suppliers and the share of local expenditures of UNIZA's students and staff are main factors influencing the overall local economic impact of the university. Regional multipliers are always specific to the city or region in which the university is located. The specificity of multipliers lies in the different sizes of the city and region and its economic structure.

ACKNOWLEDGEMENTS

This paper was supported by the Slovak Research and Development Agency under the contract No. APVV-14-0512 "Universities and economic development of regions (UNIREG)" and No. APVV-0101-10 "Creative economy - regional and national economic conditions and incentives (KRENAR)".

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