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Entrepreneurial Innovation: the European Union perspective

Augustin Ignatov[1]

Abstract: Entrepreneurship is the driving force of economic development and progress. A successful state, first of all, provides favourable conditions motivating the businesses to grow and flourish. Presently, the European Union is developing unevenly with multiple economic misbalances across the community, the West and the North being more competitive than the South and the East. The aim of the present research is to examine the framework of interdependence between the degree to which the governance quality and economic freedom in the European Union are supporting entrepreneurial activities and the performance of the community in terms of entrepreneurial innovation. The results reached through applying both qualitative and quantitative analyses show that the interdependence between entrepreneurial innovation and regulatory efficiency is strong for many of the European Union states which is determined by multiple factors including the institutional and economic ones. Also, the present paper underlines the importance of the proper regulatory framework for the efficient development of business innovation. The future research on this matter could consider in depth the impact of socio-cultural environment, its influence on the quality of governance and the impact of both upon the European entrepreneurial innovation.

Key words: economic freedom, entrepreneurship, European Union, innovation investments, market behaviour, venture capital.

JEL Classification: F15, F43, P16, O30, O38

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1. Introduction

One of the main goals of entrepreneurs on the market is to achieve profit. The size of the profit augments the market competition which, in turn, stimulates innovation. The last is the driver of progress and welfare, since the overall economic efficiency is increased. Countries can develop their economic potential only through fostering their capacities in terms of innovation, entrepreneurship and competitiveness. Each of the

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mentioned elements is determined by a multitude of factors starting with governmental regulation, availability of resources and finishing with the pre-established consumer bias. Although the profit is the primary goal of entrepreneurs and innovation is the main method of keeping up with the increasing competition, the approaches to them vary depending on the legal & socio-economic environment.

The main driver of the economic development in the European Union is the common market comprising 28 European states. Namely the common market allows the business to reach a higher number of consumers without meeting administrative, trade or investment barriers. Moreover, 19 of those states joined the Eurozone sharing a common monetary policy and currency. The general regulatory framework, including in the business field, is harmonized for all the member states, despite the existing fiscal legislation heterogeneity. Nevertheless, the economic activity across the Union is fluctuating, not to speak of entrepreneurial innovation, the main focus of the present research. These discrepancies could be remarked even inside the Eurozone. In these conditions, it has been proposed to determine how the regulatory framework expressed through governance quality and economic liberty affects the entrepreneurial innovation performance of the European Union states. To reach this goal, the attractiveness of countries in terms of entrepreneurial innovation will be assessed through the prism of Global Venture Capital and Private Equity Country Attractiveness Index which comprehensively describes the influence of both economic and social factors upon business innovation. Namely, this index characterizes the best the willingness of entrepreneurs from a certain country to undertake innovative risk-related projects. Thus, the propensity of business environment to invest in innovative projects will be also described. Afterwards, the willingness will be compared with the economic freedom and governance quality. Finally, it is proposed to find the main sources of financing entrepreneurial innovation, i.e. debt securities, banking deposits or both.

Despite the multitude of materials available on the subject, the present research highlights the importance of fostering entrepreneurship in order to stimulate innovative performance. Also, it deals with the question as to why excessive bureaucratic pressure and taxes de-motivate businesses to undertake innovation risk related projects. Finally, the present research underlines the main levers which can be used to foster entrepreneurship and innovation.

2. Literature review

In order to have a deeper comprehension of the relationship between entrepreneurship and innovation, a subset of literature has been selected. Thus, according to Ezell & Marxgut (2015), cultural environment (i.e. the totality of beliefs, behaviours, customs and practices characteristic for a society determining individuals' personality) has an important impact on the countries' innovation and entrepreneurial performance. The attitude towards risk and failure is determinant in assuring innovation breakthrough. The cultural difference between Europeans and Americans is that the latter have a higher tendency to tolerate risks which is the base for the US economic success. Thus, in the last sixty years, the USA has contributed with 52 new large companies compared with only 12 of the same size emerging from Europe. Some of the impediments hindering innovation development in the European Union regard complex regulatory environment,

less capital available to finance risky activities and attitude towards risks. Hofstede (2011) highlights that cultural environment is determinative for the success of entrepreneurship. Even if the countries are affected by technological change, the culture tends to be steadfast unless serious shifts are pushed through by government to stimulate business activity. China is one of the few cases where has been made a considerable move from traditional to globalised business culture in a relatively short period of time. This major change could only appear through abolishing barriers to businesses irrespective of their origin. According to KPMG (2016), when it comes to collaboration in the field of innovation, Europeans tend to be anchored to their comfort zone. It has been found that only a small portion of firms pursue open innovation, since it requires significant cultural and operational transformation. Yet, the firms which succeed in building innovation networks prove to be more competitive and flexible. It is believed that in the field of innovation the main competition regards attraction of talented employees.

