European initiatives for a competitive economy in a globalised world- Entrepreneurial innovation as a pivotal stake

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Abstract

The global economic crisis has revealed the main weaknesses of the European Union's economy, including slow decision making, over-regulation and excessive bureaucratisation, lack of economic cohesion among the various nations of the EU, uneven competitive readiness and poor economic performance & development. Less flexible and more regulated, the European Union's entrepreneurial environment is undermined by excessive governmental intervention justified by "soziale Marktwirtschaft" or the social market economic principles. The main stake of the European Union and member countries' decision making factors and elites relies on stimulating entrepreneurial and public innovation as to raise the level of economic competitiveness. In such a way, it is possible to keep the present standards of living imposed by the principles of social market economy, and report at the same time competitiveness of more liberal-capitalistic economies. Taking into account these circumstances, the present research has established the goal to identify to which extent the initiatives promoted by the European Union in the area of innovation and entrepreneurship proved to have a beneficial effect upon community's economic competitiveness taking into account the modern day economic challenges. As a result, there have been formulated two main hypotheses and namely, H1, which states that entrepreneurial innovation could not be compensated with public driven innovation policies and, H0, identifying the vice-versa and namely that governmental supported innovation can offset entrepreneurial innovation.

Key-words: entrepreneurial innovation; public innovation; economic competitiveness; the European Union; globalisation;

JEL-classification: F02; F15; F63; G38; J88;

Introduction

The global economic crisis has revealed the main weaknesses of the European Union's economy, including slow decision making, over-regulation and excessive

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bureaucratisation, lack of economic cohesion among the various nations of the EU, uneven competitive readiness and poor economic performance & development. Accordingly, European economy, on overall, has not reached the pre-crisis growth rates and is still stagnating while other global powers including the USA and China have faced a relatively faster recovery. Less flexible and more regulated, the European Union's entrepreneurial environment is undermined by excessive governmental intervention justified by "*soziale Marktwirtschaft*" or the social market economic principles. Additionally, the European Union is aiming to develop in the spirit of the "welfare state", promoting these ideas across the whole territory regardless of the regions' development level, the fact suppressing entrepreneurship. Since reformation of the present economic system requires large social consensus, renouncing to this development model certainly does not meet society's aspirations and therefore politicians promoting these principles can face marginalisation. In these conditions, the main stake of the European Union and member countries' decision making factors and elites relies on stimulating entrepreneurial and public innovation as to raise the level of economic competitiveness. In such a way, it is possible to keep the present standards of living imposed by the principles of social market economy, and report at the same time competitiveness of more liberal-capitalistic economies.

Taking into account these circumstances, the present research has established the goal to identify to which extent the initiatives promoted by the European Union in the area of innovation and entrepreneurship proved to have a beneficial effect upon community's economic competitiveness taking into account the modern day economic challenges. To reach this aim, there were established two objectives and namely: first, assess the interdependency between entrepreneurial innovation and economic competitiveness indicators. Or, evaluate the degree to which entrepreneurship is capable of boosting innovation and therefore economic competitiveness. Secondly, it is supposed to compare the influence of entrepreneurial innovation with the governmental supported innovation. Thus, it is possible to determine to which extent public innovation can compensate the loss of entrepreneurial innovation which the European Union faces as a result of bureaucratisation. Taking into consideration these objectives and the main goal of the research, there have been formulated two main hypotheses and namely, H1, which states that entrepreneurial innovation could not be compensated with public driven innovation policies and, H0, identifying the vice-versa and namely that governmental supported innovation can offset entrepreneurial innovation. The hypotheses will be tested based on both qualitative and quantitative research methods which will comprise the analysis of the main actions undertaken by the European Union in the area of innovation including the public driven and entrepreneurial one. Also, how these actions affected quantitative indicators of innovation and economic competitiveness.

Afterwards, the present research provides several policy recommendations addressed to European policy makers underlining which actions are advised to reinforce entrepreneurship in the EU and to overpass the present socio-economic difficulties. Moreover, there are identified which levers the European Union can apply to raise

economic competitiveness of its member countries through advancement of communitarian policies.

Literature review

In order to have a better understanding upon the matters related to the European initiatives for a competitive economy in a globalised world, a subset of relevant literature has been selected. Thus, according to Wennekers & Thurik (1999) entrepreneurs are the people who are willing to undertake, organise and lead business activities incurring the related risks in their pursuit of profit. The meaning of entrepreneurship should not be summarised only to launching and running of new businesses its framework being wider comprising the ability of the organisations to develop new, more competitive initiatives and products through the implementation of innovation and technologies. The commercialisation of innovation in this regard is of determinative importance since it allows maximisation of economic benefits obtained by businesses. Accordingly, it can be underlined the idea that entrepreneurship is the main source of economic development since it fosters innovation and technology progress. Moreover, Varis & Littunen (2010) mentioned that innovation i.e. novel product, process or market innovation leads to firms' development and improved market positions and not necessarily enhanced profitability. Governments should provide clear and transparent support services for the firms developing innovative products in order to enhance regional competitive edges as to create more efficient networks and supply chains. Landabaso (2014) & Kehm (2014) underlined that the European Union should reinforce its public sector and entrepreneurial policies to enhance its business culture through applying the bottom-up approach, or otherwise said by consolidating microeconomic foundation. The smart specialisation direction of development of the European Union empowered by research and innovation initiatives should allow the promotion of locally oriented business models- so called place-based approach. Innovation is a determining factor of economic development, while the public and governmental support is crucial in implementing efficient innovation policies at the local level.

Ignatov (2017) determined that entrepreneurship requires favourable macroeconomic conditions and optimal level of bureaucratic control. By fostering these two dimensions, an economy is capable of enhancing its potential through developing both extensively, by enlarging the number of participants to the economic activity, and intensively by increasing effectiveness and efficiency of these activities by implementing innovation and technologies. At the same time, Lofgren & Benner (2011) highlighted that the European Union needs consolidated innovation policies to be able to enhance its economic competitiveness. In intent to overtake the USA as a global economic power, the EU needs more integration legitimised on common European identity. Present innovation initiatives are not suitable for a globalised society since they have reduced economic efficiency and market fundament. To have a stronger "rhetoric" in issues related to innovation, the European Union is obliged to re-think its present institutional arrangements. Mendoza et al (2010) as well as Tiberghien et al (2017) determined that the main difference between entrepreneurial environments of the European Union and

the United States of America is that the first face more regulatory pressure increasing bureaucratisation of the economy. The difference is accentuating not in the favour of the European Union since more regulations and rules are adopted. This fact hinders the development of financial markets, new businesses, and existing European corporations. European listed firms are subject to considerable costs generated by red-tape. Changing economic environment should motivate European decision makers to undertake actions to reduce the influence of the public sector in economic activities as to be able to face the present and future global challenges. Furthermore, Sirbu et al (2017) found that entrepreneurship certainly consolidated the economic power of the Baltic States. Nevertheless, the degree to which entrepreneurial polices proved to be successful alternates, Estonia being the leading business power in the region followed by Lithuania and Latvia. The achievements of Estonia are more prominent as compared to the neighbouring nations due to the promotion of innovation driven business alongside with traditional one. Thus, this small nation succeeded in reaping the benefits of technology and digitalisation considerably enhancing its economic potential.

