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HIGHER EDUCATION'S CONTRIBUTION TO ECONOMIC PERFORMANCE AND INNOVATIVENESS IN LATVIA: EXPLORATORY RESEARCH

ABSTRACT: *A detailed investigation of higher education's contribution to economic performance and innovativeness inLatvia is necessary because of contradictory facts in the socio-economic reality of Latvian higher education. Despite the fact that investment in theLatvian higher education system results in high participation, the economic and innovation returns, i.e., the profitability of the resulting highly educated labour force, are low. The analysis of the literature has shown that there are other factors that determine highereducation'scontr ibutiontoeconomicperformanceandinnov ativenessand enable highly skilled specialists to potentially turn their knowledge into innovation and national income; e.g., the quality of higher education and the level of technological development in business. We conducted an empirical analysis of a set of indicators that are potentially significant to economic performance and innovativeness, and concluded that, first, higher education's contribution to economic performance and innovativeness differs depending on the stage of the country's economic development; and second, that a country's ability to attract and retain talented people becomes more significant at each stage of economic development. In Latvia both theability to attract and retain talented people and the level of technological development are poorly developed,which results in low economic and innovative returnsfroma relatively large number of highly skilled specialists.*

KEY WORDS: *higher education, tertiary education, country's economic performance, country's innovativeness, stages of economic development.*

JEL CLASSIFICATION: I25, O31, O50.

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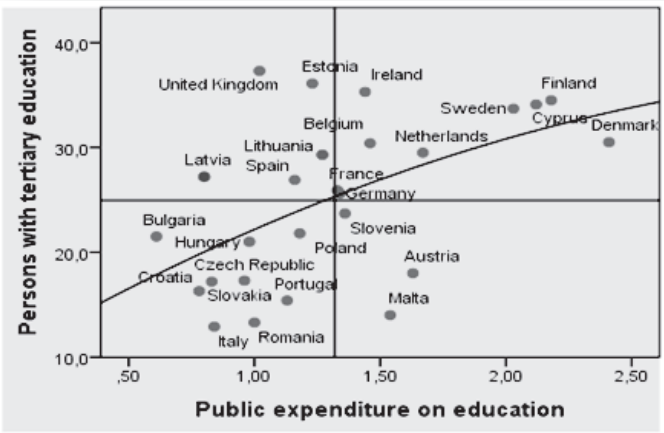
1. INTRODUCTION

That education is economic development's most important resource is generally accepted and no longer leads to much debate.In his1991 study,Dynamic Forces of Capitalist Development, Angus Maddison (1991) found that the higher the proportion of educated people among the population the higher the economic growth rate. A 1% increase in allocation for education leads to a 0.35% increase in the country's gross domestic product.In 2003 the UNESCO Institute for Statistics released a report on investment in education and its economic effects(UNESCO-UIS / OECD, 2003) that considered the returns of a wide range of investments in education. In 2004 the Organization for Economic Cooperation and Development (2004) concluded that if the average length of study increases by a year, Gross domestic product increases by 3%–6%.

The present exploratory investigation was prompted by an in-depth statistical analysis of Eurostat data, correlatingindicators on education, economic performance, and innovativeness in the EU countries,carried out by ourselves. The direct correlation of public expenditure on education ("Total public expenditure on education as % of GDP, at tertiary level of education (ISCED 5-6)") and persons with tertiary education ("Population with tertiary education attainment, percentages of population of 25 years or over"),(r=0.519, p=0.007; see Figure 1) was found to be logically understandable.

Figure 1. Correlation between public expenditure on education (2010) and number of persons with tertiary education (2012), Pearson correlation, n = 28 countries

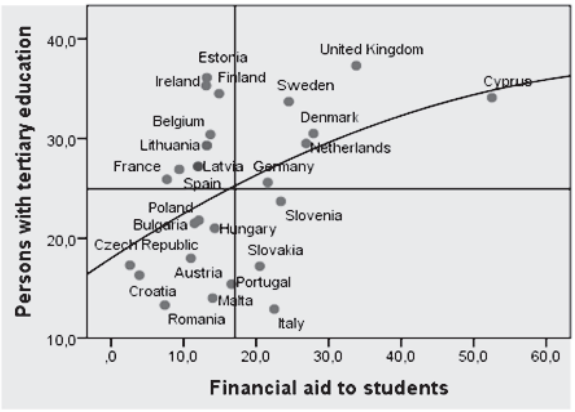


Source: Elaborated by the authors using Eurostat data, 2014a, 2014b.

The data in Figure 1 show that some EU countries are placed above the correlation line, meaning that the return from public expenditure on tertiary education is above average. In the countries below the correlation line the return from public expenditure on education is below average. Latvia, along with its Baltic neighbours Lithuania and Estonia, is in the square where the return from public expenditure on education is particularly high, i.e., where even comparatively little public investment in tertiary education results in a relatively high growth of persons with tertiary education.

The next figure presents a logical and understandable direct correlation (r=0.534, p=0.004) of financial aid to students ("Financial aid to students as % of total expenditure on education, at tertiary level of education (ISCED 5-6)") and persons with tertiary education.

Figure 2. Correlation between financial aid to students (2010) and number of persons with tertiary education (2012), Pearson correlation, n = 28 countries



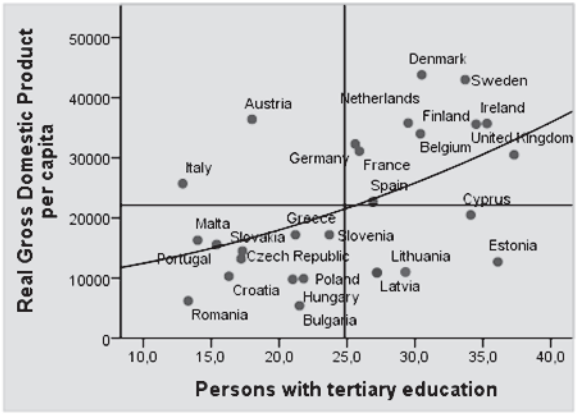
Source: Elaborated by the authors using Eurostat data, 2014b, Eurostat, 2014c.

Figure 2 shows that the Baltic countries (Latvia, Lithuania, and Estonia) are again in the square where a relatively small increase in financial aid to students leads to a relatively substantial increase in the number of persons with tertiary education.

Thus, the statistics persistently show that expenditure on tertiary education in Latvia and its neighbouring Baltic countries has a high return in the number of skilled specialists with tertiary education who then enter the labour market with a capacity for high productivity and innovativeness.

However, an illogical correlation was found in Latvia and other Baltic countries between the number of persons with tertiary education and real Gross Domestic Product (GDP) ("Real GDP per capita, EUR per inhabitant") (see Figure 3).