Estrin & Mickiewicz (2011) underlined that one of the most severe consequences of communism was the eradication of entrepreneurial traditions. When the centralised economy fell, the population lacked entrepreneurial experience, abilities and skills which transformed the transition into a "nightmare". It was the period of "wild capitalism". Yet, these effects were less evident in the former satellite states of USSR than in the proper USSR because of lighter form of communism. 27 years after the fall of Iron Curtain, the remnants of communism still divide Europe. This effect can be assessed even within a nation, for instance Germany. In spite of multiple investments from the West, Eastern Germany still faces lower levels of entrepreneurship and welfare. Didero et al (2008) underlined that European policies should be driven to smooth the disperse business environment across the Union. This should be made in order to provide a greater space for developing projects without which it is not possible to cumulate the necessary critical mass to undertake ambitious projects. Regulation should be oriented towards stimulating innovation-related investments without restricting and imposing sometimes bizarre regulation over all the dimensions of socio-economic life. At the same time, Bosma (2009) marks that the European entrepreneurial environment is not uniformed. There are important differences even inside the Eurozone which does not favourably influence entrepreneurship. These differences are expressed in terms of business regulation, taxation which creates economic misbalances.

Pelkmans & Renda (2014) mentioned that there is a high complexity interaction between innovation and regulatory framework. Under certain circumstances, regulation can serve as an important stimulus motivating entrepreneurs to undertake innovation-related projects, at the same time, it can create impediments disabling innovation due to the increase of regulation compliance costs. It has been found out that regulation in the EU is determinative when motivating or not entrepreneurs to develop ambitious projects and incurring risks. There are several types of regulations including general, innovation specific and sector specific. General regulation refers to overall business i.e. bankruptcy, administrative and compliance costs determining transaction efficiency. Specific and sector regulation tackles the problem of minimising cost of innovation (Pelkmans & Renda, 2014). Regulatory framework is determinant when stimulating companies to undertake entrepreneurial innovation. It determines the success of whole innovation-driven industries which are sensible to any changes in regulations and are characterised by high levels of uncertainty. A proper economic regulation is capable to foster competitiveness which in turn motivates the firms to undertake innovation-related process to

price competitiveness and introduce product innovation to gain competitive advantages on a particular market (Blind, 2016). Competition is an important driver of entrepreneurial innovation. The main task of regulation is to assure favourable competitive environment for all participants on a certain market including entrepreneurs. To improve competition, it is necessary to minimise the cost of market entry and exit which will foster flexibility and mobility increasing entrepreneurship (Ignatov, 2017). Thus, it can be expected to develop a more dynamic business environment which is capable of generating more ideas, action and, therefore, more economic activity. The entrepreneurial strength is boosted since there are enhanced chances of a successful start-up and at the same time there are minimised difficulties regarding business closure. This can be achieved by optimising bureaucratic procedures linked to the operations of business, i.e. registration, getting any kinds of permits, easing fiscal accountability, making more efficient closing procedures and so on. Competition will motivate businesses to innovate and invest in R&D activities to keep up with the environment (Szyszczak, 2009). Sirbu et al (2017) points out that competition is important in every aspect, yet there are rigid markets requiring high levels of resources which are thus unavailable for a great number of participants. Proper anti-monopolies and oligopolies rules should be in place to motivate firms to compete with each other to allow consumers to benefit the most. Moreover, Oganisjana (2013) stresses that entrepreneurship is more than a simple combination of knowledge, attitudes and skills. It is a specific environment comprising regulatory and cultural aspects functioning as a whole. European regulation is too restrictive to stimulate entrepreneurship since there are important regulatory, administrative and compliance burdens relating to business operations. Pelkmans & Renda (2014) underlined that rigid regulations undermine innovation and entrepreneurship and there are important burdens imposed upon business by the EU's acquis which needs an adjustment.