Miles et al (1995) & Wullweber (2014) highlighted that technology and innovation are the main contributors to long run economic development. Innovation policies should be directed towards stimulating development and implementation of research outputs in the real economy as to reap the benefits of the improved technology. Industrialised states must be particularly concerned by innovative projects since this fact contributes to their competitiveness in a permanently changing society. Van Someren & Someren-Wang (2013) as well as Kovalčíková (2014) stated that the role of market driven processes in the promotion of innovation is by far more important in the USA than in the EU. The fragmentation of the European market weakens the capacity of the EU based businesses to innovate since they are subject to increased regulation, the situation which is not present in the USA. The EU is obliged to change policy priorities in the field of entrepreneurship as to strengthen the business environment as it is the main guarantee of enhanced long run development and competitiveness. Tiberghien (2017) and Mason & Brown (2014) highlighted that the main task of the government is to assure a stable and propitious ecosystem for entrepreneurship and no interference in the business processes are required. Business environment in the European Union is undermined by excessive bureaucracy as over-regulations leads to increased entrepreneurial costs. The support the institutions offer towards the business sector is not sufficient as to compensate the increased costs. Moreover, the interference of the government through this support leads to economic distortions, irregularities which reduce the quality of growth and development. Henrekson & Stenkula (2010) mentioned that it can be observed that more and more countries are changing their priorities related to business sector. Thus, if the past SMEs were the main policy focus, then, in the present entrepreneurship regardless of the organisational size are sought as the targets. Moreover, public policies are aimed to stimulate both so called productive entrepreneurship and the high impact one. Developed economies should develop policies which are concentrated on innovation since these nations cannot exploit costs as to face rising global competition.

At the same time, Knight (2015) said that the crisis in the European Union has considerably increased the level of entrepreneurial uncertainty which in the conditions of high bureaucratic pressure diminish the competitiveness of European business on the world arena. Despite of multiple initiatives the European Union has developed in the area of innovative economy including such as clean and secure energy, it is necessary a radical change of the present economic system to free the EU from excessive red tape. Moreover, Singh (2012) underlined that the European Union has paid increased attention to the re-definition of its economy by extensively implementing modernisation policies. The existing shortage of e-skills determined the growth of technology and innovation literate graduates who presently represent an important capital resource fostering the competitiveness of the European economy. Thus, it can be observed that the European economy is consistently moving towards digitalisation. Nevertheless, further effort is needed to be made in this area which can be assured only though developing suitable innovation public policies.

Bongardt & Torres (2010) found that Europe 2020 strategy was designed as a response of the EU to world challenges which worsened as a result of the crisis of 2008. This initiative is aimed to mobilise the European efforts towards enhancing common economic competitiveness through efficiently dealing with the existing structural weaknesses. In the conditions of declining European economic power on the global arena, Europe 2020 is directed towards assuring a stable basis for innovation and technological development. Accordingly, Europe 2020 is the EU main initiative to reinforce its economy as to be able to increase overall competitiveness. Meanwhile, Buch-Hansen & Wigger (2011) the European Union needs structural change in the area of competitive regulation to be capable of overpassing the modern global challenges. Bureaucracy is one of the main weaknesses of the EU's economy. Over-institutionalisation of the European Union's economy, where the market is highly influenced by the governmental interference, makes the community's economy less flexible having a reduced capability of adapting to changing environment. This fact characterises the slow recovery of the EU from the crisis and weak development in the following period. Finally, Lagendijk & Varró (2013) came to the conclusion that innovation policies are seen by the European decision makers as solutions to global challenges. However, innovation without proper entrepreneurial policies is not sustainable since innovation needs commercialisation. Accordingly, business innovation is much more important for an economy as compared to publicly financed innovation since it is self-sufficient and it is economically efficient and justifiable. The EU offers extensive support for publically generated innovation and undermines business innovation through excessive bureaucratisation. In such a way, the community is facing stagnation as public innovation is less efficient that private one.

According to the literature examined, it can be stressed the following ideas, and namely: entrepreneurship is the main driving force "boosting" innovation and economic development. The European Union developed specific sectorial policies to strengthen innovation capacities of the community, yet they are less efficient than the business innovation due to the varying efficiency of implementation in the real economy. Thus, it

has been reached the general conclusion that the European Union needs to de-bureaucratise its economy and re-inforce entrepreneurship to be capable of re-ignite its economic competitiveness and development in a permanently changing global environment.

Methodology

The present research applies both qualitative and quantitative research methods to improve readers' understanding of the issues related to the European Union's initiatives for a competitive economy in a globalised world. Particularly, it is analysed the effect of European policies upon entrepreneurial innovation which is considered to be the main driver of economic development and growth both extensively and intensively by growth of the resource inputs involved in the economy and consequently by increasing their efficiency. Qualitative analysis is used to identify and assess the impact of the main European policies in the area of innovation and entrepreneurship. Accordingly, it is designed the theoretical framework on which the further research is constructed. In other words, the qualitative assessment is applied to recognise the main policies areas which the European Union has prioritised as to improve its competitive edges in a globalised society. Afterwards, the present research reflects the efficiency of the examined policies through the prism of entrepreneurial innovation which in its turn is identified through the quantitative measure of per capita R&D expenditure made by the Business of EU countries. At the same time, it is analysed the governmental supported R&D investments made by the European Union in the period of 2006-2016. Consequently, it is applied quantitative analysis to assess the impact of entrepreneurial innovation, and governmental backed innovation upon the European Union's economy. In such a way, it is evaluated the following indicator: the share of full-time equivalent high tech business R&D personnel in the total number of persons with tertiary education and employed in science and technology. Hence, it is possible to identify the impact of business innovation upon human capital formation inside the European Union which is a crucial pre-condition for future economic development. Secondly, it is assessed the gross fixed capital formation (investments) in the European Union which is an important component establishing the fundamental basis for further economic development of the EU. Afterwards, it is analysed the impact of the entrepreneurial and governmental supported innovation upon the intra-European per capita exports and the extra-European per capita exports, in such a way, it will be possible to increase readers' understanding upon the effect of business/ public innovation upon external competitiveness. At the same time, it is evaluated the dynamics of the resource productivity and domestic material consumption, Euro per kilogram since this dimension represents a crucial indicator expressing how innovation affects economic efficiency. Further, it is examined energy productivity, Euro per kilogram of oil equivalent, to assess the impact of business/ public innovation upon energy efficiency, an important condition for the European Union facing energy supplies deficiencies. Finally, there are calculated the correlations coefficients between entrepreneurial/ public innovation and indicators of economic competitiveness previously mentioned to identify whether innovation investments made

by the business sector of the European Union are interconnected with economic efficiency and competitiveness performance.

