

SLOVAK UNIVERSITY OF AGRICULTURE IN NITRA
FACULTY OF ECONOMICS AND MANAGEMENT

1129889

ECONOMIC/WELFARE ANALYSIS OF HIGHER
EDUCATION SYSTEM IN THE EUROPEAN UNION

2011

Helena Šimočková

**SLOVAK UNIVERSITY OF AGRICULTURE IN NITRA
FACULTY OF ECONOMICS AND MANAGEMENT**

**ECONOMIC/WELFARE ANALYSIS OF HIGHER
EDUCATION SYSTEM IN THE EUROPEAN UNION**

Bachelor thesis

Study program: International business with agrarian commodities
Branch of study: International economic relations (6221700)
Department: Department of economics
Supervisor: Doc. Ing. Artan Qineti, PhD.

Nitra 2011

Helena Šimočková

Declaration of Originality

I, the undersigned Helena Šimočková, solemnly declare that the thesis “Economic/welfare analysis of higher education system in the European Union” is a result of my own independent research and was written solely by me using the literature and resources listed in Bibliography.

I am aware of legal consequences in case the data are not true and correct to the best of my knowledge.

Nitra, May 12, 2011

Acknowledgments

I would like to thank my supervisor for his help, support, encouragement and inspirations given to me during the compilation of my thesis.

Abstract

Education has always been perceived as having positive effects not only on well-being of individuals receiving it but also society as a whole. Number of economic and social benefits is believed to be brought about by an increase in one's level of education. Examples include higher incomes, better employment prospects, higher living standards etc. To verify this belief, twenty-one countries of the European Union served as a sample for empirical testing of relationship between countries' expenditures on higher education and alumni's salaries as well as countries' GDP per capita. Results obtained reveal that if expenditures on education institutions per student at tertiary level increase by 1 Euro, the average salaries of university graduates increase by 1,51 EUR and a country's GDP rises by 1,93 EUR.

Key words: higher education, human capital, public good, economic effect, welfare

Abstrakt

Vzdelanie sa vždy považovalo za majúce pozitívny vplyv nielen na blaho jednotlivca, ktorý ho získava, ale aj celej spoločnosti. Vo všeobecnosti sa verí, že rast úrovne vzdelania so sebou prináša množstvo ekonomických i sociálnych výhod, ako napríklad vyššie príjmy, lepšie pracovné vyhliadky, vyššiu životnú úroveň atď. Na overenie tohto tvrdenia nám poslúžilo dvadsaťjeden krajín Európskej únie, z ktorých bola zostavená vzorka za účelom empirického testovania vzťahu medzi výdavkami krajín na vysokoškolské vzdelanie a mzdami absolventov vysokých škôl, ako i HDP krajín na občana. Získané výsledky odhaľujú, že ak sa výdavky na vzdelávacie inštitúcie tretieho stupňa zvýšia o 1 euro na študenta, tak priemerné mzdy absolventov univerzít vzrastú o 1,51 a HDP krajiny o 1,93 eur.

Kľúčové slová: vysokoškolské vzdelanie, ľudský kapitál, verejný statok, ekonomický efekt, blahobyť

Table of Contents

Table of Contents	6
Introduction	7
1 Literature Review	8
1.1 Education and its Economic Effects	8
1.1.1 Human Capital	9
1.1.2 Investment in Human Capital	11
1.2 Higher Education – Public vs. Private Good.....	12
1.3 Theoretical Model of a Public Good Provision.....	15
2 Objectives	18
3 Materials and Methods	19
4 Results and Discussion	21
4.1 Higher Education.....	21
4.2 Higher Education Snapshot	22
4.3 University Ranking.....	25
4.4 Regression Analysis	26
4.4.1 Regression Models 1 and 2	27
4.4.2 Regression Models 3 and 4	29
Conclusion	32
Resumé	35
Bibliography	38
Appendices	44

Introduction

Education is undoubtedly the most important form of human resource development, which conditions economic growth and contributes to reducing poverty and promoting productivity. Both developing and developed countries show a huge demand for education due to a widespread belief that education and income are highly correlated. Mutual relation has been found also between level of education and levels of national income.

Human capital formed by investments in education is the basic component of wealth and defines a developed economy. Differences in human capital across countries help to determine differences in growth rates and levels of per capita income. Human capital accumulation is one of the important engines of economic growth and impacts both individual's employment prospects and earning capacity since an additional year of education increases return, regardless of sex, by 5-10 per cent. To sustain well-being of individuals as well as nations an adequate investment in human capital is needed. Understanding the rate at which human capital is to be formed would help avoiding economic stagnations.

The objective of the thesis is to analyze higher education system in the countries of the European Union.

The first theoretical part of the thesis deals with locating and describing economic and welfare effects of education as well as determining the public vs. private good character of higher education.

Second part of the work focuses on providing data to compare attitudes of selected EU member countries toward higher education and identifying the gaps in their systems by confronting them to their American counterparts.

To furnish an empirical proof of welfare effects education has on its receivers, magnitude of the relationship between expenditures on higher education institutions and both average salaries of university graduates and GDP per capita of the European countries respectively by means of data extracted from statistical databases is being tested.

1 Literature Review

1.1 Education and its Economic Effects

Education is undoubtedly the most important form of human resource development (Perkins, 2001) and generally refers to “the process of receiving or giving systematic instruction, especially at a school or university”. (Oxford Dictionaries, 2010) It is one of the factors that condition development and economic growth, (Neira et al., 2009) and nowadays represents a large item of public expenditure of most countries. (OECD, 2010) Economists claim that education “plays a key role in reducing poverty levels, fomenting productivity and, by extension, encouraging the development of emerging economies”. (Neira et al., 2009)

Both developing and developed countries show a huge demand for education, particularly for schooling, due to a widespread perception that education and income are highly correlated. (Perkins, 2001) “The earnings of more educated people“, said Becker (1993), “are almost always well above average, although the gains are generally larger in less-developed countries”. Similarly Vila (2000) acknowledged that, “other things being equal, better educated people generally have better jobs and higher incomes than those with less schooling”. Furthermore, many economists state that an improved distribution of schooling goes hand-in-hand with a more-equal distribution of income. (Perkins, 2001)

The strong correlation, has been found also between education and national income levels, (Perkins, 2001) “Countries with high levels of education tend to become wealthier, so there is more money to spend on further expanding education. “ (Keeley, 2007) Mass education in the poorer countries, however, is a significantly much more recent phenomenon. (Perkins, 2001)

Perkins (2001) identified three principal types of learning:

- **Formal education** – takes place at schools; its participants have not begun their working lives yet
- **Nonformal education** – narrowly focused and concerned with applied knowledge; takes place outside schools and involves adults belonging to labour force

- **Informal education** – takes place outside schools or any other organized program; e.g. home, job, community

1.1.1 Human Capital

Labour, land and physical capital were three factors of production traditionally identified by economists. (OECD, 2001) The importance of human capital to economic well-being was not fully understood for long. Human capital used to be de-emphasized at the expense of physical capital.

Theories dominating the first half of the twentieth century stressed the accumulation of physical capital as the key engine and investment in physical capital came to be widely accepted as the theory of economic growth. (Savvides & Stengos, 2009) Theorists' attitude changed during the 1960s when increasing attention was paid to the quality of labour, predominantly the level of education and training. (OECD, 2001) Interest in human capital contribution to both a person's standard of living and aggregate economic growth began to surface. (Savvides & Stengos, 2009)

Researchers admitted that economic growth can not be attributed exclusively to growth in the factors of production since there is always an unexplained residual left. Yet, improvement in the quality of human resources, by education of either children or adults, constitutes one important explanation for this residual. Such an improvement leads workers to a higher productivity. (Perkins, 2001)

Schultz (1960), as one of the first, proposed to treat education as an investment in man and its consequences as a form of capital. "Since education becomes a part of the person receiving it, I shall refer to it as *human capital*," he wrote. Reasoning behind Schultz's treatment of education was his conviction that some substantial increases in national income were caused by additions to the stock of this form of capital. (Schultz, 1960) Later on, human capital developed into a separate line of research and became an important tool in the study of economic growth. (NEIRA et al., 2009)

Recent literature began redefining the link between schooling and human capital. Economists found that human capital is an exponential function of the years of schooling, which means that there is a log-linear correspondence between them. (Cohen and Soto, 2007)

Keeley (2007) defined human capital as “the knowledge, skills, competencies and attributes that allow people to contribute to their personal and social well-being, as well as that of their countries”. “In its simplest form”, said Piazza-Georgi (2002), “human capital is the stock of personal skills that economic agents have at their disposal, in addition to physical capital”. Additionally, OECD’s (2001) definition states that human capital is “the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being”. Human capital grows through learning, use and experience, but also tends to decline with age and depreciate through lack of use.