Entrepreneurship should be complemented by behavioural motivators which is a trigger mechanism towards increased business activity. Hogg et al (2006) stressed that entrepreneurship in a country is rather determined by the established consumer behaviour on the market. It regards the perception, attitudes, memory, and values of consumers. You will be successful on a market only through meeting the demands of your clients. Chandra Lal et al (2015) mentioned that the consumer as a decision maker determines what, when and how something will be produced. At the same time, consumers should be seen as the main driver of innovation, since they are powering all entrepreneurial activities. Furthermore, the differentiation among the European countries could be remarked even in preference for packaging. Thus, entrepreneurs pay higher attention to satisfy consumer peculiar preferences, reducing the concentration for developing technologies requiring important financial and intellectual resources.

An important link between the capital and entrepreneurs is so called "business accelerators". They are in charge of providing information to potential investors and funding for the newly established start-ups. Accelerators provide different instruments for the market participants, i.e. funding networks, mentoring, and information services, in order to select the "brightest" ideas worth of considering. If the country tends to re-ignite its entrepreneurship and innovation, it should provide favourable conditions for accelerators which would act as a binding chain between financing and projects' implementation. There should be enough competition to minimise intermediation costs (Dempwolf et al, 2014). Economic clusters are the main drivers of competitiveness and innovation in Europe. They focus on building strategies and brands and less on business development,

i.e. export promotion, joint purchasing. It has been found that cluster managers in Europe have permanent contact with firms' representatives and less with financial institutions. European clusters tend to concentrate on common market rather than reach international ones since they lack internationalisation strategies and global connections, with only 10% of all European clusters being integrated into the global networks. It is because of their lack of resources (including financial and time-related ones) to boost their internationalisation. It is necessary to remind that clusters are the structures responsible for economic competitiveness of a country or region (Ketels et al, 2012). The European Union is seeking to re-ignite its entrepreneurial and innovation capacities – it is forced in this direction by internal factors such as low levels of economic growth and external ones including the raise in the global competition. The existing socio-economic differentiation among the member countries of the European Union is seen as an impediment towards mobilizing national efforts in overcoming economic and social difficulties. This fact stands for poor integration of small and middle size enterprises into pan-European economic clusters. The cultural segmentation across the Europe is impeding the consolidation of a sufficiently large market absorption capacity necessary to provide enough motivation for companies to risk (Blind & Georghiou, 2010). Röhl (2016) adds that entrepreneurial confidence is an important factor driving economic growth in a country. In the European Union there can be observed a declining degree of entrepreneurship due to increasing costs of failure. This fact fuels the growing risk aversion, businesses being reticent to start innovative projects since they are facing high uncertainty. Moreover, the European culture of second chance is underdeveloped and most of EU countries lack entrepreneurial education. It is necessary to ensure that the education system at different levels (primary, secondary or university) fosters the knowledge, competences, skills and motivation to support the future business success. Collard (2009) stated that investment is the driver of economic growth. It requires a developed financial infrastructure to mobilize disperse savings into consolidated resources. The cost of intermediation in this case should be minimal in order to allow the businesses to fund their activities with cheap money. Generally, the vast majority of investors tend to minimise their losses than maximising benefits. The risk aversion is an important obstacle towards innovating, since most of the related projects can fail. Nevertheless, few of those who risk prove to report impressive gaining. In contrast to their American counterparts, European entrepreneurs are less determined to undertake ambitious projects, proving to be more conservative. An imperative condition to motivate entrepreneurs to assume risks is the presence of stable macroeconomic environment. Thus, according to Ignatov (2016), macroeconomic factors (i.e. prices & supplies stability, political and economic security) should not be underestimated when speaking about entrepreneurship. A relevant example in this regard is to assure stable energy supplies. Thus, in a market full of uncertainties it is necessary that there are several known variables which are crucial for businesses when determining whether to invest and pursue long run development strategies.

According to the reviewed literature, entrepreneurial innovation depends on the cultural environment which dominates within a certain nation which comprises the totality of beliefs, behaviours, customs and practices determining individuals' personality. Moreover, the dominating culture within the society influences the degree of risk aversion a characteristic important for entrepreneurship. Moreover, business competitiveness is determined by the established entrepreneurial traditions comprising entrepreneurial experience, abilities and skills dominating within a society. Furthermore, entrepreneuri-

al innovation is conditioned by the existing regulatory framework which either stimulates or restricts business activities. It establishes specific operating environment comprising competition and administrative compliance costs determining overall entrepreneurial efficiency. Also, there are other factors motivating business innovation, including the level of development of financial markets, cost of funding business activities, existing capital and its structure as well as managerial and organisational effectiveness. In this respect, it can be observed that there are numerous factors determining entrepreneurial innovation, yet the present paper evaluates the degree to which entrepreneurial innovation is interdependent with governance quality and economic freedom as indicators of regulatory effectiveness. Moreover, it identifies what is the driving force of entrepreneurial innovation, i.e. debt or savings.