Accordingly, it can be underlined to which extent entrepreneurial innovation surpasses the governmental financed one and why the European Union should decrease bureaucratisation of its economy, liberalise the market and, consequently decrease the governmental intervention in the economy. Thus, there are recommended several policy directions which should be followed by European decision makers in order to re-define entrepreneurial environment as the main pre-condition of fostering economic growth and boost of the innovation capacities in the community.

Results

1. The initiatives of the European Union in the field of entrepreneurship and innovation

One of the main initiatives of the European Union regarding promotion of entrepreneurship and innovation is Horizon 2020 programme which is allocated 80 billion EUR for the period of 2014-2020. This initiative represents the eighth framework programme funding research, technological development, and innovation. Horizon 2020 is implemented by the European Commission through various structures including the Directorate general for research and innovation, the Directorate general for communications networks, content and Technology, the Research Executive Agency, the Executive Agency for SMEs, the ERC Executive Agency (ERCEA). Horizon 2020 is also implementing different strategies and policies developed by the European Union including Europe 2020, European environmental research and innovation policy, EU's industrial policy and European Innovation Council pilot. The main aims of the programme is to assure the European Union with "excellent science", foster the EU's industrial competitiveness or "industrial leadership" and improve the community's abilities in dealing with societal challenges. Besides Horizon 2020, the European Union provides funding for entrepreneurial and innovation related activities through European Structural and Investment Funds which allocates around €110 billion to innovation activities, ICT, small and medium-sized enterprise (SME) competitiveness, and the low carbon economy. Top priorities of the European Union in this regard are: fostering key enabling technologies; promotion of advanced manufacturing; bio-based products; creative industries and tourism. In such a way, the European Union is directing efforts towards promotion of smart specialisation of its regions. The European Union enhances its entrepreneurship and innovation competitiveness also through European Fund for Strategic Investments. It is "*one of the three pillars of the Investment Plan for Europe and aims to overcome current market failures by addressing market gaps and mobilising private investment*" (European Commission, 2017). The funds are allocated towards developing infrastructure, improving the quality of research and innovation, fostering the efficiency of education, enhancing renewable energy and energy efficiency as well as reduce the risks of financing small and medium-sized enterprises (SMEs). The institution responsible for the distribution of funding is the European Investment Bank (EIB). All these programmes, including Horizon 2020, European Structural and

Investment Funds and European Fund for Strategic Investments are the financing "arms" of the European Union to implement its innovation policies including: Social innovation, Design for innovation, Demand-side innovation policies, Public sector innovation and Workplace innovation.

One of the particular initiatives of the European Union in the area of entrepreneurship is The Entrepreneurship 2020 Action Plan. The main priorities set up by the European Union through the implementation of this initiative are: provision and stimulation of the entrepreneurial education, enhancing the quality of training to support growth and business creation. Second priority is related to the removal of the existing barriers, including the bureaucratic ones and development of means of supporting entrepreneurs in crucial phases of the business lifecycle. Finally, it is aimed to reignite the business culture in the European Union through nurturing new generations of entrepreneurs. At the national level, entrepreneurship is boosted through SME Envoys Network comprising both supranational and national representatives. Supranational representatives are set "*to open up channels of communication between the European Commission, SMEs, and their representative organisations and, therefore, promote SMEs' interests throughout the whole Commission and ensuring that the 'think small principle' is applied effectively in the new Europe 2020 strategy*". At the same time, national envoys are aimed "*to promote SMEs' interests throughout all government bodies and ensure that the 'think small first' principle is integrated into their policy-making and regulatory proposals, act as the main interface between the Commission and national policy-makers and report on the uptake of the SBA in EU countries, step up efforts to distribute information on SME policy actions, and promote the exchange of good practices*" (European Commission, 2017). The Entrepreneurship 2020 strategy is set as a comprehensive part of the European Union's industrial and competitiveness policy and is aimed towards bringing the community a new quality of entrepreneurial activity.

It is necessary to underline that the European Union is paying increased attention towards supporting SMEs since they account for 99% of all business in the community providing 2/3 of the total employment, "*the European Commission considers SMEs and entrepreneurship as key to ensuring economic growth, innovation, job creation, and social integration in the EU*" (European Commission, 2017). The EU fosters the development of SMEs through the following actions: establishing an entrepreneurial friendly environment (Small Business Act for Europe); fostering entrepreneurship (Entrepreneurship Action Plan); consolidating access to new markets and internationalisation (SMEs' access to markets); facilitating accessibility to finance and supports SME competitiveness and innovation capacities. Also, the EU is providing the possibility to SMEs to exploit market opportunities through different support networks including Enterprise Europe Network.

As a result, it can be remarked that the European Union has developed many policies, strategies and instruments to enhance the business environment competitiveness, innovation achievements and as to boost overall economic development. The goal of the present research is to identify the extent to which

innovation and economic competitiveness is stimulated by entrepreneurial environment and market or by direct governmental intervention. It can be noted that the European Union has developed multiple policies to stimulate business and research and development activities. It is of key relevance to find out the way to which the European can reinforce its competitiveness edges in a globalised environment either by assuring favourable to business conditions by decreasing states intervention or by keeping it at the same level yet centralised directing more financial resources towards innovation activities.