Figure 3. Correlation between number of persons with tertiary education (2012) and real GDP per capita (2012), Pearson correlation, n = 28 countries

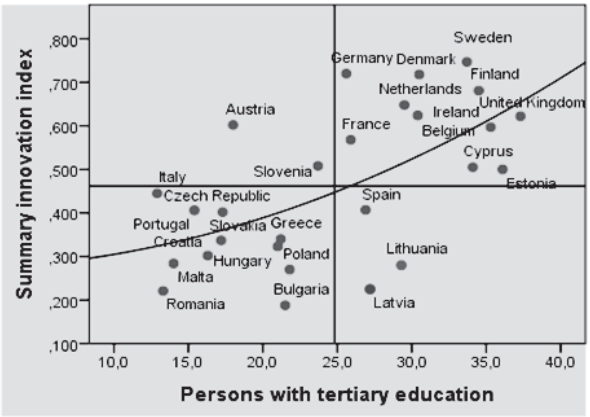


Source: Elaborated by the authors using Eurostatdata, 2014b, Eurostat, 2014d.

With a general statistically significant direct correlation between the number of persons with tertiary education (2012) and real GDP per capita (r=0.623, p=0.001), Latvia and its Baltic neighbours, which havea highly efficient financial investment in tertiary education, end up in the square where a relatively large number of persons with tertiary education results in the lowest growth in real GDP. Thus, the 'return' on financial investment in tertiary education materializes only in the number of specialists with higher education, whose entry into the labour market does not help the economy and makes a minimal contribution to the Baltic countries' economic growth.

In order to verify the persistence of this phenomenon in the Baltic countries, we studied the correlation between the Summary Innovation Index and the number of persons with higher education (Figure 4).

Figure 4. Correlation between the Summary Innovation Index (2012) and number of persons with higher education (2012), Pearson correlation, n = 28 countries



Source: Elaborated by the authors using Eurostatdata, 2014b, European Commission, 2014.

Figure 4 shows a statistically significant direct correlation between Summary Innovation Index and number of persons with tertiary education (r=0.613, p=0.001).The Baltic countries (especially Latvia and Lithuania) once again are found in the square where the investment of the number of persons with higher education in the innovativeness of the country is minimal.

The results of this correlation analysis of statistical indicators for the EU countries show the existence of:

1) An economic problem, in that financial aid to higher education in the Baltic countries promotes the production of a highly skilled but economically and innovatively unprofitable labour force;
2) A research problem, which shows that the theoretical paradigm of the economy of knowledge concerning the significance of general knowledge and tertiary education to economic performance and innovativeness (Garmise 2006, Livingstone, Guile 2012, Stankevics 2012) is not empirically confirmed in the Baltic countries andneeds more investigation.

Hence, the aim of the present research is to explain the low returns in economic performance and innovativeness from higher education in Latvia by means of a more in-depth, theoretical, and empirical study of higher education's contribution to economic performance and innovativeness.

In our research to discover the reason for the economic problem in Latvia we use empirical data from The Global Competitiveness Report of the World Economic Forum, whichcovers Latvia andover 100 other countries and allows for a comparative analysis of the contribution of higher education to economic performance and innovativeness.

2. LITERATURE REVIEWAND FINDINGS OFPREVIOUS RESEARCHES

Several studieshave empiricallyexaminedthe mismatch of the indicators of higher education and economic performance,both in individual countries and globally. The most well-known is by Hanushek and Wobmann (2007), in which they show that economic growth is affected by the quality of education, rather than its mass character.

This study was motivated by doubts that have been raised about the role of education and human capital in economic development. These doubts come from a variety of vantage points, ranging from whether the actual research has correctly identified the impact of education, to whether other institutional aspects of countries might be more important. Hanushek and Wobmann'sanalysis produced some remarkably simple but clear conclusions:

"Educational quality – measured by what people know – has powerful effects on individual earnings, on the distribution of income, and on economic growth. The accumulated evidence from analyses of economic outcomes is that the quality of education – measured on an outcome basis of cognitive skills – has powerful effects. Much of the earlier discussion has concentrated solely on school attainment, or the quantity of schooling. This focus is unfortunate, because it distorts analysis and the policy discussions. Individual earnings are systematically related to cognitive skills. The distribution of skills in society appears closely related to the distribution of income. And, perhaps most importantly, economic growth is strongly affected by the skills of workers. Other factors obviously also enter into growth and may well have stronger effects. For example, having well-functioning economic institutions such as established property rights, open labour and product markets, and participation in international markets have clear importance for economic development and may also magnify the benefits of quality education. Nonetheless, existing evidence suggests that quality of education independently affects economic outcomes even after allowing for these other factors."(Hanushek, Wobmann 2007)

Most of the studies focus on the value of education in terms of economic returns for individuals, depending on the level of educationgained, following Mincer's innovative analyses of human capital (Mincer 1970, 1974) to consider how investment in education affects individual earnings. Over the past thirty years, literally hundreds of such studies have been conducted around the world(e.g., Psacharopoulos 1994, Card 1999, Harmon et al. 2003, Psacharopoulos,Patrinos 2004, Heckman et al. 2006). These studies have uniformly shown that more schooling is associated with higher individual earnings. The rate of return on schooling across countries is about 10%, with variations based largely on scarcity: returns appear higher for low-income countries, for lower levels of schooling, and, frequently, for women (Psacharopoulos, Patrinos 2004).

Building on statistical analysis of data in international studies, Agranovich(2010) tried to answer why, taking into account the proven effect of education on economic development, Russia is a leader in the level of education but is not an economic leader.

In Russia in 2006 43% of the people were educated according to International Standard Classification of Education (ISCED) codes 3–4 (corresponding to higher secondary education). As for secondary vocational and higher vocational education (classified by ISCED as tertiary education levels 5B and 5A, respectively), with an indicator of 47% Russia is second to Canada (48%), and well ahead of all other countries (Agranovich 2010). In higher vocational education (corresponding to tertiary education level 5A in international classification) Russia is just behind Korea, New Zealand, and Israel.

The data on the level of education in Russia cannot be evaluated unequivocally. If producing a small proportion of people with primary and secondary education is an achievement thenthe situation at the higher levels of education is not so simple.In his empirical study, Agranovich (2010)consideredthe average expected duration of educationas an indicator of thedegree of inclusion of the Russian population in education, in order to give an indirect answer to his question. At 15.8 years, Russia's indicator of the expected length of study and thus of the involvement of the population in education corresponds to its level of economic development and is close to countries such as Chile. Among less economically developed countries this level has been reached by Uruguay, and among the more economically developed by Latvia, Lithuania, and Israel.