Piazza-Georgi (2002) distinguished between three categories of human capital:

- **Human skills**
- **Entrepreneurship**
- **The stock of knowledge**

Human capital, as claimed by Agee and Crocker (1998), is the basic component of wealth and defines a developed economy. Ranjan (2001) believed that differences in human capital across countries help to determine differences in growth rates and levels of per capita income. Growth may be discouraged by human capital inequality. “In a cross section of countries over the period 1960-2000, findings reveal that, all other things being equal, a greater degree of human capital inequality increases fertility rates and reduces life expectancy, which in turn hampers the accumulation rates of human capital. This effect is reinforced in the countries where individuals find it difficult to access credit.” (Castelló-Climent, 2010)

It is widely recognized now that human capital accumulation truly is one of the important engines of economic growth (Yakita, 2010) and determines both individual’s earning capacity and employment prospects. (OECD, 2002) Human capital accumulated by expenditure on education promotes physical capital accumulation, which in turn raises the wage rate and thus educational expenditure. (Yakita, 2010)

The amount of human capital an individual acquires is dependent on the talent an individual is born with. (Ranjan, 2001) The larger the size of human capital stock, the higher the rate of return. Understanding the rate at which human capital must be

formed would help policymakers in avoiding economic stagnation. (Agree and Crocker, 1998)

1.1.2 Investment in Human Capital

A country's standard of living is nowadays determined primarily by the country's ability to utilize the skills, knowledge and health of its people effectively. "These skills, knowledge and health are necessarily developed through investment in people." (Becker, 2002) To sustain well-being an adequate investment in human capital is needed. (OECD, 2001) Yakita (2010) adds that there exists so-called "threshold wage rate, above which individuals begin to invest in the human capital of their children, while reducing the number of children". At this point, the economy switches from an exogenous path brought on by physical capital accumulation to an endogenous growth phase happening due to human capital investment.

Riddell (2005) defined three key elements of human capital theory. Firstly, he stated that this theory is a theory of investment decisions for "individuals incur costs at the present time in return for benefits in the future". Secondly, "because the benefits accrue in the future there will be uncertainty about the extent to which the investments will pay off," therefore investments into human capital are generally risky. And thirdly, "a major component of the costs of acquiring human capital is typically the opportunity cost – the income foregone by not working".

"The theory of human capital asserts that human beings invest in themselves, by means of education, training, or other activities." (Becker, Paulsen qt. from Richards, 2007) According to Becker (1993), "education and training are the most important investments in human capital". Similarly Savvides & Stengos (2009) admitted that "education is the main form in which human beings invest in human capital".

According to Perkins (2001), the core of the human capital theory is the assumption that the main reason why individuals or governments spend money on education, health etc. is to raise their future income and productivity. "People with better education tend to enjoy higher incomes," said Keeley (2007). Similarly Riddell (2005) stated that "investments are made in human resources in order to improve productivity, and therefore employment prospects and earnings". Therefore the additional future output and income are seen as returns on this kind of investment.

(Perkins, 2001) Mincer (1993) admitted that an additional year of education increases return, regardless of sex, by 5-10 per cent.

Estimating the rate of return to investments in education is one of the main concerns of the theory of human capital. This is performed via comparing the immediate costs related to schooling with the subsequent benefits. (Bloom, Hartley and Rosovsky, 2006) The private costs of schooling are both explicit and implicit. “Explicit costs involve actual outlays of cash,” e.g. tuition fees, books, transportation, whereas implicit costs constitute students’ forgone earnings, and increase along with the age of the student and level of schooling. (Perkins, 2001)

The *private rate of return* reflects explicit as well as implicit costs to individuals and the increases in earnings attributable to having received education. “By contrast, the *social rate of return* compares the full cost to society of more schooling, including public subsidies, with the benefits to the entire society of having a better educated populace.” (Bloom, Hartley and Rosovsky, 2006)

1.2 Higher Education – Public vs. Private Good

In the economy exist distinct kinds of goods that can be usefully grouped into categories according to two qualities – *excludability* and *rivalry in consumption*. Excludability refers to “the property of a good whereby a person can be prevented from using it”. This implies that a good is excludable when there is a possibility to prevent people from using the good. If there exists no such a possibility then the good is referred to as non-excludable.

Rivalry in consumption can be thought of as “the property of a good whereby one person’s use diminishes other people’s use”. Simply said, a good is rival in consumption if “one person’s use of the good reduces another person’s ability to use it”. In case this condition is not fulfilled the good is referred to as non-rival in consumption. (Mankiw, 2011)

Having examined these characteristics goods can be further divided into four categories – *private goods*, *public goods*, *common resources* and *natural monopolies*.

		Rival in consumption?	
		Yes	No
Excludable?	Yes	Private Goods <ul style="list-style-type: none"> • Ice-cream cones • Clothing • Congested toll roads 	Club Goods <ul style="list-style-type: none"> • Fire protection • Cable TV • Uncongested toll roads
	No	Common Resources <ul style="list-style-type: none"> • Fish in the ocean • The environment • Congested nontoll roads 	Public Goods <ul style="list-style-type: none"> • Tornado siren • National defense • Uncongested nontoll roads

Fig 1

Four types of goods

Source: *Mankiw, 2011*

Firstly, **private goods** are “goods that are both excludable and rival in consumption”. A good example of a good which is private is an ice-cream cone “because it is possible to prevent someone from eating” and at the same time “if one person eats an ice-cream cone, another person cannot eat the same cone”. Private goods are the most common goods in the economy which means “you don’t get one unless you pay, and once you have it, you are the only person who benefits”.

Secondly, **public goods** can be defined as “goods that are neither excludable nor rival in consumption”. We can thus deduce that “people cannot be prevented from using a public good, and one person’s use of a public good does not reduce another person’s ability to use it”. An example of a public good is a small town siren. In case of danger, “once the siren sounds, it is impossible to prevent any single person from hearing it... Moreover, when one person gets the benefit of the warning, she does not reduce the benefit to anyone else”.

Thirdly, “**common resources** are rival in consumption but not excludable”. For instance, fish in the ocean can be thought of as a common resource for as soon as fish

are caught by one person, fewer fish left for another person to catch. This means they are rival in consumption and at the same time “these fish are not an excludable good because, given the vast size of an ocean, it is difficult to stop fishermen from taking fish out of it”.

And fourthly, “**club goods** are excludable but not rival in consumption”. They are a type of natural monopoly. (Mankiw, 2011)

Cemell (n.d.) admitted that definitions of higher education are very hard to come by but generally it can be said that higher education fulfils a non-separable bundle of four major functions:

- Research function - development of new knowledge
- Teaching function - training of highly qualified personnel
- Provision of services to society
- Ethical function, which implies social criticism

Higher education is conventionally considered to be a public good which benefits both the individuals and the society as a whole due to a wide set of social benefits and mostly positive externalities higher education produces. (Tilak, 2009) “Some argue that higher education is itself a public good that can only be provided by the state.” So any decline of the state support for higher education injures the public interest. (Dill, 2005) Despite of this fact, higher education, as claimed by Tilak (2009), has been exercising shortage of public funds in the recent period of time. Lack of funds, neo-liberal economic policies and globalization, international law on trade in services fostered by WTO and GATS – these all challenge view of many that higher education is a public good and propose trade in it instead. “The very shift in perception of the nature of higher education from a public good to a private good – a commodity that can be traded – will have serious implications,” he said.

As for the criticism, there are economists who do not approve thinking of education as a public good. Some believe that “education is naturally a club good, a good that is non-rivalrous in consumption but excludable because its benefits can be confined to individuals”. (Marginson, 2007)

Others are convinced that higher education satisfies neither non-rivalrousness nor non-excludability feature. “Entry into education institutions, it is argued, can be restricted to some, and others can be excluded; and since the places of admission are generally given, admission to or consumption by some necessarily means reduction in the consumption levels of others.” (Tilak, 2009)

Yet, Stiglitz (1999) opposed by claiming that “there is zero marginal cost from an additional individual enjoying the benefits of knowledge”. He added also that the “costs associated with transmission of knowledge do not in any way affect the public good nature of knowledge itself”. This nature of knowledge, however, gives rise to a potential market failure recognized by adoption of institutional arrangements such as patent laws etc. (Riddell, 2005)

According to Tilak (2009), “education, specifically higher education, satisfies all the three essential features of public goods,” namely non-excludability, non-rivalry and production of externalities. Moreover, other features, like ‘free-rider’, associated with public goods are equally applicable to education. Similarly Cemmell (n.d.) admitted that “higher education has a significant amount of public good character” and therefore “it is possible to treat it as a public good”.

After all, Marginson (2007) concluded that “education is potentially rivalrous or non-rivalrous, and potentially excludable or non-excludable”. That is, the final character of education depends on the policy chosen.

1.3 Theoretical Model of a Public Good Provision

Idea dominating all of economics is that “self-interested behavior in the marketplace leads to the best products being produced and sold at the lowest possible prices and that this is socially optimal”. However, problems emerge in the case of public goods. (Batina and Ihori, 2005) Provision of public goods is one of the most prominent examples of a market failure. “The conflict of interest between the socially desirable and individually optimal contribution to the public good commonly prevents the implementation of Pareto optimal solutions.” (Gerber and Wichardt, 2008)

Public goods constitute an extreme form of externalities and can be found in various classes, such as *pure public goods*, *impure/crowdable public goods*, *local public goods* and so forth. (Jha, 2009) The most important examples of public goods include

national defense or basic research. (Mankiw, 2007) Public goods give rise to two major questions – how much of a public good to provide and how to finance it. (Batina and Ihuri, 2005)

Generally there exist some problems which are common to all types of public goods, whereas others are associated with particular types only. So-called *'free-rider'* problem emerges due to non-conflicting consumption of public goods which encourages people to understate their true demand for the public good in order to avoid paying for it. Such an action results in a shortage of funds to cover costs to supplier leading further to a drastic underproduction. Nevertheless, revealing true preference for public goods is a problem, since every consumer wants to have a free ride. (Jha, 2009)

The private sector is not able to provide public goods in efficient quantities “since it is difficult to charge those who benefit from the good and to exclude non-payers from enjoying the good once it has been provided”. (Batina and Ihuri, 2005) So either paying for it or (preferably) not, users receive benefits of the good. (Leach, 2004)

There exists, however, a potential remedy to the problem. “If the government decides that the total benefits of a public good exceed its costs,” said Mankiw (2007), “it can provide the public good, pay for it with tax revenue, and make everyone better off”. Similarly Cemmell (n.d.) stated that as “there is no way to guard against the free rider problem,” an important role in providing public goods is played by governments or non-profit organisations. He identified also another rationale behind government-provided public good - the even demand for a public good by all members of society.