2. Main driver of economic competitiveness: entrepreneurial vs public innovation

Entrepreneurial innovation is quantitatively reflected by the per capita R&D expenditure made by the business sector of EU countries. According to the figure 1, it can be remarked that the strongest nations of the European Union in terms of entrepreneurial innovation are Sweden spending more than 1069 EUR per capita on R&D, followed by Denmark, 918 EUR, Austria, 896 EUR, and Germany, 764 EUR. The least competitive nations of the European Union according to the same indicator are Romania, 23 EUR, Latvia, 14 EUR, Cyprus, 36 EUR, and Lithuania, 36 EUR. It is necessary to underline that the EU average in 2016 was 386 EUR. In such a way, it can be underlined that the business sector in the community is unevenly developed, the Western and Northern EU being considerably more competitive than the Eastern and Southern parts. It is necessary to highlight that on overall the dynamics of entrepreneurial innovation in the community is favourable, thus in the period of 2006 till 2016, this indicator has grown from 276 to 386 EUR. The highest growth was registered by Austria, +357 EUR, followed by Germany, +265 EUR, Belgium, +257 EUR and Denmark, 250 EUR. The poorest performance in terms of the dynamics were reported by Luxembourg, -445 EUR, Finland, -71 EUR, Latvia -12 EUR and Spain, +6 EUR.

Figure 1. Per capita R&D expenditure made by the Business of EU countries, EUR
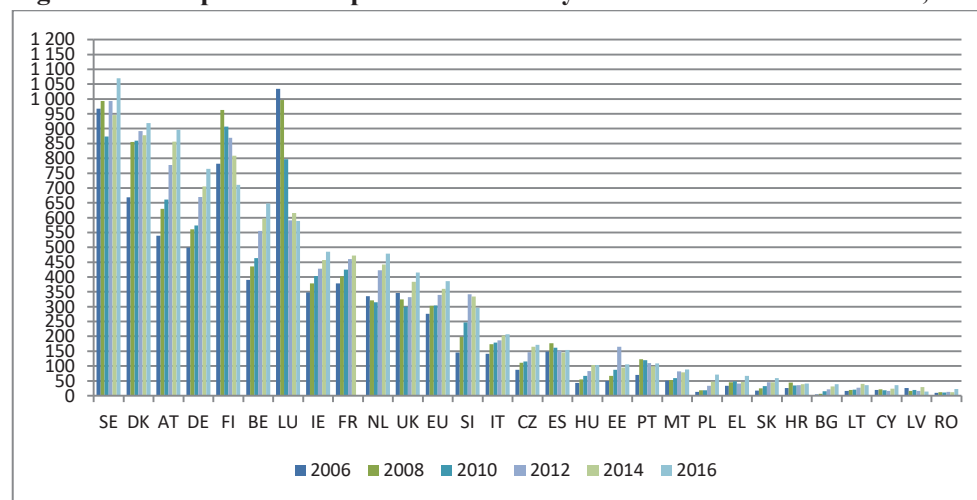
Source: Eurostat, indicator's code [rd_e_gerdtot].

The secondary source of financing innovation is governmental funding. The highest publically supported innovation is characteristic for Luxembourg where the government allocates per capita financing of more than 341 EUR for 2016 (figure 2). This nation is followed by Germany, 154 EUR, Netherlands, 97 EUR, France, 97 EUR, and Belgium, 88 EUR. The lowest public funding for innovation is allocated in Malta, 1.5 EUR, Poland, 2.7 EUR, Bulgaria, 11.1 EUR and Portugal, Romania and Cyprus around 12-13 EUR. In the period of 2007-2016, the highest growth in terms of public innovation funding is characteristic for Luxembourg, +175 EUR, Germany, 50 EUR, Belgium, 40 EUR, and Netherlands, 20 EUR. At the same times, the weakest dynamics could be remarked for UK, -16 EUR, Poland, -14 EUR, Finland, -12 EUR, Sweden and Ireland, -11 EUR, and Cyprus, -10 EUR. It can be remarked that, there is a considerable difference between the "old" and "new" member countries of the European Union, yet less evident as compared to the entrepreneurial innovation. The overall per capita public financing of innovation in the European Union is 67 EUR increasing in dynamics with 7.4 EUR.

Figure 2. Per capita R&D expenditure made by the Governmental sector of EU countries, EUR
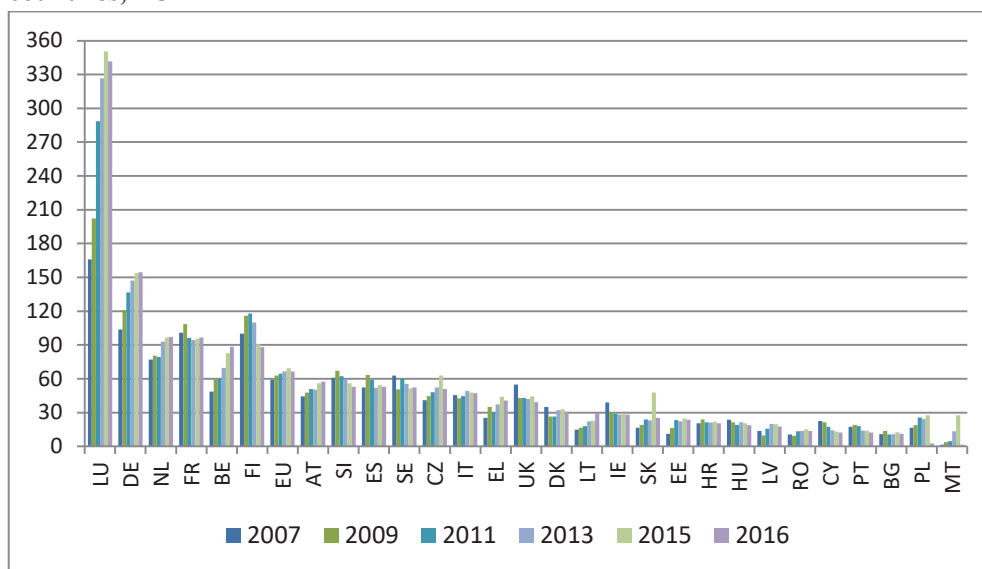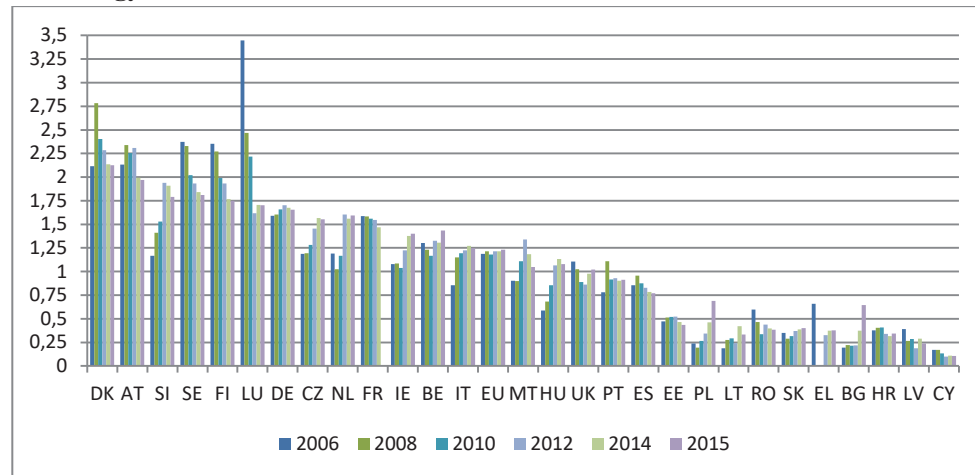

Source: Eurostat, indicator's code [rd_e_gerdtot].