Therefore, the present paper formulates the following research hypothesis (H1A): regulatory efficiency expressed through governance quality and economic freedom is interconnected with the performance of the European Union states in terms of entrepreneurial innovation. Consequently, the respective null hypothesis (H0A) states that the entrepreneurial innovation performance in these states is independent from the regulatory framework. Also, it proposes another hypothesis (H1B) declaring that the entrepreneurial innovation in the countries of the European Union is interconnected with debt and/or savings level. The null hypothesis in this case (H0B) establishes that there is no interdependence between these variables.

3. Methodology

In order to have a better perspective on the subject it has been decided to apply both qualitative and quantitative research of the issues related to entrepreneurship and innovation among the European Union member countries. In this respect, it is possible to comprise a wider set of information which in turn allows us to identify relevant findings and draw relevant conclusions as a result.

Qualitative analysis regards the entrepreneurial behaviour in the market of innovation from the perspective of risk propensity of entrepreneurs at the level of European Union countries. A relevant index characterising this direction was selected, namely the Global Venture Capital and Private Equity Country Attractiveness Index. The main advantage of this index regards its multidimensional and comprehensive coverage of economic activity, size and liquidity of capital markets, investor protection, fiscal obligations and human capital availability. Also, there are particularly important areas for the present paper considered by this index including entrepreneurial culture, ease of doing business, quality of organisational management and innovation opportunities, which are domains difficult to quantitatively assess. The main objective to be achieved by analysing the specified index is to identify which EU countries lead in terms of venture-innovation. Also, it is necessary to underline which countries are more suitable for investments from the perspective of social, cultural and economic factors including economic activity, entrepreneurial culture and social environment. In this respect, the present research creates a fundamental picture of countries' favourability for innovation-related investments and entrepreneurial attitude for developing venture projects.

Quantitative analysis completes the fundamental picture through assessing relevant interdependencies between entrepreneurial innovation performance and economic free-

dom as well as the quality of governance as indicators of regulatory effectiveness. The business per capita R&D expenditure was selected to quantitatively assess the degree to which entrepreneurs from a certain country are able to finance innovation-related projects. Therefore, it is possible to evaluate and compare the size of innovation investments in different countries of the European Union. As a result, the leading and following nations in terms of entrepreneurial innovation can be determined. In this way, it quantitatively values the efforts entrepreneurs from a specified economy undertake in the innovation sector. By calculating the indicator's per capita value, we are provided with the opportunity to make abstract of a country's sheer economic size and consider only relative to population innovation investments. Afterwards, the paper examines the correlation coefficient between business per capita R&D spending and governance quality. In this respect, it is possible to determine the degree to which entrepreneurial innovation and governance quality are inter-related. Also, the research evaluates the interdependency between the business per capita R&D expenditure and the countries' scores according to the Index of Economic Freedom. The correlation coefficient between these datasets allows identifying the degree to which the innovation-related business activity in the researched countries is correlated with economic liberty in terms of business, trade, monetary, investment, financial and fiscal freedom, government spending, and protection of property rights. Thus, the research presents the macroeconomic overview of the inter-dependency between innovation and general economic and regulatory environment. At the same time, the present paper aims to establish what is the entrepreneurial driving force powering innovation. Therefore, it evaluates, first, the correlation coefficient between business per capita R&D expenditures and debt securities percentage of gross domestic product (GDP), and second, currency and deposits percentage of gross domestic product (GDP). Consequently, it can be identified whether entrepreneurial innovation is determined either by debt issued by companies/firms, different structures of government or by the level of savings of population represented by currency and deposits, or by both. It is necessary to highlight that the datasets used to assess the correlation coefficients comprise the period of 2006-2016.

Accordingly, it is possible to underline the relation between the regulatory framework efficiency reflected trough governance quality and economic freedom and the performance of countries in terms of entrepreneurial innovation from the perspective of the European Union member states.