Sechrest (2003) claimed that “the core assertion of public goods theory is that some goods or services provide such significant positive externalities that every citizen should be taxed to pay for them. But the magnitude of such externalities may be impossible to prove”.

The way in which governments divide up budget and allocate tax revenues between a public good and transfers is dependent upon governmental systems. According to Deacon (2009), “dictatorial governments are found to provide public schooling, roads, safe water, public sanitation, and pollution control at levels far below democracies”.

In the case of private goods, consumers decide on the quantity consumed according to the given market price, whereas public good consumers “adjust their

willingness-to-pay for the public good given the quantity supplied”. The Samuelson’s rule, which governs the efficient public good provision, therefore states that “at the first-best social optimum the public good should be supplied so that the sum of the willingness-to-pay for those who benefit from the good is equal to the marginal production cost”. (Batina and Ihuri, 2005)

There are two problems connected to implementation of the Samuelson’s rule in a competitive economy. Firstly, determining the willingness-to-pay, which is very difficult due to the consumers’ tendency not to reveal it; and secondly, a method of financing. “Under Lindahl’s financing mechanism each individual who benefits pays a share of the marginal production cost based on his or her willingness-to-pay for the public good, where the sum of the shares is equal to one by design.” Another method of financing is through using person-specific lump sum taxes. These financing methods are, unfortunately, usually unavailable. (Batina and Ihuri, 2005)

In the second-best case, Pigou considered taxes as the means to finance public spending. “He argued that the social marginal cost of public good is greater if distorting taxes are used because of the ‘indirect damage’, or deadweight loss, caused by such taxes. Furthermore, if the deadweight loss did raise the social cost of providing the public good, he argued it is optimal to produce less of the public good as a result.” (Batina and Ihuri, 2005)

2 Objectives

The aim of the submitted bachelor thesis is to analyze higher education system in the countries of the European Union. In pursuit of attainment of the principal goal of the thesis a few steps had to be taken:

- To locate and describe economic effects of education and determine the public vs. private good character of higher education using the relevant world literature
- To provide a comparison of data on higher education systems and policies implemented within the European Union in order to compare performance of individual member countries selected for the research as well as confront it with the USA system
- To furnish an empirical proof of welfare effects aroused by education via testing the relationship between expenditures on higher education institutions and both average salaries of university graduates and GDP per capita of the European countries respectively by means of data extracted from statistical databases
- To identify gaps and indicate future research and policy recommendations concerning a quality improvement in the tertiary education system of the European Union countries

3 Materials and Methods

On the grounds of a reputable scientific literature and scholarly articles we have processed information and knowledge covering these particular areas – economic effects of education, human capital and investment in human capital; education as a public vs. private good; and a theoretical model of a public good provision.

To study empirically the effect of investments in higher education on salaries of university graduates and GDP per capita of the EU member states chosen, we have opted to employ regression analysis and constructed four simple linear regression models with a view to demonstrate the interdependence of the entering variables, estimate the magnitude of the relationship and interpret the generated outcomes.

Countries included in the models have been selected purposefully to provide us with as large a sample as possible, while those lacking the accurate figures have been omitted. The models thus involve twenty-one states each. A complete list is presented in the table 1.

The data intended for statistical treatment, ranging in years from 2005 to 2007 (in the models 1 and 2) and from 2001 to 2007 (in the models 3 and 4), have been collected by the author of the thesis and obtained from Eurostat - the European Union statistical office with a seat in Luxembourg - whose databases are fully accessible online.

Other data incorporated into the practical part of the thesis in a form of tables, figures and charts have been collected by the author and taken from recognized economic literature, own calculations and the official websites of one of the three most influential and widely observed international university ranking *ARWU – Academic Ranking of World Universities*.

Tab 1

List of the EU countries involved in the regression models

Model 1 and 2	Model 3 and 4
Belgium	Belgium
Czech Republic	Bulgaria
Denmark	Czech Republic
Germany	Denmark
Estonia	Germany
Ireland	Ireland
Spain	Spain
France	France
Italy	Italy
Cyprus	Cyprus
Latvia	Latvia
Lithuania	Lithuania
Netherlands	Netherlands
Austria	Austria
Poland	Poland
Portugal	Portugal
Slovenia	Slovenia
Slovakia	Slovakia
Finland	Finland
Sweden	Sweden
United Kingdom	United Kingdom

Source: Own creation

4 Results and Discussion

4.1 Higher Education

National defense is one of handful goods that may be referred to as a pure public good. It fulfils both non-excludability and non-rivalry. Lighthouses, on the other hand, constitute an example of impure public goods – it is rather difficult to exclude somebody from consumption but not impossible.

There exist, however, a number of goods that posses these characteristics to a certain extent only. Excluding free-riders is possible but may not be desirable for one or other reason.

In the chapter 1.2 we have already given some indication that higher education can not be viewed as a pure public good. According to Stiglitz (1997), marginal costs related to education of an additional person are not equal to zero but the average costs instead. Moreover, no problems to pay for this service tend to occur.

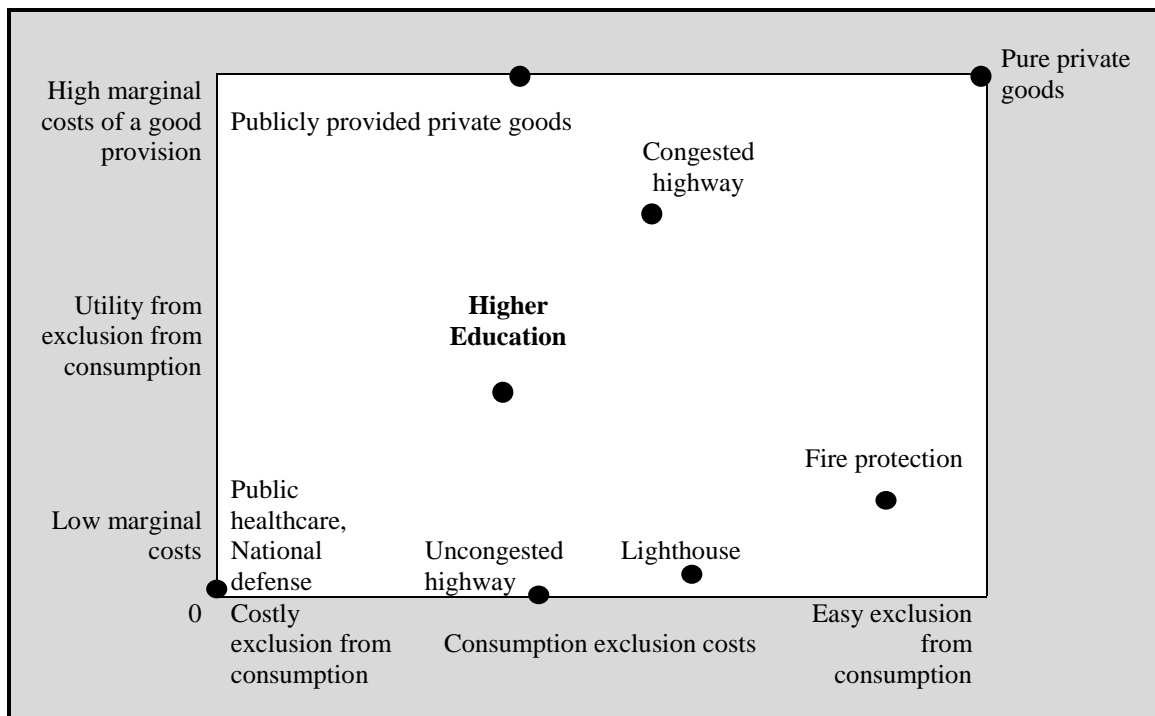


Fig 2

Pure and mixed public goods

Source: Adapted from *Stiglitz, 1997* (own translation)

Figure 2 depicts the ease to exclude non-payers from consumption on the horizontal axis and marginal costs associated with an increase in the number of consumers on the vertical axis. If we are to plot higher education into this chart presented by Stiglitz (1997), it will acquire position as shown above.

Since higher education is not a pure public good in its nature both private and public resources are needed to fund the investments in education.

4.2 Higher Education Snapshot

An increase in students' awareness of economic and social benefits stemming from tertiary education is accompanied by an increase in rates of entry into this type of education. The highest university participation rates, as shown in Figure 3, are in Germany, United Kingdom, France, Poland, Italy, Spain and Romania in this particular order.