The share of the full-time equivalent high tech business R&D personnel in the total number of persons with tertiary education and employed in science and technology show how many full time R&D business work places are available in the total number employed in science and technology. Thus, the higher is this share of people employed in this area the higher is the orientation of an economy towards business research and development with stronger potential of commercialisation. In 2015, this indicator in the European Union accounted for 1.25%. The leading countries are Denmark, 2.12%, Austria, 1.97%, Slovenia, 1.79%, Sweden, 1.81%, and Finland, 1.75%. The European

nations registering the lowest indicators are Cyprus, 0.10%, Latvia, 0.23%, Croatia, 0.34%, Greece, 0.37, and Bulgaria, 0.64% (figure 3). As it can be observed, the dynamics at the level of the European Union are more or less stable the share ranging between 1.20%.

Figure 3: Share of full-time equivalent high tech business R&D personnel in the total number of persons with tertiary education and employed in science and technology


Source: Own calculation based on data provided by Eurostat, indicators' code [htec_sti_pers2 and hrst_st_ncat]

Gross fixed capital formation is an important indicator showing the degree to which an economy is capable of assuring long run development since it reflects how much investments are directed towards infrastructural and real-capital development. According to the information presented in the figure 4, it can be remarked that fixed capital formation has decreased at the level of the European Union in the period of 2006-2016 with almost 2.2%. The only countries which reported increase of fixed capital formation in the EU are Malta, +1.7%, followed by Sweden, +1.1%, Belgium, +1.1%, Ireland, 0.8%, Austria, +0.5%, and Germany, 0.2%. The rest of the European Union nations faced drop of the capital formation, the fact demonstrating the unfavourable economic development direction. The highest decrease can be observed for Latvia, -16%, Estonia, -14.4%, Greece, -12%, Spain, -11%, Slovenia, -10%, Bulgaria, -9%, Cyprus, -7.6% and Portugal, -7.2%. Nations facing fall of the gross fixed capital formation demonstrate the lack of viability to sustain long run development through improvement of capital economic base.

Figure 4. Gross fixed capital formation (investments) at current prices % of GDP
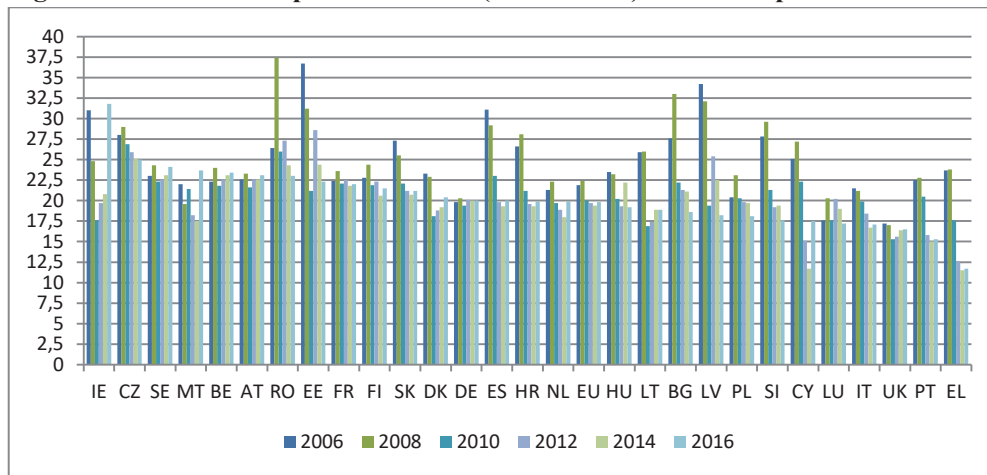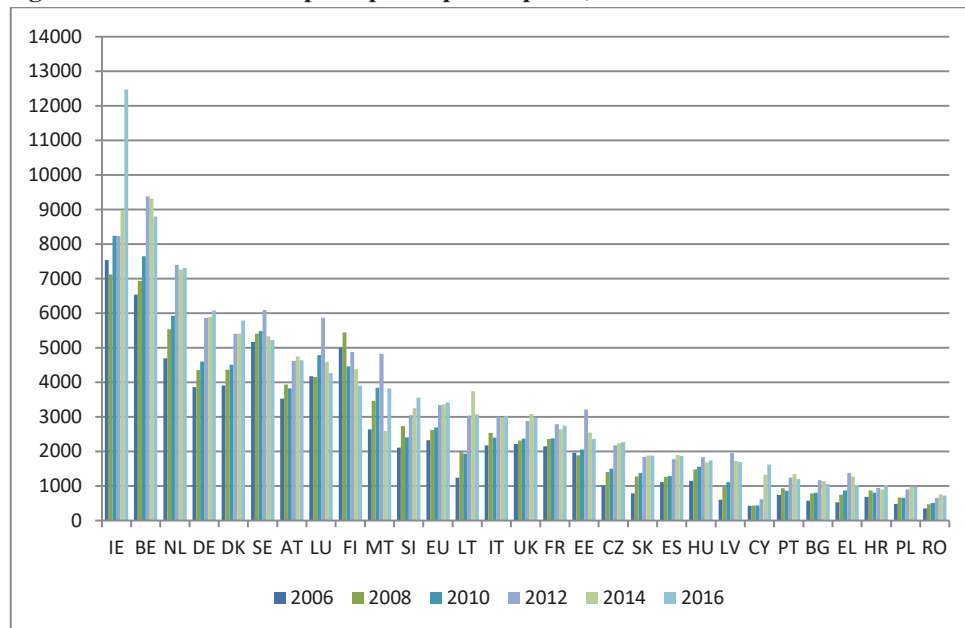

Source: Eurostat, indicator's code [tec00011]

An important indicator showing the effects of improved economic competitiveness is reflected through the prism of per capita exports, i.e. intra or extra communitarian ones. According to the figure 5, it can be noted that within the period of 2006-2016, the value of intra – European per capita exports has slightly changed, from around 5100 EUR in 2006 to almost 6100 EUR in 2016. The countries with the highest among of intra-community per capita exports are Netherlands, 23100 EUR, followed by Belgium, 23000 EUR, Luxembourg, 20600 EUR, Ireland, 12000, and the Czech Republic, 11700 EUR. The nations registering the lowest indictors are Greece, 1327 EUR, Cyprus, 1536 EUR, Croatia, 1952 EUR, Romania, 2180 EUR, and Bulgaria, 2226 EUR. Considerable improvements of the dynamics were reported by the Czech Republic, +5282 EUR, Slovakia, +5617 EUR, Netherlands, +5186 EUR, Hungary, 2824 EUR, and Estonia, 2927 EUR (figure 5).