The formally high educational levelin Russia may indicate a lower quality of education due to the average duration of study being significantly shorter than in

developed countries(Agranovich 2010). A comparison of the data on the results of students from countries with different levels of GDP per capita indicates a significant relationship between these two indicators (Agranovich 2010). It should be noted that this concurs with the conclusions ofHanushekonthe quality of education as a deciding influence on economic growth (Hanushek, Kim 1995, Hanushek et al. 1996, Hanushek, Kimko 2000, Hanushek, Zhang 2006, Hanushek et al. 2006).

Agranovich concludes that Russia (just as Latvia) contradicts current world tendencies and its exceptionally high indicators of participation in education do not result in the positive benefits ofa high level of economic development and a reduction in social and economic inequality because the study period in Russia is relatively short and the education of insufficient quality.

Vanags (2013) carried out an interesting study on the role of education in the ability of a country to 'attract brains',based on data from The Global Competitiveness Reports collected and published by the World Economic Forum

Having reviewed the data of the Global Competitiveness Report for more than 140 world countries (Schwab 2011),Vanags(2013) noticed a tendency for many countries with a comparatively well-developed secondary and higher education system but low technological development to not 'attract brains' as actively as countries witha less-developed education system but with well-developed technologies, in which businesses pay attention to research and technology development or technology absorption.

In order to illustrate how this is expressed in real life, Vanags compared the 2008 and 2011 rankings of different countries in the ratings of the Global Competitiveness Report, according to the indicators analysed in his research. The author came to the conclusion that the "brain gain" leaders are Great Britain and Norway and that these countries have the highest ratings for level of technological development compared to other world countries, inter alia Latvia;while the education system development indicators in Great Britain and Norway in total are not higher and at times even lower than in Latvia. In an interview with the Latvian business magazine "Capital",Pavluts,Latvia's Minister of Economics, expressed the opinion that "in general our labour force is highly educated, our work ethic is on a comparatively high level" (Pavļuts, Rungainis 2012). However, according to Vanags' (2013) results,"brain gain" in the global economy is enabledwhen, in parallel to an educatedworkforce, companies' level of technological growth isinsufficient.

The literature described above, including the results of comparative studies on the importance of higher education to social and economic development and the ability to "attract brains",are the basis of this present study. In previous studies it has been shown that a country's economic performance is influenced much more by the quality of higher education than by the tertiary education enrolment rate. But theability of a country to attract highly educated and talented people is influenced, first of all, by the technological level of the companies that work in that country, and not by the quantitative and qualitative indicators of the education system.

It may appear that the problem of the importance of higher education formulated in the introduction to this article has already been explained. However, returning to the statement by the Latvian economics minister on Latvia's highly skilled labour force and to indicators capturing the quality of Latvian education published in the Global Competitiveness Report 2013-2014, it is clear that this problem cannot be explained solely by the quality of education. According to World Economic Forumdata, in 2013 Latvia ranked 68thout of 148 countries for "Quality of the educational system" and 33rdfor "Quality of math and science education" (Schwab 2013). This is not as good as stated by the Latvian economics minister, butnot so bad that it does not contribute to the successful economic development of the country.

As to the significance of the "technological" factor discovered by Vanags, it should be stressed that in his research he studied the significance of the factors that determine the ability of a country to "attract brains" and not a country's economic performance. Yet the results of his research suggest that the technological factor can explain a lot even in the present study. That is why, building on the knowledge and research experience gained in this field and using the most recent empirical data and some methodological innovations, we have tried to find other factors to explain the low economic and innovative profitability of higher education in Latvia.

3. THEORETICAL AND CONCEPTUAL FRAMEWORK (METHODOLOGY) OF THE RESEARCH

To explain the prerequisites of the smallcontribution of higher education to economic performance and innovativeness in Latvia, it is crucial to start with clearly defined theoretical and methodological substantiation and empirical interpretation of the main concepts of the study. First of all, it is essential to discover what constitutes a country's economic performance and innovativeness

in contemporary reality. What do modern economics and research practices say in relation to this, and how do they interpret these concepts?

Let us start with the first one – a country's economic performance: what is it and how can it be measured? In global research practice scientists/economists often do not substantiate their choice of indicators to measure economic performance, either theoretically or methodologically. For example, Ramkissoon (2002) simply notes "I use an average GDP per capita as the main indicator of economic performance", not going into explanations as to why and on which theoretical and methodological basis he chose this indicator for the empirical interpretation of economic performance.

Nevertheless, modern economics takes GDP per capita as one of the key indicatorsof economic performance (Simpson 2014),although other indicators have been proposed, e.g.,a Genuine Progress Indicator (Hart 2014), which would include indicators of the sustainability of economic conditions(Costanza et al. 2014, Lonska 2012, 2013, Lonska, Boronenko 2013), i.e., indicators of savings, investment, and asset prices; integrated financial and real accounts that better relate asset prices to underlying income, profit, and GDP statistics; and integrated estimates of savings out of current income, capital gains, and changes in wealth (Stiglitz et al. 2014). In the present study, however, we are investigating economic performance and noteconomic development, and so use GDP per capita as an empirical indicator.

It is common to interpreta country's economic performance through the concepts of productivity, outputs, and the results of economic activity (Hanks 2009, Sala-i-Martin et al. 2013). In this respect, GDP per capita can be the most suitable methodological basis for empirical interpretation and measuring of a country's economic performance, in so far as this is the indicator that measures the nation's total output of goods and services and contains information on acountry's economic performance and its ability to release real products.

Regardless of the fact that a lot of publishedresearch has shown that education and knowledge have a positive impact on innovation (Porter 1990, McElroy 2002, Carlucci et al. 2004, Gloet, Terziovski 2004, Ling, Jaw 2006, Marques, Simon 2006, Perdomo-Ortiz et al. 2009, Quintane et al. 2011, Moustaghfir, Schiuma 2013), in many of these studies the conceptual understanding of innovativeness is unclear. For instance, the concepts of a country's innovativeness, innovative capacity, and innovation are often confused (Slavkovic, Babic 2013). In the present study the concept of a country's innovativeness is conceptually understood as the

ability of a country to produce something new: new products, new knowledge, or new processes. In this respect, a country's innovativeness is conceptually close to innovative capacity (Stern et al. 1999, 2000) and innovation performance (Hollanders, Es-Sadki 2014, Ryan 2014).

In the present research, a country's innovativeness is interpreted empirically, and is measured by the World Economic Forum's indicator. The quantitative values of this indicatorfor more than 100 countries are published annually in the Global Competitiveness Report. The "nature of competitive advantage" (Schwab 2013) is based ona question for local experts: "What is the competitive advantage of your country's companies in the international markets based upon?" with a measurement scale from 1 (low-cost labour or natural resources) to 7 (unique products and processes).