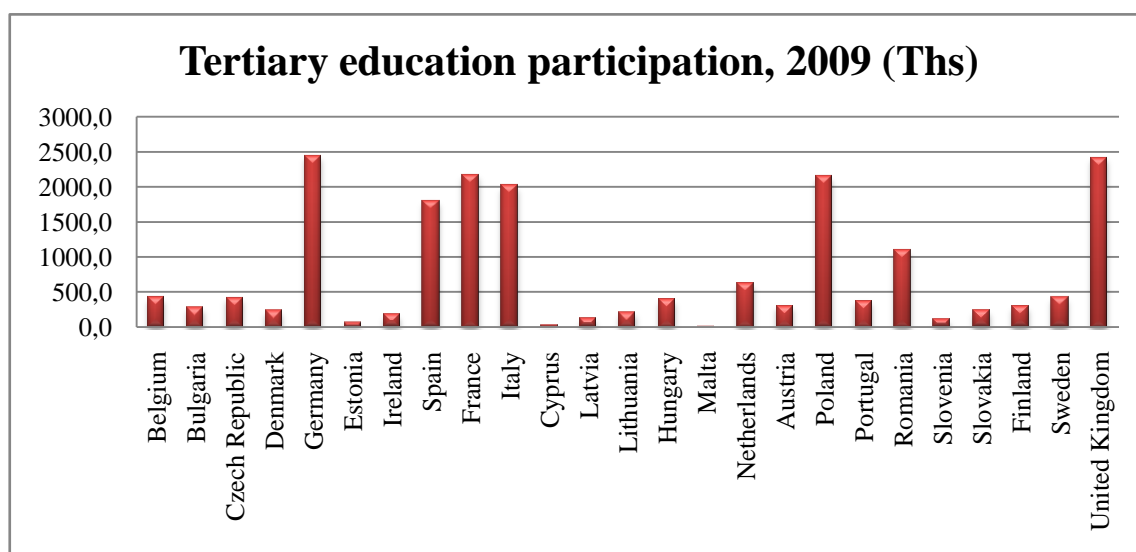


Fig 3

Trends in the number of students, at tertiary level of education, 2009, (Thousands)

Source: Own creation based on *Eurostat, 2011*

The top investors in higher education per student are Sweden, Denmark, Netherlands, United Kingdom, Finland, Belgium, Germany and Austria (See Figure 5).

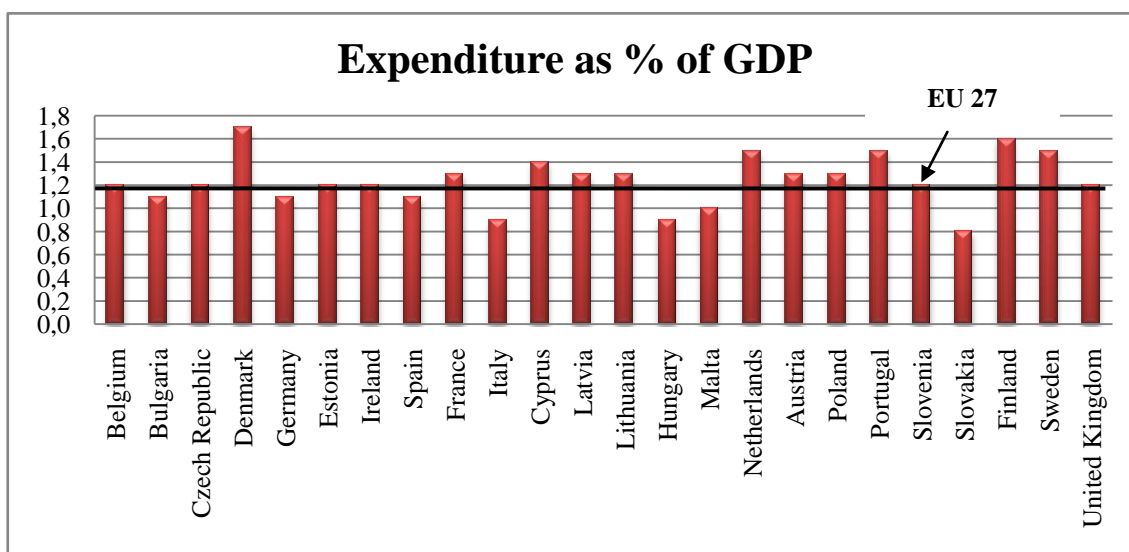


Fig 4

Expenditure on public and private educational institutions as percentage of GDP, at tertiary level of education, 2007

Source: Own creation based on *Eurostat, 2011*

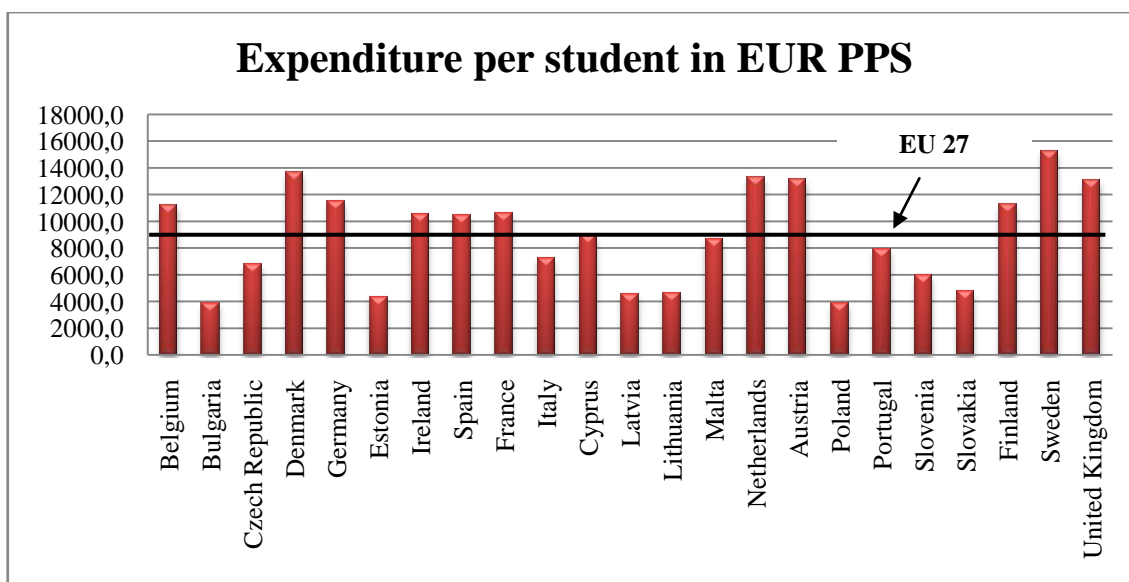


Fig 5

Expenditure on public and private educational institutions per student in EUR PPS, at tertiary level of education, in EUR PPS, 2007

Source: Own creation based on *Eurostat, 2011*

Although the financial means are undoubtedly very important, no further development and increase in the quality of universities and the majors provided is possible without a comprehensive reform of the higher education system.

Nowadays, most of universities produce graduates from majors which are actually not sought by the firms and thus not valued and demanded by the labour market. In fact, the higher education system and policy in many European countries are being designed such a way which creates discrepancies and subsequent mismatch between labour market requirements and the specialization of the labour force.

Maintaining this kind of system to govern the tertiary level institutions, without any further changes and adjustments, results into funding, and actually producing, not a public good but inferior one instead. “A good for which,” as stated by Mankiw (2007), “other things equal, an increase in income leads to a decrease in demand”.

Furthermore, as the new countries with lower GDP per capita become member states of the European Union, the other states’ competitiveness regarding the price of the labour declines. This fact can be listed as a reason why countries should no longer rely on the cheap labour as a main tool helping them attract foreign investors but instead should initiate an increase in productivity and qualification of the labour market participants by investment in education and human capital.

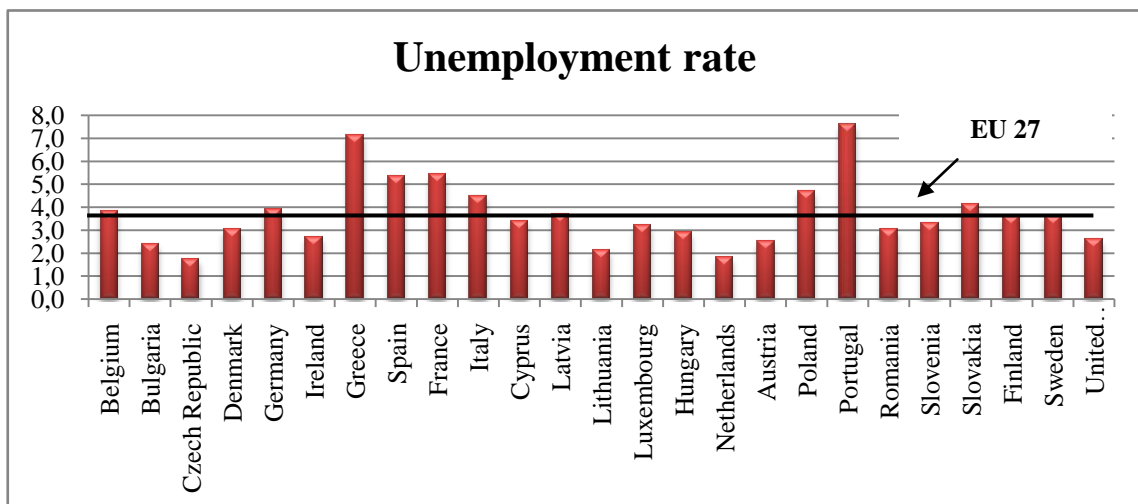


Fig 6

Unemployment rate, at tertiary level of education, 2007

Source: Own creation based on *Eurostat, 2011*

4.3 University Ranking

American universities receive large amounts of funds (private and public) which are being thoroughly invested in research carried by field specialists and academic personnel who in turn receive a valuable recognition in a form of sizeable salaries.

Doing so, the university increases its reputation and the quality of knowledge it supplies, for teachers engaged in research are more capable of embedding the skill to comprehend and solve problems in students. (Serenčėš et al., 2007)

Large investments in research are counted as one of the reasons why American universities occupy not only the highest positions in the world rankings of universities but also at a greatest frequency.