Figure 5. The intra-European per capita exports, million EUR
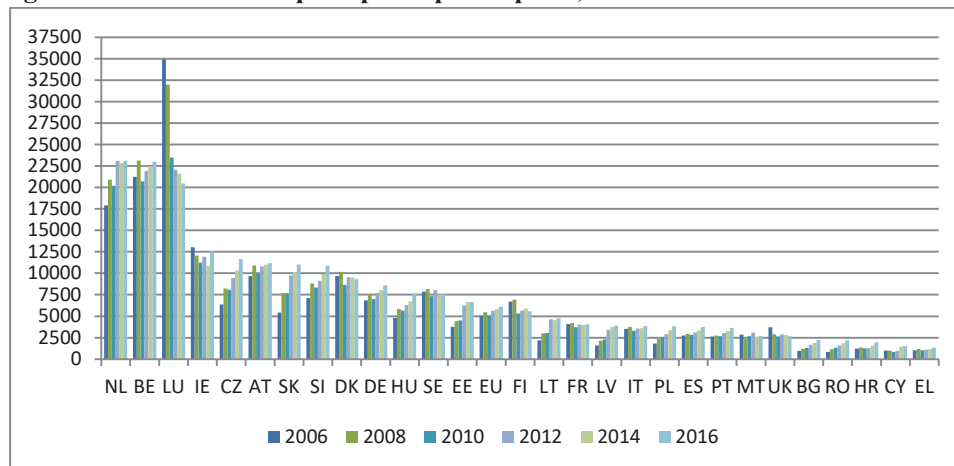
Source: Eurostat, indicator's code [ext_lt_intratrd] & [tps00001]

The information provided in the figure 6 underlined the idea that the European Union in the period of 2006-2016 has increased its export competitiveness since at the beginning of the period the extra community per capita exports accounted for 2321 EUR, while at the end these made up 3417 EUR. The European Union nations which export the most in the extra community space are: Ireland, per capita exports accounting for 12472 EUR, followed by Belgium, 8793 EUR, Netherlands, 7300 EUR, Germany, 6081 EUR, Denmark, 5787 EUR, and Sweden, 5223 EUR. At the opposite end there are Romania, 724 EUR, Poland, 985 EUR, Croatia, 1027 EUR and Greece, 1032 EUR. It is necessary to mention that several developed nations of the European Union registered below average indicators including Italy, UK and France. The leading nation in terms of the dynamics reported is Ireland, +4932 EUR. This country is followed by Belgium, Netherlands and Germany.

**Figure 6. The extra-European per capita exports, million EUR**

Source: Eurostat, indicator's code [ext_lt_extratrd] & [tps00001]

Resource productivity is an important indicator demonstrating the level of economic competitiveness since it shows the efficiency of material production. By analysing the information provided in the figure 7, it can be remarked that the European Union's countries with the highest level of resource productivity in 2016 were Netherlands, 4.19 EUR per kilogram of material consumption, followed by Luxembourg, 3.85 EUR, Italy, 3.7 EUR, UK, 3.64 EUR and France, 2.91 EUR. At the opposite end there are situated Bulgaria, 0.29 EUR, Romania, 0.30 EUR, Latvia, 0.47 EUR, Estonia, 0.54 EUR, and Poland, 0.68 EUR. The most favourable dynamics in the period of 2006-2016 were registered by Italy, +1.80 EUR, followed by Spain, +1.67 EUR, Ireland, +1.37 EUR, and UK, +1.07 EUR. Sweden, Romania, Estonia, Latvia, Bulgaria, Greece and

Malta registered the weakest dynamics and namely, -0.14 EUR, -0.02 EUR, 0.024 EUR, 0.03 EUR, 0.04 EUR, 0.042 EUR and 0.627 EUR respectively (figure 7).

Figure 7. Resource productivity and domestic material consumption, Euro per kilogram, chain linked volumes (2010)
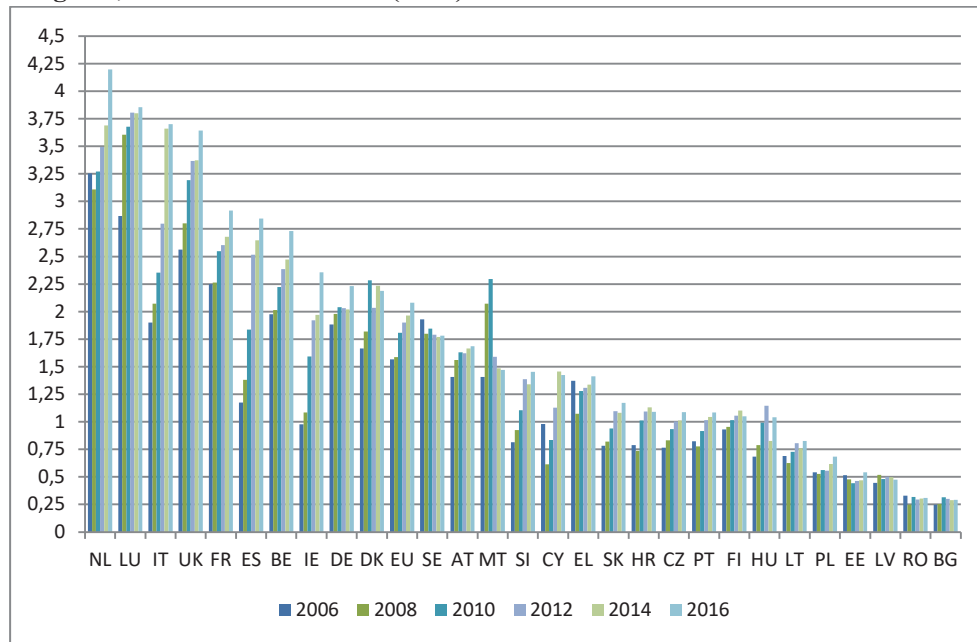
Source: Eurostat, indicator's code [sdg_12_20]