The methodological novelty of the present research is the study of higher education's contribution to economic performance and innovativeness according to the stage of economic development. In its Global Competitiveness Reports the World Economic Forum divides countries into five groups corresponding to three main and two transition stages of economic development (Schwab 2013):

- *factor-driven stage*, at which the main motive force of economic development is intensive use of production factors;
- *transition stage,* fromfactor-driven stage to efficiency-driven stage;
- *efficiency-driven stage*, at which the main motive force of economic development is productivity of resources used in the economy;
- *transition stage,* fromefficiency-driven stage to innovation-driven stage;
- *innovation-driven stage*, at which the main motive force of economic development is use of innovation.

When using the Global Competitiveness Index (GCI) todefine and measure a country's competitiveness, the World Economic Forum includes three main components or sub-indexes, which have different determining roles at each stage of economic development (Schwab 2013):

- *basic requirements sub-index:* institutions, infrastructure, macroeconomy, health, basic education;
- *efficiency enhancers sub-index:* higher education and training, market efficiency,technological readiness;
- *innovation and sophistication factor sub-index:* business specialization, innovation.

Table 1. Determining roles of main competitiveness componentsat each stage of economic development

Stage of economic development	Main competitiveness components		
	Basic requirements	**Efficiency enhancers**	**Innovation and specialization factors**
Factor-driven stage	60%	35%	5%
Transition stage	40-60%	35-50%	5-10%
Efficiency-driven stage	40%	50%	10%
Transition stage	20-40%	50%	10-30%
Innovation-driven stage	20%	50%	30%

Source: Schwab 2013.

The main methodological guide to this classification of countries is the fact that at different stages of economic development different factors act as engines of competitiveness, which is applicable to the present study. It can be assumed that the significance of higher education toacountry's economic performance and innovativeness will also vary depending on the stage of economic development. However, at certain stages of a country's economic development there are other factors that could be much more important than higher education in determining economicperformanceandinnovativeness. The next part of this paper is devoted to the empirical study of this issue, based on the data of theGlobalCompetitivenessReport and taking into account the countries' stages of economic development.

4. RESEARCH TECHNIQUE

Based onthe World Economic Forum'sstudy of global competitiveness (World Economic Forum, 2014), we estimate indicators calculated for various world countries using linear regression analysis,in an attempt to show the significance of higher education toa country's economic performance and innovativeness and to study the contribution of other potentially significant factors.

Two targets have been selected to achieve this aim:

- GDP per capita (PPP) – to measure the economic performance of a country;
- the nature of competitive advantage– to measure the innovativeness of a country.

To determine the sustainability of the results all the indicators are taken from three periods, 2005, 2009, and 2013. The selected targets were studied for each stage of the countries' economic development. The distribution of the countries according to these stages in 2005, 2009, and 2013 is shown in the following table.

Table 2. Distribution of countries according to stage of economic development, 2005, 2009, and 2013

Stage of economic development	2005 n = 116 countries	2009 n = 133 countries	2013 n = 148 countries
Factor-driven stage	Bangladesh, Benin, Cambodia, Cameroon, Chad, Ethiopia, Gambia, Ghana, India, Kenya, Kyrgyz Republic, Madagascar, Malawi, Mali, Mozambique, Nicaragua, Nigeria, Pakistan, Tanzania, Uganda, Vietnam, Zimbabwe		
	Bolivia, Guyana, Honduras, Mongolia, Phillipines, Sri Lanka, Tajikistan		
		Burkina Faso, Burundi, Cote d'Ivoire, Lesotho, Mauritania, Nepal, Senegal, Zambia	
	Armenia, Azerbaijan, Bosnia and Herzegovina, China, East Timor, Egypt, Georgia, Indonesia, Jordan, Moldova, Morocco, Paraguay, Ukraine	Timor-Leste	Guinea, Haiti, Lao PDR, Liberia, Myanmar, Rwanda, Sierra Leone, Yemen
Transition from factor-driven to efficiency-driven stage	Algeria		
	Guatemala, Kazakhstan		
		Azerbaijan, Botswana, Brunei Darussalam, Kuwait, Libya, Morocco, Saudi Arabia, Venezuela	
	Albania, Colombia, Dominican Republic, Ecuador, El Salvador, Macedonia, Namibia, Peru, Serbia, Thailand, Tunisia	Egypt, Georgia, Indonesia, Jamaica, Paraguay, Qatar, Syria	Angola, Armenia, Bhutan, Bolivia, Gabon, Honduras, Iran, Moldova, Mongolia, Philippines, Sri Lanka,

Stage of economic development	2005 n = 116 countries	2009 n = 133 countries	2013 n = 148 countries
Efficiency-driven stage	Bulgaria, Mauritius, South Africa		
	Argentina, Botswana, Brazil, Costa Rica, Malaysia, Panama		
		Albania, Bosnia and Herzegovina, China, Colombia, Dominican Republic, Ecuador, El Salvador, Jordan, Macedonia, Namibia, Peru, Serbia, Suriname, Thailand, Tunisia, Ukraine	
	Chile, Croatia, Estonia, Jamaica, **Latvia**, Lithuania, Mexico, Poland, Romania, Russian Federation, Slovak Republic, Turkey, Uruguay, Venezuela	Armenia	Cape Verde, Egypt, Georgia, Guatemala, Guyana, Indonesia, Jamaica, Montenegro, Paraguay, Romania, Swaziland, Timor-Leste
Transition from efficiency-driven to innovation-driven stage	Hungary		
	Bahrain		
		Barbados, Chile, Croatia, **Latvia**, Lithuania, Mexico, Oman, Poland, Russian Federation, Turkey, Uruguay	
	Czech Republic, Korea, Malta, Portugal, Slovenia, Taiwan, Trinidad and Tobago	Romania	Argentina, Brazil, Costa Rica, Estonia, Kazakhstan, Lebanon, Malaysia, Panama, Seychelles, Slovak Republic

Stage of economic development	2005 n = 116 countries	2009 n = 133 countries	2013 n = 148 countries
Innovation-driven stage	Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Singapore, Spain, Sweden, Switzerland, United Arab Emirates, United Kingdom, USA		
		Czech Republic, Korea, Malta, Portugal, Puerto Rico, Slovenia, Taiwan, Trinidad and Tobago	
	Kuwait, Qatar	Estonia, Slovak Republic	Bahrain, Qatar

Note: in 2013 some of the countries, for instance, Haiti and Germany, lack at least one of the studied indicators and are not included in the further empirical analysis, so there is the possibility of a slight difference in the number of countries in this and some following tables presenting the results of the empirical analysis.

Source: Lopez-Claros 2005, Schwab 2009, 2013.