Tab 2
World's Top Universities by Region, 2010

Region	Top 20	Top 100	Top 200	Top 300	Top 400	Top 500
Americas	17	58	100	133	162	187
Europe	2	33	74	123	168	204
Asia/Pacific	1	9	26	43	68	106
Africa	-	-	-	1	2	3
Total	20	100	200	300	400	500

Source: *ARWU, 2011*

Another reason is being stuck to a renowned phrase “publish or perish” driving the academics and researchers to a high quality performance often worth Nobel Prizes and Fields Medals or becoming highly cited authors recognized worldwide. Undoubtedly, the impact factors assigned to being published in the peer review publications, e.g. *American Economic Review*, are substantial.

Yet the surveys reveal that the EU universities are, in this sense, lagging behind their American counterparts enormously. (Serenčėš et al., 2007) The EU scholars absolutely fail as soon as compared to the American ones who publish in peer reviews a hundred, in some cases even thousand times as much.

The consequences of these findings have a lot to do with all the problems emerging with the accreditation process of the universities within the European Union since a constant research and publication activity is required as a rule.

Tab 3

World's Top Universities by Country, EU member countries, 2010

Country	Top 20	Top 100	Top 200	Top 300	Top 400	Top 500
United Kingdom	2	11	19	30	35	38
Germany	-	5	14	23	33	39
France	-	3	7	13	18	22
Sweden	-	3	4	9	10	11
Netherlands	-	2	9	9	11	12
Denmark	-	2	3	3	4	4
Belgium	-	1	4	6	6	7
Finland	-	1	1	1	3	6
Italy	-	-	4	8	13	22
Austria	-	-	1	3	6	7
Spain	-	-	-	4	7	10
Ireland	-	-	-	1	2	3
Greece	-	-	-	1	2	2
Czech Republic	-	-	-	1	1	1
Hungary	-	-	-	-	2	2
Poland	-	-	-	-	2	2
Portugal	-	-	-	-	-	2
Slovenia	-	-	-	-	-	1

Source: ARWU, 2011

4.4 Regression analysis

The simple linear regression model consists of a deterministic and a random part, and is generally stated in the form

$$y = \beta_0 + \beta_1 x + \varepsilon \quad (1)$$

The typical experiment for the simple linear regression is conducted via observing the n pairs of data, so the model can be denoted, in the terms of the n pairs as

$$y_i = \beta_0 + \beta_1 x_i + \varepsilon_i \quad \text{for } i=1,2,\dots, n. \quad (2)$$

Tab. 4

Variable and parameter description of equation 1

Variable	Definition	Explanation
y	Dependent/response variable	
x	Independent/predictor/explanatory variable: explains causal changes in the response	

Parameter	Definition	Explanation
β_0	y Intercept: the value of the mean of the dependent variable when x is zero	
β_1	Slope of the simple linear regression line: the change in the mean of the dependent variable associated with a unit change in x	A negative β_1 indicates that the variables y and x are negatively correlated
ε	Random error: explains the variability of the responses about the mean	

Source: *Freund, Wilson & Sa, 2006; Yan & Su, 2009*

To study the relationship between expenditures invested in higher education and average incomes of the university graduates in the first case and gross domestic product per capita in the second case we utilize *simple linear regression* to discuss relationship between one dependent variable (y) and one independent variable (x).

4.4.1 Regression Models 1 and 2

Annual expenditure on public and private educational institutions per student in EUR PPS (purchasing power standard), at tertiary level of education enters the regression as the independent variable (x), whereas Mean net income of tertiary level education graduates aged 18-64y, in EUR PPS acts as the dependent variable (y).

Yet the regression model 2 is a double logarithmic model, that is, the natural logarithms, the logarithms to the base of an irrational constant e equal to 2,718; of the initial variables specified above serve as the input data.

Tab 5
Results from Regression models 1 and 2

Parameters	Summary Output Reg. 1	Summary Output Reg. 2
Multiple R	0,7460	0,8278
R Square	0,5565	0,6852
Observations	63	63
Significance F	2,27999E-12***	5,92496E-17***
Intercept	6489,1499	2,5128
P-value	0,0017	0,0001
X Variable 1	1,5069***	0,8114***
P-value	2,28E-12	5,92E-17

Source: Own creation based on own calculations (See Annex A and B)

The *Correlation coefficient*, measuring the strength and direction of a linear relationship between two variables (Jaisingh, 2005), indicates that the relationship between average salaries of university graduates (y) and expenditures on higher education per student (x) is moderately high positive in the first model, and strong positive in the second double logarithmic model.

The *Coefficient of determination*, that measures the proportion of the variability in the dependent variable that is explained by the regression model through the independent variable (Jaisingh, 2005), suggests that the first regression model explains approximately 56 % of variability in the average salaries of university graduates (y) through the expenditures on higher education per student (x), while the second double logarithmic model explains circa 69 % of it.

On the grounds of the regression coefficients β_1 , both highly statistically significant, obtained from the models we can draw a conclusion as follows:

- If expenditures on education institutions per student at tertiary level increase by one monetary unit, which is the Euro in our case, the average salaries of university graduates increase by 1,51 Euros
- 1 % increase in expenditures on education institutions per student at tertiary level will result in 0,81 % increase in the average salaries of higher education graduates

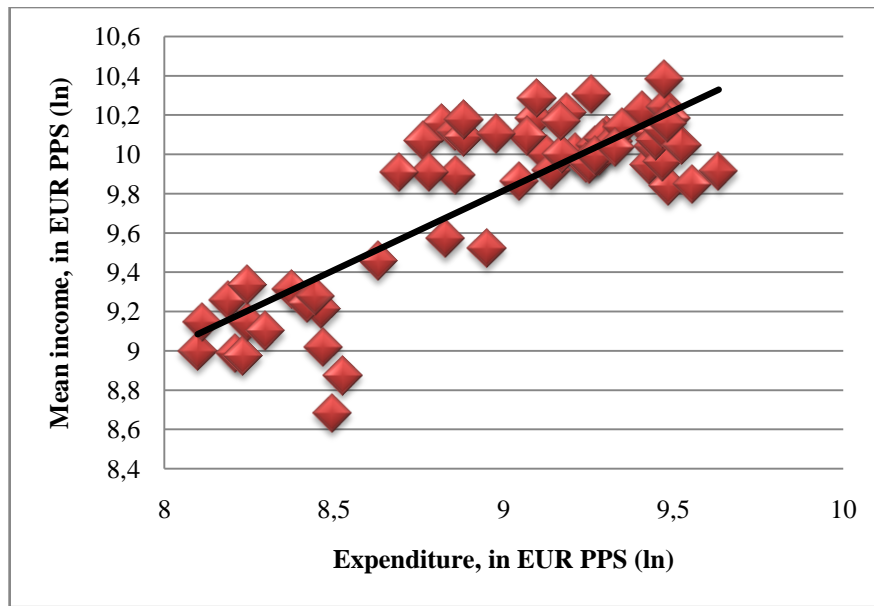


Fig 7

Interdependence between Mean net income of tertiary level education graduates, in EUR PPS (y) and Expenditure on public and private educational institutions per student in EUR PPS (x)

Source: Own creation based on own calculations

4.4.2 Regression models 3 and 4

Annual expenditure on public and private educational institutions per student in EUR PPS (purchasing power standard), at tertiary level of education enters the regression as the independent variable (x), whereas Nominal gross domestic product per capita in EUR PPS acts as the dependent variable (y).

In the regression model 4, natural logarithms of the initial variables specified above serve as the input data.

The *Correlation coefficient* indicates that there is a strong positive relationship between Nominal gross domestic product per capita (y) and expenditures on higher education per student (x) in both regression models, namely model 3 and 4.

The *Coefficient of determination* implies that the regression model 3 explains approximately 81 % of variability in Nominal gross domestic product per capita (y)

through the expenditures on higher education per student (x), while the double logarithmic model, model 4, explains around 86 % of it. (See Table 6)

Tab 6
Results from Regression Models 3 and 4

Parameters	Summary Output Reg. 3	Summary Output Reg. 4
Multiple R	0,8977	0,9265
R Square	0,8058	0,8584
Observations	147	147
F Significance	1,79E-53***	1,98E-63***
Intercept	5256,363	2,5150
P-value	4,17E-12	1,61E-18
X Variable 1	1,9362***	0,8267***
P-value	1,79E-53	1,98E-63

Source: Own creation based on own calculations (See Annex C and D)

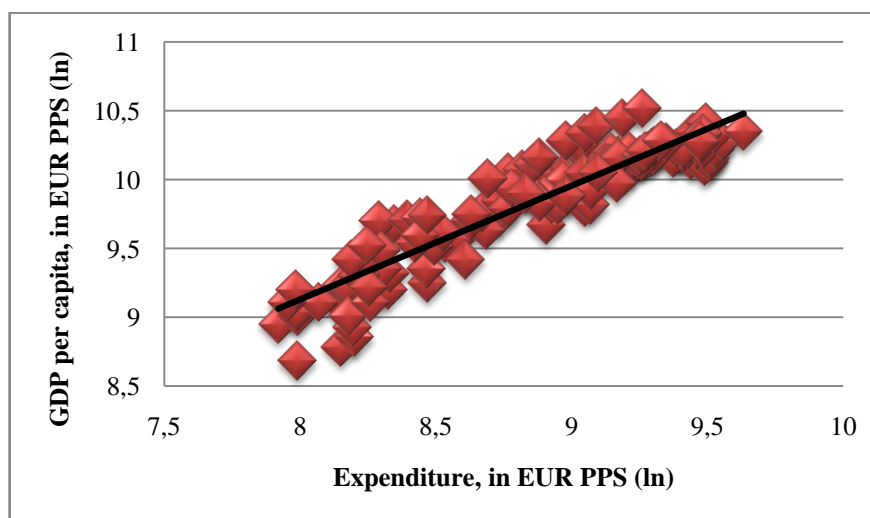


Fig 8

Interdependence between Nominal gross domestic product per capita in EUR PPS (y) and Expenditure on public and private educational institutions per student in EUR PPS (x)

Source: Own creation based on own calculations

As for the regression coefficients β_1 , which are both highly statistically significant, an interpretation can be formulated as follows:

- If expenditures on education institutions per student at tertiary level increase by one monetary unit, Euro in this case, the EU member country's GDP per capita increases by 1,9362 Euros
- 1 % increase in expenditures on education institutions per student at tertiary level will result in 0,8267 % increase the EU member country's GDP per capita when purchasing power standard taken into account

Conclusion

Education is one of the factors that condition development and economic growth, and nowadays represents a large item of public expenditure in most countries. It is widely-observed that education contributes to reducing poverty levels, fomenting productivity and encouraging the development of emerging economies. Both earning capacity and employment prospects of better educated people are almost always well above the average, i.e. education and income are highly correlated. Furthermore, countries with high levels of education tend to become wealthier.