The last indicator analysed in this article describing economic competitiveness of the European Union countries is energy productivity (figure 8). As it can be observed, Ireland is the most energy efficient country of the European Union with an output of 16.8 EUR per kilogram of oil consumed. This nation is followed by Denmark, 15.4 EUR, Luxembourg, 11.1 EUR, Malta, 11 EUR, UK, 10.7 EUR, and Italy, 10 EUR. The least efficient European Union nations in terms of energy productivity are Bulgaria, 2.2 EUR, Estonia, 2.8, the Czech Republic, 4 EUR, Hungary, 4.3 EUR, and Romania & Poland, 4.4 EUR. The overall energy productivity at the European Union level in 2015 was 8.3 EUR per kilogram of oil equivalent. The most favourable dynamics were registered by Ireland, +5.9 EUR, Malta, +4.3 EUR, Denmark, +3.5 EUR, Luxembourg, +3.2 EUR, UK, +2.7 EUR and Sweden, +1.8 EUR. At the same time, least favourable evolution was registered by Estonia, -0.2 EUR, Greece, -0.1 EUR and Hungary, Latvia, Croatia and Bulgaria, +0.5 EUR.

Figure 8. Energy productivity, Euro per kilogram of oil equivalent
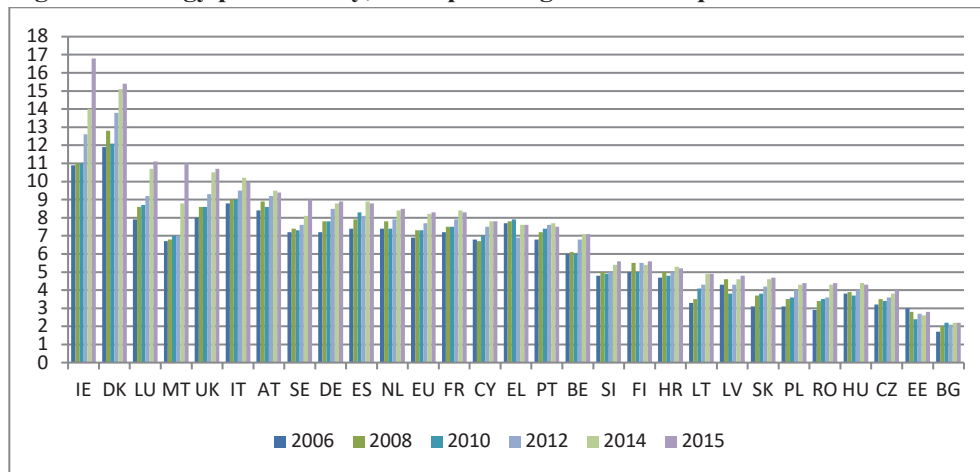
Source: Eurostat, indicator's code [sdg_07_30]

It has been calculated the correlation coefficients between entrepreneurial (1)/ public (1*) innovation, represented by business and respectively governmental per capita R&D expenditure of the European Union and the indicators reflecting economic competitiveness from various perspectives including: 2) share of full-time equivalent high tech business R&D personnel in the total number of persons with tertiary education and employed in science and technology; 3) gross fixed capital formation (investments) at current prices % of GDP; 4) the intra-European per capita exports, million EUR; 5) the extra-European per capita exports, million EUR; 6) resource productivity and domestic material consumption, Euro per kilogram, chain linked volumes (2010); 7) energy productivity, Euro per kilogram of oil equivalent. The results of the calculated correlation coefficients are presented in the table 1 and in the table 2. As it can be remarked in the first table, entrepreneurial innovation has a relatively strong interdependence with the indicator 2 with an average of 0.47. At the level of European Union the correlation coefficient equals 0.81. The countries registering high interconnection of more than 0.50 are marked with green colour. The correlation coefficient between entrepreneurial innovation and indicator 3 is weaker, being -0.26. Only 3 countries out of 28 register strong interdependences. The correlation coefficient recorded with the indicator 4 is much stronger, being on average 0.55, 19 out 28 registering coefficients larger than 0.50. At the European Union's level the correlation makes for 0.88. The same observations can be made for the correlation of entrepreneurial innovation and indicator 5, which on average it was 0.60, 20 countries out 28 recording strong interconnection with the general coefficient at the European Union of 0.94. In case of inter-relation of business innovation with indicator number 6, it can be noted that it is weaker of only 0.39, 15 out of 28 nations registering strong correlation and the coefficient at the level of the European Union being 0.93. Strong interdependency can be assessed between entrepreneurial innovation and indicator number 7, which on average was 0.52, 17 nations out of 28 recording strong coefficients. It is necessary to

underline that at the level of the European Union it can be noticed almost perfect correlation of 0.97.

Table 1. Summary of Correlations between Entrepreneurial Innovation and indicators of economic competitiveness

	1&2	1&3	1&4	1&5	1&6	1&7		1&2	1&3	1&4	1&5	1&6	1&7
AT	-0,62	0,15	0,77	0,93	0,86	0,85	IE	0,86	-0,23	0,24	0,87	0,96	0,87
BE	0,56	0,19	0,75	0,9	0,96	0,92	IT	0,91	-0,92	0,4	0,87	0,93	0,9
BG	0,87	-0,77	0,93	0,74	0,21	0,61	LT	0,83	-0,42	0,86	0,85	0,53	0,92
CY	0,19	-0,14	0,65	0,65	0,44	0,13	LU	0,91	-0,01	0,84	0,75	-0,8	0,79
CZ	0,98	-0,82	0,97	0,98	0,95	0,85	LV	0,62	0,2	0,04	-0,04	-0,4	0,21
DE	0,79	0,22	0,77	0,96	0,87	0,96	MT	0,76	0,12	0,56	0,4	-0,53	0,69
DK	0,31	-0,71	-0,11	0,68	0,8	0,61	NL	0,96	-0,69	0,9	0,92	0,86	0,83
EE	0,43	-0,33	0,68	0,91	-0,22	-0,45	PL	0,93	-0,75	0,95	0,87	0,88	0,94
EL	-0,8	-0,58	0,52	0,28	0,41	-0,03	PT	0,77	0	-0,17	0	0,04	0,31
ES	0,92	0,59	-0,48	-0,64	-0,65	-0,44	RO	-0,18	-0,23	0,63	0,35	0,06	0,36
EU	0,81	-0,73	0,88	0,94	0,93	0,97	SE	-0,32	0,47	0,74	0,58	-0,58	0,43
FI	0,35	0,57	-0,04	0,4	-0,29	0	SI	0,98	-0,9	0,74	0,79	0,95	0,48
FR	-0,86	-0,62	0,2	0,93	0,95	0,92	SK	0,72	-0,75	0,94	0,94	0,98	0,88
HR	-0,3	-0,37	0,62	0,64	0,37	0,76	UK	0,42	0,54	0,36	0,61	0,41	0,63
HU	0,95	-0,54	0,87	0,74	0,56	0,86	Aver.	0,47	-0,26	0,55	0,6	0,39	0,52

Source: Own calculations of the authors.