As shown in Table 2, the majority of countries at the lowest and highest stages of development remained at that stage during the whole period of the research study. In the transitional stages the countries were actively moving, mainly towards the stages of higher development. For instance, in 2005 Latvia was at the efficiency-driven stage, but in the later studied periods (2009 and 2013) it moved to a higher stage of development (transition from efficiency-driven stage to innovation-driven stage). The same happened to Lithuania, while in 2009 Estonia reached an innovation-driven stage but then moved one stage downwards. From these movements it can be suggested that the different stages were determined by different driversof economic performance and innovativeness: for instance, in 2005 Latvia, at the efficiency-driven stage, had other significant determinants of its economic performance and innovativeness than in 2009 and 2013 when the country moved to a higher stage of development.

To test this assumption we used linear regression analysis with stepwise method of variables' inclusion. The dependent variables are'GDP per capita (PPP)' and'Nature of competitive advantage', but the independent variables are the following (Schwab 2013):

- ***Tertiary education enrolment rate*** (for 2005, 2009, 2013);
- ***Quality of the educational system*** (for 2005, 2009, 2013);

- Technological readiness (for 2005);
- Firm-level technology absorption (for 2005, 2009, 2013);
- Availability of latest technologies (for 2009, 2013);
- Brain drain (for 2005, 2009);
- Country'sability to retain talent (for 2013);
- Country's ability to attract talent (for 2013).

The first two variables, denoted in bold italics, directly characterize the country's education system in general and the higher education system in particular. The later indicators characterize a country's level of technological development and its ability to attract and retain talent. The results of the empirical analysis are shown and analysed in the next part of the paper.

5. RESULTS AND DISCUSSION

The first results of the regression analysis for 2005 are shown in Table 3 in accordance with the stage of economic development. To achieve more valid statistical results the five stages of economic development were grouped inthree sets: the first group coincides with the factor-driven stage, the second group contains transition from efficiency-driven to innovation-driven stages, and the third group contains transition to innovation-driven stage and the innovation-driven stage itself.

Table 3. Results of regression analysis:statistically significant determinants* of economic performancemeasured by GDP per capita (PPP, in USD), 2005, n = 116 countries

Stage of economic development	**Linear regression**	**Statistically significant determinants of the country's economic performance**
Factor-driven stage (n = 41 countries)	$y=-273+812*x_1+\boldsymbol{53*x_2}$	Technological readiness (x_1, p=0.007) ***Tertiary education enrolment rate*** (x_2, p=0.000)

Efficiency-driven stage and transition to it (n = 37 countries)	y=-2838+***1416*x*$_1$***+1289*x_2+***60*x*$_3$***	***Quality of the educational system*** (x_1, p=0.010) Technological readiness (x_2, p=0.013) ***Tertiary education enrolment rate*** (x_3, p=0.008)
Innovation-driven stage and transition to it (n = 38 countries)	y=7308+4363*x_1	Brain drain (x_1, p=0.018)

* Within the five potential searched determinants:
- ***Tertiary education enrolment rate***
- ***Quality of the educational system***
- Technological readiness
- Firm-level technology absorption
- Brain drain

Source: Elaborated by the authors based on the data of Lopez-Claros 2005.

As testified by the data presented in Table 3, in 2005 economic performance was indeed determined by different factors at different stages ofeconomic development. But if tertiary education enrolment rate (in line with technological readiness, and not separately) produced a statistically significant influence on a country's economic performance during the first two stages of economic development, then during the third innovation-driven stage (and during transition to it) another factor moved to the foreground – brain drain, which shows whether talented and well-educated people stay in the country or leave it. In 2005 this was the only factor that was significant to a country's economic performance at the innovation-driven stage of development and during transition to it. In 2005Latvia was at the efficiency-driven stage and its economic performance was dependent on "Quality of the educational system", "Tertiary education enrolment rate", and"Technological readiness".

Table 4. Results of regression analysis:statistically significant determinants* of economic performancemeasured by GDP per capita (PPP, in USD), 2009, n = 133 countries

Stage of economic development	Linear regression	Statistically significant determinants of economic performance
Factor-driven stage (n = 38 countries)	$y=-1228+625*x_1+65*x_2$	Availability of latest technologies (x_1, p=0.010) ***Tertiary education enrolment rate*** (x_2, p=0.000)
Efficiency-driven stage and transition to it (n = 44 countries)	$y=-21184+10170*x_1$	Brain drain (x_1, p=0.000)
Innovation-driven stage and transition to it (n = 51 countries)	$y=-29913+6321*x_1+5754*x_2$	Availability of latest technologies (x_1, p=0.033) Brain drain (x_2, p=0.007)

* Within the five potential searched determinants:
- ***Tertiary education enrolment rate***
- ***Quality of the educational system***
- Availability of latest technologies
- Firm-level technology absorption
- Brain drain

Source: Elaborated by the authors based on the data of Schwab 2009.

Table 4 shows that by 2009 the change towards the ability of a country to retain and attract talented and well-educated people is of decisive significance even at the efficiency-driven stage and in the process of transition to it. By 2009 Latvia already was at the transition from efficiency-driven stage to innovation-driven stage in which economic performance was determined not by the state and the higher education system but by the ability of the country to retain and attract 'brains'and the availability of latest technologies.

Table 5. Results of regression analysis:statistically significant determinants* of economic performancemeasured by GDP per capita (PPP, in USD), 2013, n = 146 countries

Stage of economic development	Linear regression	Statistically significant determinants of economic performance
Factor-driven stage (n = 37 countries)	$y=-950+543*x_1+\boldsymbol{64*x_2}$	Firm-level technology absorption (x_1, p=0.037) ***Tertiary education enrolment rate*** (x_2, p=0.000)
Efficiency-driven stage and transition to it (n = 51 countries)	$y=-91+3577*x_1$	Country capacity to attract talent (x_1, p=0.035)
Innovation-driven stage and transition to it (n = 58 countries)	$y=-40126+7794*x_1+6855*x_2$	Availability of latest technologies (x_1, p=0.026) Country capacity to retain talent (x_2, p=0.003)

* Within the six potential searched determinants:
- ***Tertiary education enrolment rate***
- ***Quality of the educational system***
- Availability of latest technologies
- Firm-level technology absorption
- Country capacity to retain talent
- Country capacity to attract talent

Source: Elaborated by the authors based on the data of Schwab 2013.

Table 5 shows that the situation had not changed in the period 2009–2013: tertiary education enrolment rate (although along with the technological factor) is the determiningfactor inacountry's economic performance only at the factor-driven stage. At the following stages of economic development a new factor 'enters the game' – a country's ability to retain and attract talented people (in 2013 the factor "Brain drain" was divided into two more-specific factors,"Country capacity to retain talent" and "Country capacity to attract talent"). The technological factor

remains significant for countries at the innovation-driven stage and the stage of transition to it (which includes Latvia).