Regression analysis of the impact the EU countries' investments in tertiary education have on personal welfare of the university alumni and welfare of the whole nation revealed that 1 % increase in expenditures on education institutions per student at tertiary level will result in 0,81 % increase in average salaries of higher education graduates, and 0,83 % increase in the EU member country's GDP per capita when purchasing power standard taken into account.

Higher education is conventionally considered to be a public good benefiting not only an individual receiving it but also society as a whole due to a number of positive externalities it produces. Some economists, however, oppose when claiming that education is an excludable club good or even a rival private good. In fact, character of higher education depends on the policy chosen. Yet its attributes suggest we are not dealing with a pure public good but a privately offered public good instead. Accordingly the issue of funding such a good should be solved, so that public and private entities as well as funds should be involved.

Increasing students' awareness of benefits tertiary education confers is accompanied by increasing university entry rates in both the European Union and the rest of the world. Average income of university alumni in the EU member states exceeds income of those with primary and secondary education by 80 % and 40 % respectively. Within the EU, the greatest figures in university participation are being reported by educational institutions in countries such as Germany, United Kingdom, France, Poland, Italy and Spain. Countries like Sweden, spending almost 16 000 EUR PPS per student annually; Denmark, Netherlands, United Kingdom, Belgium, Finland, Austria and Germany dominate the list of top investors in higher education institutions.

Financial resources are undoubtedly crucial but do not constitute any guarantee of a high quality education provided. No improvement in this sense is going to happen without a higher education system reform.

Majority of study programs offered by universities do not create any additional value to the firms standing on the demand side of the labour market. In fact, many students graduate from the fields, which are actually not sought by the potential employers. Unemployment rates of university graduates within the EU reach values of more than 7 % in Portugal and Greece. A few other countries such as Spain, France, Italy, Poland or Slovakia also report above average (4 %) values.

The way the EU countries' system of education is designed creates discrepancies and subsequent mismatch between labour market requirements and qualification as well as specialization of the labour force available. Maintaining so ineffective a system governing the tertiary level educational institutions without any remedies may have deleterious consequences - tax revenues used to finance production of an inferior good instead of a public one.

As the European Union enlarges and the new states with lower living standards join it the other EU countries start losing their competitiveness in labour price in favour of the freshmen. This can be listed as a reason why countries should no longer rely on the cheap labour as a mode to attract foreign investors but turn their mind instead to increasing both productivity and specialization of the labour market participants via investments in education and human capital.

American universities, on the other hand, receive huge public as well as private funds which are thoroughly invested in research carried by fairly rewarded specialists and academic personnel. Universities thus increase their reputation as well as quality of knowledge they supply, for teachers engaged in research are more able to transmit the skill to comprehend and solve problems. Large expenditure on research results in an international scale success of American universities to occupy prominent positions in world university rankings. Seventeen out of top twenty world universities are American. American universities' share in top 100 is almost 60 %, while EU universities' share is not even 30 %.

Another factor taken into account when ranking the higher education institutions is the number of research papers published by the university alumni and professors in the peer review publications. Whether a research paper gets published in, let us say,

American Economic Review depends actually on its quality which is subject to the funds invested. This is why EU universities are lagging behind their American counterparts whose academics publish in internationally renowned journals a hundred, in some cases even thousand times as much. Therefore it is no wonder that the EU universities encounter problems regarding the accreditation process where a constant research and publication activity is required as a rule.

Resumé

Vzdelanie je jedným z faktorov podmieňujúcich rozvoj a hospodársky rast a v súčasnosti predstavuje značnú položku vo verejných výdavkoch mnohých krajín. Je všeobecne známe, že vzdelanie prispieva k zmierneniu úrovne chudoby, podnecovaniu produktivity a podpore rozvoja rýchlo rastúcich ekonomík. Zárobková schopnosť i vyhliadky do zamestnania vyššie vzdelaných ľudí sú takmer vždy vysoko nadpriemerné, t.j. vzdelanie a príjem sú navzájom vysoko korelačné. Navyše krajiny s vyššou úrovňou vzdelania majú tendenciu byť bohatšie.

Regresná analýza dopadu investícií krajín EU do vysokoškolského vzdelania na osobné blaho absolventov univerzít a blahobytu celého národa odhalila, že 1 % nárast výdavkov na vzdelávacie inštitúcie tretieho stupňa v prepočte na študenta vedie k 0,81 % nárastu priemerných miezd vysokoškolských absolventov a k 0,83 % zvýšeniu HDP na občana členskej krajiny EU, pri štandarde nákupnej sily.

Vysokoškolské vzdelanie je tradične považované za verejný statok prinášajúci osob nielen jedincovi, ktorému sa ho dostáva, ale aj celej spoločnosti, vzhľadom na množstvo pozitívnych externalít, ktoré produkuje. Niektorí ekonómovia však oponujú tvrdením, že vzdelanie je vylúčiteľný klubový statok, či dokonca konkurenčný súkromný statok. Charakter vysokoškolského vzdelania v skutočnosti závisí od politiky, ktorú zvolíme. Jeho atribúty však naznačujú, že nejde o čisto verejný, ale skôr súkromne ponúkaný verejný statok. Na základe toho by mala byť riešená aj otázka jeho financovania, ktoré by malo byť ako z verejných tak aj súkromných fondov.

Rastúce povedomie študentov o výhodách, ktoré vysokoškolské vzdelanie so sebou prináša je sprevádzané rastúcim záujmom práve o tento typ vzdelávania, či už v Európskej únii alebo inde vo svete. Priemerný príjem vysokoškolských absolventov v členských krajinách EU presahuje príjem ľudí s ukončeným základným vzdelaním o 80 % a stredoškolským vzdelaním o 40 %. V rámci Európskej únie sú najvyššie čísla týkajúce sa návštevnosti univerzít zaznamenané vzdelávacími inštitúciami v krajinách ako Nemecko, Veľká Británia, Francúzsko, Poľsko, Taliansko a Španielsko. Krajiny ako Švédsko, ktoré ročne minie takmer 16 000 EUR PPS na študenta, Dánsko, Holandsko, Veľká Británia, Belgicko, Fínsko, Rakúsko a Nemecko dominujú v zozname top investorov do vysokoškolských inštitúcií.

Finančné zdroje sú nepochybne rozhodujúce, no nepredstavujú žiadnu záruku vysokej kvality poskytovaného vzdelania. Žiadne zlepšenie, v tomto zmysle, sa nedá očakávať bez reformy vysokoškolského systému.

Väčšina študijných programov ponúkaná univerzitami nevytvára žiadnu pridanú hodnotu firmám stojacim na trhu práce na strane dopytu. Pravdou je, že mnoho študentov absolvuje odbory, ktoré vlastne nie sú vyhľadávané potenciálnymi zamestnávateľmi. Miera nezamestnanosti vysokoškolských absolventov v rámci EU dosahuje v Portugalsku a Grécku výšku viac než 7 %. Niekoľko ďalších krajín ako Španielsko, Francúzsko, Taliansko, Poľsko, či Slovensko taktiež zaznamenáva nadpriemerné, viac ako 4 %, hodnoty.

Spôsob akým je systém vzdelávania krajín EU navrhnutý, vytvára nezrovnalosti a následný nesúlad medzi požiadavkami trhu práce a kvalifikáciou ako aj špecializáciou dostupnej pracovnej sily. Udržiavanie takto neefektívneho systému riadiaceho vysokoškolské vzdelávacie inštitúcie bez akejkoľvek nápravy, môže mať zhubné následky – používanie daňových príjmov na financovanie produkcie nie verejného, ale podradného statku.

Zväčšovaním Európskej únie, ktoré je spôsobené vstupom nových štátov s nižšou životnou úrovňou, začínajú ostatné krajiny EU strácať svoju konkurencieschopnosť ohľadom ceny práce v prospech nových členov. Tento fakt môže byť považovaný za dôvod, prečo by sa krajiny už dlhšie nemali spoliehať na lacnú prácu ako spôsob prilákania zahraničných investorov. Radšej by sa mali sústrediť na zvyšovanie produktivity a špecializácie účastníkov trhu práce prostredníctvom investícií do vzdelania a ľudského kapitálu.