Analysing the correlations coefficients calculated between public innovation and indicators of economic competitiveness, it can be expressively noted that these coefficients are considerably lower. Thus, on average the correlation between governmental supported innovation (1*) and indicators 2, 3, 4, 5, 6, 7, is ranging between -0.04 (no interdependence) to 0.24 (weak positive interdependence). Accordingly, in the table 2 out of 174 calculated correlations, only 70 are strong compared to 95 identified in the table 2. It is necessary to underline that at the level of the European Union, it is reported strong correlations for all of the indicators except the 3rd, the fact demonstrating that in both cases i.e. entrepreneurial or public supported innovation, they are weakly interconnected with gross capital formation in the economy.

Table 2. Summary of Correlations between Governmental Innovation and indicators of economic competitiveness

	1*& 2	1*& 3	1* &4	1* &5	1* &6	1* &7		1* &2	1* &3	1* &4	1* &5	1* &6	1* &7
AT	-0,64	-0,02	0,60	0,77	0,89	0,73	IE	-0,52	0,50	0,20	-0,50	-0,76	-0,41
BE	0,63	0,18	0,60	0,71	0,97	0,87	IT	0,49	-0,74	0,31	0,76	0,67	0,69
BG	0,36	0,56	-0,32	-0,52	-0,25	0,20	LT	0,47	-0,19	0,74	0,66	0,47	0,72
CY	0,91	0,90	-0,86	-0,84	-0,92	-0,96	LU	-0,90	-0,21	-0,75	0,65	0,85	0,82
CZ	0,87	-0,60	0,82	0,82	0,75	0,94	LV	-0,07	-0,04	0,85	0,81	-0,36	0,69
DE	0,80	0,04	0,56	0,92	0,73	0,90	MT	0,21	0,17	0,11	-0,29	-0,52	0,96
DK	-0,43	0,52	0,66	0,25	-0,29	0,33	NL	0,77	-0,72	0,75	0,86	0,85	0,80
EE	-0,07	-0,47	0,85	0,77	0,32	-0,31	PL	0,68	0,17	-0,13	0,06	-0,37	0,75
EL	-0,49	-0,17	0,50	0,03	0,14	0,09	PT	0,63	0,86	-0,82	-0,88	-0,78	-0,71
ES	0,61	0,25	-0,67	-0,68	-0,51	-0,18	RO	-0,12	0,14	0,50	0,56	-0,51	0,36
EU	0,64	-0,86	0,64	0,87	0,92	0,94	SE	0,20	-0,12	0,46	0,49	-0,35	-0,59
FI	0,19	0,20	-0,42	0,12	-0,22	-0,54	SI	-0,55	0,65	-0,84	-0,88	-0,70	-0,79
FR	0,77	0,37	-0,52	-0,81	-0,56	-0,56	SK	0,85	-0,22	0,70	0,59	0,59	0,92
HR	0,60	0,65	-0,41	-0,49	-0,69	-0,16	UK	0,70	0,61	0,20	-0,51	-0,84	-0,54
HU	-0,73	0,83	-0,49	-0,63	-0,75	-0,26	Aver.	0,24	0,11	0,13	0,13	-0,04	0,20

Source: Own calculations of the authors.

Conclusions

Entrepreneurial and innovation performance is unevenly distributed across the European Union. The Western and Northern member countries tend to report more favourable results in terms of economic competitiveness and technological readiness, while the Eastern and Southern parts register weaker performances. In order to keep up with the changing global environment and reduce the existing internal economic and social irregularities, the European Union developed a complex policy framework aimed to boost its competitiveness. It has been established a range of programmes and strategies intended to direct funding in the areas of strategic importance irrelevant i.e. innovation and re-definition of entrepreneurship. By analysing the indicators of economic competitiveness it was demonstrated that the initiatives promoted by the European Union in the area of innovation and entrepreneurship proved to have a beneficial effect upon overall European economic performance. Nevertheless, there are considerable development gaps between the "old" and "new" European member countries as well as between the Northern and Southern counterparts. Thus, it can be explicitly noted that the European Union is composed by two groups of countries and namely those forming the economic "core" i.e. Scandinavian nations, Benelux, Germany, France, Italy and the United Kingdom and the periphery, the rest of the nations. Consequently, it is necessary to underline that the "core" is much more advanced in terms of public and entrepreneurial innovation having higher levels of economic competitiveness while the periphery struggle with significantly less competitive environment. In its present form, the European Union lacks financial and institutional power to develop more comprehensive policies capable of reducing development gaps among the EU countries. Present policies promoted by the European Union based on the principles of "social market" demonstrated low effectiveness as they cannot be efficiently applied on the whole territory of the Union due to the existence of development gaps. Thus, in the lower developed "peripheral" nations which register lower competitive entrepreneurship and innovation readiness, it is not justifiable to apply policies requiring higher governmental participation in the economy since this fact will lead to further suppression of the business environment. In such conditions, the business, population, financial resources will migrate towards developed EU regions where opportunities are higher. The EU is trying to compensate these losses in terms of economic potential by provision of funding through different instruments, nevertheless, the beneficial effects are not sufficient to compensate the economic loss. In such conditions, it is accepted the H1 which mentions that entrepreneurial innovation could not be compensated with public driven innovation policies and funding. In these circumstances, the European Union should re-define its policy framework providing more favourable business opportunities and reducing bureaucratic pressure and over-regulation, enhancing business potential of the member countries. This fact is particularly valid for peripheral nations of the European Union the business environment of which should be offered more evident entrepreneurial opportunities. In the conditions of changing global environment, trying to export the model of "welfare state" on the whole territory of the EU, including regions with prominent business and those registering weaker entrepreneurship will reduce the overall

community's economic competitiveness since additional implication of the state in the economy requires financial resources. Accordingly, it is advised that the decision makers in the European Union should re-define policy framework putting the accents on more liberalistic principles, the fact which is necessary to be accompanied by stronger political and economic integration among nations.

Acknowledgement

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