The next three tables present the results of the regression analysis of target indicator "Nature of competitive advantage", taken in the three periods and considering the three stages of countries' economic development.

Table 6. Results of regression analysis:statistically significant determinants* of acountry'snature of competitive advantage, as evaluated by experts,2005, n = 116 countries

Stage of economic development	Linear regression	Statistically significant determinants of acountry's nature of competitive advantage
Factor-driven stage (n = 41 countries)	$y=2.024+\boldsymbol{0,293*x_1}$	***Quality of the educational system*** (x_1, p=0.004)
Efficiency-driven stage and transition to it (n = 37 countries)	$y=2.639+0.246*x_1-\boldsymbol{0.009*x_2}$	Brain drain (x_1, p=0.006) ***Tertiary education enrolment rate*** (x_2, p=0.024)
Innovation-driven stage and transition to it (n = 38 countries)	$y=0.600+0.829*x_1$	Technological readiness (x_1, p=0.000)

* Within the five potential searched determinants:
- ***Tertiary education enrolment rate***
- ***Quality of the educational system***
- Technological readiness
- Firm-level technology absorption
- Brain drain

Source: Elaborated by the authors based on the data of Lopez-Claros 2005.

Table 6 shows that the nature of a country's competitive advantage – low-cost labour/natural resources or unique products and processes -is determined by a different factor depending on the stage the country is at. In 2005 thetertiary education enrolment rate was of statistical significance tothe efficiency-driven stage (where Latvia was). This rate had a negative influence on the ability of the

country to compete in the global market on the basis of unique products and processes. In 2005 the ability of a country (mentioned in connection with state economic performance) to retain talented people had a positive influence on the country at the efficiency-driven stage and the stage of transition to it.

Table 7. Results of regression analysis:statistically significant determinants*of acountry'snature of competitive advantage, as evaluated by experts,2009, n = 133 countries

Stage of economic development	Linear regression	Statistically significant determinants of the country's nature of competitive advantage
Factor-driven stage (n = 38 countries)	$y=1.494+0.258*x_1+0.228*x_2$	Brain drain (x_1, p=0.018) ***Quality of the educational system*** (x_2, p=0.012)
Efficiency-driven stage and transition to it (n = 44 countries)	$y=1.914+0.372*x_1$	Brain drain (x_1, p=0.002)
Innovation-driven stage and transition to it (n = 51 countries)	$y=-2.230+1.170*x_1$	Availability of latest technologies (x_1, p=0.000)

* Within the five potential searched determinants:
- ***Tertiary education enrolment rate***
- ***Quality of the educational system***
- Availability of latest technologies
- Firm-level technology absorption
- Brain drain

Source: Elaborated by the authors based on the data of Schwab 2009.

Table 7 shows that the 2009results confirm those of 2005:"Brain drain" still remains one of the most important factors of competitive advantage of countries in the global market, but this is not true for the innovation-driven stage, where the technological factor moves to the foreground. Unique products and processes at the innovation-driven stage cannot be launched without the availability of the latest technologies. In 2009 Latvia was transitioning to this stage.

Table 8. Results of regression analysis:statistically significant determinants*of acountry'snature of competitive advantage, as evaluated by experts,2013, n = 146 countries

Stage of economic development	Linear regression	Statistically significant determinants of the country's nature of competitive advantage
Factor-driven stage (n = 37 countries)	$y=1.841+0.382*x_1$	Country capacity to retain talent (x_1, p=0.000)
Efficiency-driven stage and transition to it (n = 51 countries)	$y=1.392+\mathbf{0.316*x_1}+0.269*x_2$	***Quality of the educational system*** (x_1, p=0.000) Country capacity to retain talent (x_2, p=0.000)
Innovation-driven stage and transition to it (n = 58 countries)	$y=-1.794+0.905*x_1+0.340*x_2$	Firm-level technology absorption (x_1, p=0.000) ***Quality of the educational system*** (x_2, p=0.031)

* Within the six potential searched determinants:
- ***Tertiary education enrolment rate***
- ***Quality of the educational system***
- Availability of latest technologies
- Firm-level technology absorption
- Country capacity to retain talent
- Country capacity to attract talent

Source: Elaborated by the authors based on the data of Schwab 2013.

On the whole the data presented in Table 8 confirms the results from 2005 and 2009: the ability of a country to retain talented people (at the efficiency-driven stage – along with the quality of the educational system) is the determining factor in the creation of the competitive advantages of a country on the basis of unique products and processes. In the same way as in 2005 and 2009, in 2013 the technological factor moves to the foreground in the innovation-driven stage, along with the quality of the educational system. Thus, to compete in the global market not on the basis of low-cost labour but on the basis of unique products and processes, Latvia should aim at a higher level of firm-level technology absorption and maintaining a quality educational system.

The next two tables summarize the statistically significant factors that determined a country's economic performance and innovativeness in 2005, 2009, and 2013 at each stage of economic development. The grey background marks the cells that correspond tothe stage of Latvian economic development in that year. It aims to give a more representative picture of the significance of higher education to Latvia's economic performance and innovativeness, showing the most significant factors. All the tables show only the factors that are statistically significant, rather than those deleted from the regression analysis.

Table 9. Statistically significant determinants* of economic performancemeasured by GDP per capita (PPP, in USD), 2005, 2009, and 2013

Stage of economic development	Determinants of economic performance		
	2005 n = 116 countries	**2009 n = 133 countries**	**2013 n = 146 countries**
Factor-driven stage	Technological readiness ***Tertiary education enrolment rate***	Availability of latest technologies ***Tertiary education enrolment rate***	Firm-level technology absorption ***Tertiary education enrolment rate***
Efficiency-driven stage and transition to it	***Quality of the educational system*** Technological readiness ***Tertiary education enrolment rate***	Brain drain	Country capacity to attract talent
Innovation-driven stage and transition to it	Brain drain	Availability of latest technologies Brain drain	Availability of latest technologies Country capacity to retain talent

* Within the potential searched determinants:
- ***Tertiary education enrolment rate*** (for 2005, 2009, 2013)
- ***Quality of the educational system*** (for 2005, 2009, 2013)
- Technological readiness (for 2005)
- Firm-level technology absorption (for 2005, 2009, 2013)
- Availability of latest technologies (for 2009, 2013)
- Brain drain (for 2005, 2009)
- Country capacity to retain talent (for 2013)
- Country capacity to attract talent (for 2013)

Source: Elaborated by the authors based on the data from Tables 4, 5, 6.