Americké univerzity dostávajú obrovské verejné ako aj súkromné fondy, ktoré sú starostlivo investované do výskumu riadeného korektne odmenenými špecialistami a univerzitnými zamestnancami. Univerzity tak zlepšujú svoju povesť ako aj kvalitu poskytovaných vedomostí, pretože učitelia zapojení do výskumu sú viac spôsobilí predávať schopnosť pochopiť a riešiť problémy. Značné výdaje na výskum ústia v úspech Amerických univerzít v zastávaní popredných pozícií v hodnoteniach svetových univerzít. Až sedemnást' z top dvadsiatich svetových univerzít je práve Amerických. Podiel Amerických univerzít v top stovke je takmer 60 %, zatiaľ čo podiel EU univerzít nie je ani 30 %.

Ďalším faktorom braným do úvahy v hodnoteniach vysokoškolských inštitúcií je počet publikácií v karentovaných časopisoch vypracovaných absolventmi univerzity a vyučujúcimi. Či však bude výskumná správa publikovaná v povedzme *American Economic Review* záleží na jej kvalite, ktorá je podmienená investovanými fondmi. Toto je práve dôvod prečo EU univerzity zaostávajú za Americkými, ktorých akademici publikujú v medzinárodne známych časopisoch sto, v niektorých prípadoch dokonca aj tisíckrát viac. Niet divu, že EU univerzity narážajú na problémy viažuce sa na akreditačný proces, kde sa vyžaduje nepretržitá výskumná a publikačná činnosť.

Bibliography

AGEE, Mark D. – CROCKER, Thomas D. 1998. Economies, Human Capital, and Natural Assets. In *Environmental and Resource Economics* [online], Vol. 11, 1998, No. 3-4, p. 261-271 [Accessed: 2011-04-07]. Available at: <<http://www.springerlink.com/content/x616107t4k2866nj/fulltext.pdf>>.

ARWU. 2011. *Statistics* [online]. Shanghai, CN: Academic Ranking of World Universities. [Accessed: 2010-11-13]. Available at: <<http://www.arwu.org/ARWUStatistics2010.jsp>>.

BATINA, Raymond G. – IHORI, Toshihiro. 2005. *Public goods: theories and evidence* [online]. Berlin, DE: Springer, 2005 [Accessed: 2011-04-28]. p. 421. Available at: <http://books.google.com/books?id=yT7x7jxNjC&printsec=frontcover&dq=public+goods&hl=en&ei=O7a6TZbTDIvQsgaa5NSIBg&sa=X&oi=book_result&ct=result&resnum=1&ved=0CCkQ6AEwAA#v=onepage&q&f=false>. ISBN 9783540241744.

BECKER, Gary Stanley. 1993. *Human Capital: A theoretical and Empirical Analysis, with Special Reference to Education* [E-book]. 3rd ed. Chicago, IL: University of Chicago Press, 1993. 413 p. ISBN: 9780226041223

BECKER, Gary Stanley. 2002. Human Capital. In *Revista de Ciencias Empresariales y Economía* [online], Vol. 1, 2002, p. 12-23 [Accessed: 2011-02-07]. Available at: <<http://www.um.edu.uy/docs/revistafcee/2002/humancapitalBecker.pdf>>. ISSN 1510-7159.

BLOOM, David E. – HARTLEY, Matthew – ROSOVSKY, Henry. 2006. Beyond Private Gain: The Public Benefits of Higher Education. In *International handbook of higher education* [online]. Vol. 1. Dordrecht, NL:Springer, 2006 [Accessed: 2011-04-27]. p. 293-308. Available at: <http://books.google.com/books?id=u3rtCh-EUIIC&pg=PA293&lpg=PA293&dq=Beyond+Private+Gain:+The+Public+Benefits+of+Higher+Education&source=bl&ots=lQL1UgVayA&sig=rMnrxqmdKbc43FZxeg1b3azRXhg&hl=en&ei=yxy4TYiHLofQsgad3q3sAw&sa=X&oi=book_result&ct=result&resnum=2&ved=0CCEQ6AEwAQ#v=onepage&q=Beyond%20Private%20Gain%3A%20The%20Public%20Benefits%20of%20Higher%20Education&f=false>. ISBN 9781402040115.

CASTELLÓ-CLIMENT, Amparo. 2010. Channels through Which Human Capital Inequality Influences Economic Growth. In *Journal of Human Capital* [online], Vol. 4,

(December 2010), No. 4, p. 394-450 [Accessed: 2011-04-04]. Available at: <<http://www.jstor.org/stable/10.1086/659338>>.

CEMMELL, James. 2011. *Public vs. Private Higher Education: Public Good, Equity, Access* [online]. Riga: Academic Information Centre. [Accessed: 2011-02-02]. Available at: <<http://www.aic.lv/bolona/Bologna/contrib/ESIB/PublicvsSaargh.pdf>>.

COHEN, Daniel – SOTO, Marcelo. 2007. Growth and human capital: good data, good results. In *Journal of Economic Growth* [online], Vol. 12, 2007, No. 1, p. 51-76 [Accessed: 2011-04-07]. Available at: <<http://www.springerlink.com/content/75037u718u4w6t31/fulltext.pdf>>.

DEACON, Robert T. 2009. Public Good Provision under Dictatorship and Democracy. In *Public Choice* [online], Vol. 139, (Apr 2009), No. 1/2, p. 241-262 [Accessed: 2011-04-24]. Available at: <<http://www.jstor.org/stable/40270756>>.

DILL, David D. 2005. *The Public Good, the Public Interest and Public Higher Education* [online]. Chapel Hill, NC: The University of North Carolina. [Accessed: 2011-02-02]. p. 11. Available at: <<http://www.unc.edu/ppaq/docs/PublicvsPrivate.pdf>>.

Eurostat. 2011. *Statistics by theme* [online]. Luxembourg: European Commission. [Accessed: 2011-05-04]. Available at: <<http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes>>.

FREUND, Rudolf Jakob – WILSON, William J. – SA, Ping. 2006. *Regression analysis: statistical modeling of a response variable* [online]. 2nd ed. Burlington, MA: Academic Press, 2006 [Accessed: 2011-05-07]. p. 459. Available at: <http://books.google.com/books?id=Us4YE8IJVYMC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false>. ISBN 978-0-12-088597-8.

GERBER, Anke – WICHARDT, Philipp C. 2008. *Providing Public Goods in the Absence of Strong Institutions* [online]. p. 14 [Accessed: 2011-04-28]. Available at: <www.iew.uzh.ch/wp/iewwp303.pdf>. ISSN 1424-0459.

JAISINGH, Lloyd R. 2005. *Statistics for the Utterly Confused* [E-book] 2nd ed. Blacklick, OH, USA: McGraw-Hill Professional Publishing, 2005. p. 440. ISBN 9780071483384.

JHA, RAGHBENDRA. 2009. *Modern public economics* [online]. 2nd ed. Taylor & Francis e-Library [Accessed: 2011-04-27] p. 623. Available at: <<http://books.google.com/books?id=IbCRveLKwZIC&printsec=frontcover&dq=public+economics&hl=en&>

i=4Li5TYGUDITesgbcuPzqAw&sa=X&oi=book_result&ct=result&resnum=4&ved=0CEAQ6AEwAw#v=onepage&q&f=false>. ISBN 978-0-203-87004-4.

KEELEY, Brian. 2007. *Human Capital: How what you know shapes your life* [online]. Paris: OECD Publishing, 2007 [Accessed: 2011-04-23]. p. 150. Available at: <<http://browse.oecdbookshop.org/oecd/pdfs/browseit/0107101e.pdf>>. ISBN 9789264029088.

LEACH, John. 2004. *A course in public economics* [online]. New York, NY: Cambridge University Press, 2004 [Accessed: 2011-02-04]. p. 413. Available at: <http://books.google.com/books?id=gEI-pIkI4a8C&printsec=frontcover&dq=Course+in+Public+Economics&hl=en&src=bmrr&ei=2TS1Tb2dHsbusgak6KX5Cw&sa=X&oi=book_result&ct=result&resnum=1&ved=0CD0Q6AEwAA#v=onepage&q&f=false>. ISBN 9780521535670.

MANKIWI, N. Gregory. 2007. *Principles of Microeconomics* [E-book]. 5th ed. Mason, OH: South-Western Cengage Learning, 2007. p. 545. ISBN 978-0-324-58998-6.

MANKIWI, N. Gregory. 2011. *Principles of Economics* [online]. 6th ed. Mason, OH: South-Western Cengage Learning, 2011. p. 856 [Accessed: 2011-01-12]. Available at: <http://books.google.com/books?id=nZE_wPg4Wi0C&pg=PA223&dq=providing+public+goods&hl=en&ei=7J25TZ34B8fQsgbbwvTqAw&sa=X&oi=book_result&ct=book-thumbnail&resnum=8&ved=0CE8Q6wEwBw#v=onepage&q=providing%20public%20goods&f=false>. ISBN 9780538453059.

MARGINSON, Simon. 2007. The public/private divide in higher education: A global revision. In *Higher Education* [online], Vol. 53, 2007, No. 3, p. 307-333 [Accessed: 2011-04-26]. Available at: <<http://www.ses.unam.mx/curso2008/pdf/Marginson2007.pdf>>.

NEIRA, Isabel – Vazquez, Emilia – Portela, Marta. (2009). An Empirical Analysis of Social Capital and Economic Growth in Europe (1980-2000). In *Social Indicators Research* [online], Vol. 92, 2009, No. 1, p. 111-129 [Accessed: 2011-04-07]. Available at: <<http://www.springerlink.com/content/97285w817n02j816/fulltext.pdf>>.