The data provided in Table 9 clearly and consistently show that only when Latvia was at the efficiency-driven stage in 2005 did the quantitative and qualitative characteristics of the higher education system determine the country's economic performance. It is interesting to note that, for Latvia, the insignificance of higher education in achieving a high level of economic performance in the later periods was determined not only by the fact that it had moved to a higher stage of development but also by the fact that that stage of development (efficiency-driven) was marked by the significance of another factor, the ability of a country to attract talented people. For Latvian economic performance from the crisis until the present it is exactly this ability combined with "Availability of latest technologies" for local companies that remains significant.

Table 10. Statistically significant determinants ofthe nature of competitive advantage, as evaluated by experts,2005, 2009, and 2013

Stage of economic development	**Determinants of the country's nature of competitive advantage**		
	2005 n = 116 countries	**2009 n = 133 countries**	**2013 n = 146 countries**
Factor-driven stage	***Quality of the educational system***	Brain drain ***Quality of the educational system***	Country capacity to retain talent
Efficiency-driven stage and transition to it	Brain drain ***Tertiary education enrolment rate (negative)***	Brain drain	***Quality of the educational system*** Country capacity to retain talent
Innovation-driven stage and transition to it	Technological readiness	Availability of latest technologies	Firm-level technology absorption ***Quality of the educational system***

* Within the potential searched determinants:
- ***Tertiary education enrolment rate*** (for 2005, 2009, 2013)
- ***Quality of the educational system*** (for 2005, 2009, 2013)
- Technological readiness (for 2005)
- Firm-level technology absorption (for 2005, 2009, 2013)
- Availability of latest technologies (for 2009, 2013)
- Brain drain (for 2005, 2009)
- Country capacity to retain talent (for 2013)
- Country capacity to attract talent (for 2013)

Source: Elaborated by the authors based on the data from Tables 7, 8, 9.

The data provided in Table 10 presents information on statistically significant factors that influence the nature of countries' competitive advantages. The data indicate that the ability of a country to compete in the global market on the basis of unique products and processes started to be determined by the quality of the education systemin 2013. The quantitative participation of the population in the higher education system did not contribute to this in any year or at any stage. Moreover, in 2005, at the efficiency-driven stage, it even statistically significantly reduced the possibility of a country (including Latvia) having progressive competitive advantages in the global market. For the time being, in order to achieve innovative competitive advantage Latvia has to concentrateon the ability of its companies to use new technologies in their business practice and improving its education system (and not on increasing the number of students).

The last three tables provide the data, obtained through correlation analysis, on how much the targets examined in the regression analysis– country's economic performance measured by GDP per capita (PPP) and country's innovativeness measured by nature of competitive advantage- are interconnected. Here, just as in the previous tables, the cells that correspond to the stage of Latvian economic development at a certain time are coloured grey.

Table 11. Correlation between economic performance and innovativeness at different stages of economic development,Kendall's coefficient of non-parametric correlation, 2005, n = 116 countries

Interconnected variables	**Country's innovativeness measured by nature of competitive advantage**
Factor-driven stage, n = 41 countries	
Country's economic performance measured by GDP per capita (PPP)	r=0.128, p=0.253
Efficiency-driven stage and transition to it, n = 37 countries	
Country's economic performance measured by GDP per capita (PPP)	r=0.079, p=0.503
Innovation-driven stage and transition to it, n = 38 countries	
Country's economic performance measured by GDP per capita (PPP)	r=0.486**, p=0.000

* *correlation is significant at the 0.05 level (2-tailed)*

** *correlation is significant at the 0.01 level (2-tailed)*

Source: Elaborated by the authors based on the data of Lopez-Claros 2005.

The data presented in Table 11 on the economic performancein 2005of countries that were at the efficiency-driven stage or at the stage of transition to it (including Latvia)was not statistically significantly interconnected with countries' innovativeness, i.e., with the nature of its competitive advantage.

Table 12. Correlation between economic performance and innovativeness at different stages of economic development,Kendall's coefficient of non-parametric correlation, 2009, n = 133 countries

Interconnected variables	Country's nature of competitive advantage
Factor-driven stage, n = 38 countries	
Country's economic performance measured by GDP per capita (PPP)	r=0.135, p=0.249
Efficiency-driven stage and transition to it, n = 44 countries	
Country's economic performance measured by GDP per capita (PPP)	r=0.044, p=0.678
Innovation-driven stage and transition to it, n = 51 countries	
Country's economic performance measured by GDP per capita (PPP)	r=0.468**, p=0.000

** correlation is significant at the 0.01 level (2-tailed)

Source: Elaborated by the authors from the data of Schwab 2009.

In 2009 Latvia had reached a higher level of development where economic performance and innovativeness were strongly correlated. At the lower stages of development these two phenomena were unrelated.

Table 13. Correlation between economic performance and innovativeness at different stages of economic development,Kendall's coefficient of non-parametric correlation, 2013, n = 146 countries

Interconnected variables	Country's nature of competitive advantage
Factor-driven stage, n = 37 countries	
Country's economic performance measured by GDP per capita (PPP)	r=0.218, p=0.066
Efficiency-driven stage and transition to it, n = 51 countries	
Country's economic performance measured by GDP per capita (PPP)	r=-0.064, p=0.519

Innovation-driven stage and transition to it, n = 58 countries	
Country's economic performance measured by GDP per capita (PPP)	r=0.474**, p=0.000

* *correlation is significant at the 0.05 level (2-tailed)*

** *correlation is significant at the 0.01 level (2-tailed)*

Source: Elaborated by the authors from the data ofSchwab 2013.

The data provided in Table 13 almost confirms the results of the previous years and testifies that, on the whole, economic performance and innovativeness are interconnected only at the innovation-driven stage and the stage of transition to it. In its turn, at the lower stages of these countries' economic development these two phenomena are not interconnected, i.e., high innovativeness will not necessarily have a positive effect on economic performance, and high economic performance will not necessarily be connected with innovativeness (as is the case in Qatar).

It is interesting to provide some examples of other countries. Luxembourg is particularly representative in this sense (located at the innovation-driven stage of economic development). In Luxembourg in 2013 the tertiary education enrolment rate was 18.2%, comparable with Nicaragua and India,and more than three times lower than Latvia (Schwab 2013). In 2013 the quality of Luxembourg's education system was average (4.4 points on a 7-point scale), 0.7 points higher than Latvia but lower than, for example, Malaysia and the United Arab Emirates and the same as India. However this does not prevent Luxembourg from having one of the highest levels of economic performance and innovativeness in the world on account of other factors: a high level of technological business development and the ability to attract and retain talented people from all over the world.