OECD. 2001. *The Well-being of Nations: The role of human and social capital* [online]. Paris: OECD Publishing, 2001 [Accessed: 2011-04-09]. p. 120. Available at: <<http://www.oecd.org/dataoecd/36/40/33703702.pdf>>. ISBN 9789264185890.

OECD. 2002. *Investment in Human Capital through Post-compulsory Education and Training* [online]. Paris: OECD Publishing, 2002 [Accessed: 2011-04-03]. p. 25. Available at: <<http://www.oecd.org/dataoecd/3/50/2727144.pdf>>.

OECD. 2010. *Education at a Glance 2010: OECD Indicators* [online]. Paris: OECD Publishing, 2010 [Accessed: 2010-09-29]. p. 472. Available at: <<http://www.oecd.org/dataoecd/45/39/45926093.pdf>>. ISBN 978-92-64-07566-5.

Oxford Dictionaries. *Education*. 2010 [online] Oxford, UK: Oxford University Press. [Accessed: 2011-01-19]. Available at: <http://www.oxforddictionaries.com/view/entry/m_en_gb0256500#m_en_gb0256500>.

PERKINS, Dwight H. et al. 2001. Education. In *Economics of Development*. 5th ed. New York, NY: W. W. Norton & Company, 2001. p. 319-344. ISBN 0-393-97517-7.

PIAZZA-GEORGI, Barbara. 2002. The role of human and social capital in growth: extending our understanding. In *Cambridge Journal of Economics* [online], Vol. 26, Jul2002, No. 4, p. 461 [Accessed: 2011-04-11]. Available at: <http://econrsa.org/home/index.php?searchword=The+role+of+human+ca&ordering=newest&searchphrase=all&option=com_search#content>. ISSN 0309-166X.

RANJAN, Priya. 2001. Dynamic evolution of income distribution and credit-constrained human capital investment in open economies. In *Journal of International Economics* [online], Vol. 55, Dec2001, No. 2, p. 329-358 [Accessed: 2011-04-11]. Available at: <http://www.sciencedirect.com/science?_ob=MIimg&_imagekey=B6V6D-43K9SPK-5-G5&_cdi=5812&_user=3838281&_pii=S0022199601001039&_origin=gateway&_coverDate=12%2F31%2F2001&_sk=999449997&view=c&wchp=dGLzVlb-zSkWb&md5=9d17bc6b2e733c024d88a4831bc72b27&ie=/sdarticle.pdf>. ISSN 0022-1996.

RICHARDS, Pamela B. 2007. *Global issues in higher education* [online]. New York: Nova Publishers, 2007 [Accessed: 2011-04-14]. p. 409. Available at: <http://books.google.com/books?id=oNVYAKexcu0C&pg=PA40&dq=the+economics+of+human+capital+and+investment+in+higher+education&hl=en&ei=tQKnTaCuN8qKswb1orGeCA&sa=X&oi=book_result&ct=result&resnum=5&ved=0CEcQ6AEwBA#v=onepage&q&f=false>. ISBN 9781600218026.

RIDDELL, W. Craig. 2005. *The Impact of Education on Economic and Social Outcomes: An Overview of Recent Advances in Economics* [online]. Vancouver, BC,

Canada: The University of British Columbia [Accessed: 2011-04-27]. Available at: <<http://faculty.arts.ubc.ca/criddell/cprn.pdf>>.

SAVVIDES, Andreas - STENGOS, Thanasis. 2009. *Human Capital and Economic Growth* [E-book]. Palo Alto, CA: Stanford University Press, 2008. p. 256. ISBN 9780804769761.

SECHREST, Larry J. 2003. *Private Provision of Public Goods: Theoretical Issues and Some Examples from Maritime History* [online]. p. 55 [Accessed: 2011-04-28]. Available at: <<http://mises.org/journals/scholar/Sechrest7.pdf>>.

SERENČEŠ, Roman et al. 2007. *Ekonomické vzdelávanie na stredných školách a univerzitách Slovenskej republiky*. Nitra, SR: SUA in Nitra, 2007. ISBN 978-80-8069-966-6.

SCHULTZ, Theodore W. 1960. Capital Formation by Education. In *Journal of Political Economy* [online], Vol. 68, Dec1960, No. 6, p. 571-583 [Accessed: 2011-04-01]. Available at: <<http://www.jstor.org/stable/1829945>>.

STIGLITZ, Joseph E. 1997. *Ekonomie veřejného sektoru*. Praha: Grada Publishing, 1997. p. 664. ISBN 80-7169-454-1.

STIGLITZ, Joseph E. 1999. Knowledge as a Global Public Good. In *Global Public Goods: International Cooperation in the 21st century* [online]. New York, NY: Oxford University Press, 1999 [Accessed: 2011-04-25]. p. 308-326. Available at: <<http://www.undp.org/globalpublicgoods/TheBook/globalpublicgoods.pdf#page=346>>. ISBN 0-19-513052-9.

TILAK, J. B. G. 2009. Higher education: a public good or commodity for trade? In *Prospects* [online], Vol. 38, 2009, No. 4, p. 449-466 [Accessed: 2011-04-26]. Available at: <http://www.friends-partners.org/utsumi/Global_University/Global%20University%20System/List%20Distributions/2005/MTI1721_12-15-05/Barcelona%20II%20Nobel%20Meeting%20--%20Higher%20Education%20as%20a%20Public%20Good.pdf>.

VILA, Luis E. 2000. The Non-monetary Benefits of Education. In *European Journal of Education* [online], Vol. 35, 2000, No.1. [Accessed: 2011-04-27]. Available at: <<http://dealio.mybrowserbar.com/cgi/errors.cgi?q=http://www.jstor.org/pss/1503615&type=dns&ISN=9F740C1069174ABE8F07D0AF5EF6CA4F&ccv=133&cnid=867034&cco=US&ct=3&sc=403>>.

YAKITA, Akira. 2010. Human capital accumulation, fertility and economic development. In *Journal of Economics* [online], Vol. 99, 2010, No. 2, p. 97-116 [Accessed: 2011-04-10]. Available at: <<http://www.springerlink.com/content/k850114253847x37/fulltext.pdf>>.

YAN, Xin – SU, Xiao Gang. 2009. *Linear regression analysis: theory and computing* [online]. SG: World Scientific, 2009 [Accessed: 2011-05-07]. p. 328. Available at: <http://books.google.com/books?id=MjNv6rGv8NIC&printsec=frontcover&dq=linear+regression&hl=en&ei=6irFTYqNKYqCOr2YkKMI&sa=X&oi=book_result&ct=book-thumbnail&resnum=3&ved=0CD0Q6wEwAg#v=onepage&q&f=false>. ISBN 978-981-283-410-2.

Appendices

Appendix A SUMMARY OUTPUT MODEL 1

<i>Regression Statistics</i>	
Multiple R	0,746028041
R Square	0,556557838
Adjusted R Square	0,549288294
Standard Error	4622,018595
Observations	63

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	1635560193	1,64E+09	76,56022	2,27999E-12
Residual	61	1303146410	21363056		
Total	62	2938706603			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95,0%</i>	<i>Upper 95,0%</i>
Intercept	6489,149933	1619,960119	4,005747	0,00017	3249,839503	9728,46036	3249,839503	9728,460364
X Variable 1	1,506957903	0,172226328	8,74987	2,28E-12	1,162570079	1,85134573	1,162570079	1,851345728

Appendix B SUMMARY OUTPUT MODEL 2

<i>Regression Statistics</i>	
Multiple R	0,827822908
R Square	0,685290768
Adjusted R Square	0,6801316
Standard Error	0,24686305
Observations	63

<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	8,09482404	8,094824	132,8297	5,92496E-17
Residual	61	3,717423288	0,060941		
Total	62	11,81224733			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95,0%</i>	<i>Upper 95,0%</i>
Intercept	2,51282922	0,633814063	3,964616	0,000196	1,245439684	3,78021876	1,245439684	3,780218757
X Variable 1	0,811442681	0,070406091	11,52518	5,92E-17	0,670657003	0,95222836	0,670657003	0,952228359

Appendix C SUMMARY OUTPUT MODEL 3

<i>Regression Statistics</i>	
Multiple R	0,897708
R Square	0,80588
Adjusted R Square	0,804541
Standard Error	3178,44
Observations	147

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	6,08E+09	6,08E+09	601,9595	1,79E-53
Residual	145	1,46E+09	10102482		
Total	146	7,55E+09			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95,0%</i>	<i>Upper 95,0%</i>
Intercept	5256,363	695,1198	7,561809	4,17E-12	3882,487	6630,24	3882,487	6630,24
X Variable 1	1,936285	0,07892	24,53486	1,79E-53	1,780303	2,092266	1,780303	2,092266

Appendix D SUMMARY OUTPUT MODEL 4

<i>Regression Statistics</i>	
Multiple R	0,926518
R Square	0,858436
Adjusted R Square	0,85746
Standard Error	0,156527
Observations	147

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	21,54279	21,54279	879,2726	1,98E-63
Residual	145	3,552601	0,024501		
Total	146	25,09539			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95,0%</i>	<i>Upper 95,0%</i>
Intercept	2,515002	0,248728	10,11144	1,61E-18	2,023401	3,006604	2,023401	3,006604
X Variable 1	0,826737	0,027881	29,65253	1,98E-63	0,771631	0,881842	0,771631	0,881842