Another interesting example is Qatar, which in 2013 occupied third place in the world in its ability to attract talented people. It was first in the world in its ability to retain them (by comparison, Latvia ranks 112thfor the first indicator and 98thfor the second) (Schwab 2013). Qatar concentrates its resources on maintaining a high quality of tertiary education and on the technological development of its businesses, while keeping its tertiary education enrolment rate low at only 11.6%.As a result Qatar has entrenched itself at the innovation-driven stage of economic development, occupying 13th place in the world according to the Global Competitiveness Index (Schwab 2013).The economic success of Qatar should not be explained only by the presence of its oil resources:Russia also has oil (and not just oil), but the two countries differ greatly in economic performance and

innovativeness, and inthe indicators of their higher education systems. In Russia in 2013 the tertiary education enrolment rate was 75.9% (one of the highest rates in the world), while the quality was rather low, 3.5 points on a 7-point scale (Latvia,by comparison, has 3.7 points) (Schwab 2013). In its ability to attract and retain talented people andits level of technological business development Russia isaround100th (the technological indicator has even been ranked 124thand 126th). As a result, Russia has a traditionally low level ofeconomic performance: in 2013 it was 102ndin the world for progressiveness of competitive advantage and 64th for capacity for innovation.

Latvian economic performanceis very uneven and some regions are still at the efficiency-driven stage (LR CSB 2014), soin the peripheral regions of Latvia the factors that determine the country's economic performance and innovativeness at the efficiency-driven stage are still relevant.

The unequivocally positive significance of education in the era of the knowledge economy, presented in the most systematic way in two recent scientific publications, The Knowledge Economy and Lifelong Learning: A Critical Reader (Livingstone, Guile 2012) and Educating for the Knowledge Economy: Critical Perspectives (Lauder et al. 2012), is well substantiated. However, regardless of the fact that many researchers have argued that investment in formal education leads to economic growth (McKenzie 2001, David, Foray 2002, Sannikova, Baltere 2008, Paņina 2011; Young 2012), in Europe we have experienced a generation of unprecedented growth in advanced formal education at the same time as economic stagnation and high unemployment (Livingstone, Guile 2012). In the socio-economic realities of the modern worlda large proportion of the population with a formally high level of education does not guarantee economic prosperity and a high level of innovation. Moreover, even the quality of education (as shown byHanushek) gradually ceases to guarantee high economic performance and innovativeness. Other factors move to the foreground: a high level of technological development in business, anda completely new factor, the ability of a country not to create butto attract and retain talented and highly educated people.

6. CONCLUSIONS

In the EU countries there is an empirically identified stable and statistically significant direct correlation between investment in higher education and the number of specialists with higher education trained for the labour market. Latvia is one of those countries where the return on investment in higher education (as

a proportion of trained specialists) is highest. The problem is that the relatively high number of these specialists in the Latvian labour market only minimally increases real GDP and innovativeness - in contrast to many other European countries and in contradiction to the theoretical paradigm of the knowledge economy on the importance of state education for economic performance and innovativeness.

The most significant findings in this area, which we have used to identify the reasons for the low economic profitability and innovation effectiveness of Latvian higher education, can be found in the works of Hanushek and in some Russian and Latvian studies (Agranovich 2010, Vanags 2013). According to the data presented in these studies, the quality of higher education (rather than its quantity) and the level of technological development of a country can become additional factors, along with higher education, that are potentially significant for to a country's economic performance and innovativeness.

The empirical interpretation of the basic concepts of a country'seconomic performance and innovativeness is based on economic theory and methodology, which show that: 1) a country's economic performance is methodologically understood through the concepts of productivity and output, and the world economic community has chosen real GDP per capita as the most appropriate indicator of a country's economic performance; and 2) the concept of innovativeness signifies the concepts of innovative capacity and innovation performance, i.e., the ability of a country to produce and commercialize innovative technologies.

The methodological innovation of this research is to look at the problem through the prism of the classification of the stages of economic development (factor-driven stage, efficiency-driven stage, and innovation-driven stage), as elaborated by the World Economic Forum. This methodological approach helped to explain the apparent contradiction between the 'quantitative success' of the Latvian higher education system and the low economic and innovative profitability of specialists with higher education. The most important result is that at each stage the economic development of the country is not promoted by the same factors; therefore the importance of higher education and knowledge in generalis likely to be different in countriesat different stages of economic development. The authors suggest that at the transition to the innovative-driven stage,where Latvia is now, there are other forces driving acountry's economic performance and innovativeness that are more significant than the number (and even the quality) of trained specialists with higher education.

Empirical evidence is provided by linear regression analysis with two outcome variables: real GDP per capita (to measure economic performance), andthe nature of competitive advantage (to measure innovativeness). The indicators that characterize a country's higher education system, its level of technological development, and its ability to attract and retain highly talented people were selected as the factors that potentially affecteconomic performance and innovativeness. The analysis was conducted at the above-mentioned stages of economic development during three time points – 2005, 2009, and 2013 (to prove the stability of the results).

The investigation of the influence of the above-mentioned factors on the first result variable – economic performance –according to the countries' stages of development in 2005, 2009, and 2013 showed thatat the different stages of economic development various factors determinedtheir economic performance. This result is stable over time, testifying to a stable tendency rather than static regularity.

Thus, the indicators that characterizethe higher education system affecta country's economic performance only at the lowest stage of economic development, and only then when allied with the factor of technological development. At the innovation-driven stage and during the transition to it (where Latvia has been since 2009) a new factor – the ability to retain and attract talent – 'enters the game'. Countries that are able to attract and retain talented and highly educated people perform better economically than countries with a relatively developed higher education system.

The results of the study of the determining role of various factors that affect a country's innovativeness (empirically interpreted as the nature of competitive advantage) show the particular relevance of technological development, especially the factor of firm-level technology absorption. The quality of the education system often has additional significance for the nature of competitive advantage. Thus a country's innovativeness is determined by the quality of specialists with higher education, but innovativeness is not possible without a high level of technological development.

Since 2008 Latvia has beentransitioning from the efficiency-driven stage to the innovation-driven stage of economic development.To achieve a higher level of economic performance and innovativeness it is necessary not only to pay attention to the higher education system but also to focus on the technological development of domestic enterprises and services that operate in the country,

and on the ability (and political will) of Latvia to attract and retain talented and highly educated specialists. The results of the research show that in Latvia the problems of low economic profitability and low innovative capacityof specialists with higher education are likely explained by the fact that the Latvian economy, due to its relatively low technological development (ranked 45th out of 146 countries in 2013 for"Availability of latest technologies" and 68th for "Firm-level technology absorption" - Schwab, 2013) and ability to 'attract brains' (ranked 98th out of 146 countries in 2013 for"Country capacity to retain talent" and 112th for"Country's ability to attract talent" - Schwab, 2013) is not a favorable environment for the sufficient commercialization of the professional potential of specialists with higher – even qualitatively higher – education.

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