4. Results

4.1 The attractiveness of countries in terms of entrepreneurial innovation

Innovation investments involve a high degree of risk, entrepreneurs will undertake them only if there is a sufficient degree of benefit, i.e. increase of the company's competitiveness, minimisation of costs, expansion on new markets or increase of profitability. An economy will be attractive from the point of view of venture capital as long as there is an efficient socio-economic environment which does not increase the risks and diminish rewards. By analysing the Global Venture Capital and Private Equity Country Attractiveness Index it is possible to highlight the countries with the most attractive economies for entrepreneurs from the point of view of venture capital and innovation or, in other words, most propitious nations for entrepreneurial innovation (table 1).

Table 1: The Global Venture Capital and Private Equity Country Attractiveness Index

	2016		2013		2010			2016		2013		2010	
	Rank	Score	Rank	Score	Rank	Score		Rank	Score	Rank	Score	Rank	Score
BE	18	81,6	16	83,6	17	61,1	LT	40	64	43	59,9	40	40,4
BG	55	58	53	53,4	55	30,6	LU	30	68,9	41	60,2	24	54,6
CZ	56	57,6	35	66,4	34	45,5	HU	47	60,1	42	59,9	37	41,1
DK	12	85,4	11	86	12	67,7	MT	69	50	*	*	*	*
DE	9	88,6	7	91,7	10	69,1	NL	16	84,4	14	84,9	9	70,1
EE	44	62,6	51	54,2	35	44,5	AT	23	78,5	22	79,7	19	58,6
IE	17	82,2	23	78,1	21	58,3	PL	25	73,7	28	70,3	31	45,8
EL	66	53,2	67	47,8	39	40,7	PT	31	68,6	37	65,5	27	49,5
ES	26	73,7	27	72,2	20	58,3	RO	46	61	62	50,9	47	38,1
FR	21	80,3	19	82,2	16	65,2	SI	50	59,1	45	58,6	33	45,6
HR	80	46	65	48,8	45	38,6	SK	61	54,2	44	59,1	41	40,3
IT	34	67	31	69,7	29	47,5	FI	14	85,2	21	80,2	15	65,9
CY	67	52,7	63	50,1	*	*	SE	15	84,6	9	88,4	11	69
LV	52	58,7	60	51,1	50	35,6	UK	2	95,5	3	95,4	3	84,3

Source: IESE Business School, University of Navarra & EM Lyon Business School. Available online at: http://blog.iese.edu

Thus, United Kingdom and Germany have the most auspicious economies for developing innovation-related projects and venture initiatives. During the researched period, UK has increased its position to the second most attractive country worldwide while Germany recorded its highest position in 2013, the seventh, and the 9th in 2016. These states are followed by Denmark, 12, Finland, 14, Sweden, 15, Netherlands, 16, Ireland, 17 and Belgium, 18. By classifying the EU countries by ranking groups 1 to 10, 11 to 20, and so on, it can be underlined that the overall ranking for 2010 is by far the best since 3 EU states out of 28 are ranked in top 10 and 10 countries in top 20. Moreover, 21 out of 28 were positioned in the first 40 states, data was not available for Cyprus and Malta. Compared to 2013 and 2016, only 15 and respectively 16 countries were ranked in top 40. Nevertheless, it can be underlined that the scores reported by the EU countries in this period have generally increased, yet it was not sufficient to keep up positions. Thus, it can be concluded that the European Union's entrepreneurial innovation attractiveness is stagnating due to the decrease in the EU member countries' rankings as related to other countries of the world. Consequently, the EU attractiveness for risk-related innovation projects is diminishing some of the causes being the declining attrac-

tiveness of the European Union countries from the point of view of venture projects, eroding entrepreneurial environment and more rigid regulatory framework. Furthermore, there is considerable heterogeneity in terms on entrepreneurial innovation attractiveness across the Union, with some nations having impressive performances and the others being weak in this field. Generally, the stagnation and polarised performances reduce the overall competitiveness of the community and it risks becoming a periphery of the world's entrepreneurship.

As a result, it is inferred that the regulation in the European Union became more rigid, providing fewer opportunities for entrepreneurs. The social orientation of the European economy in detriment to the market efficiency also de-motivates entrepreneurship, especially small and medium sized businesses. Rigidity of regulation and high bureaucratic pressure determine the business to search for new markets with greater opportunities and rewards even if they could face higher degree of risk. Moreover, considering the existing differences in the European Union regarding entrepreneurial innovation, a subsequent question arises - why is the entrepreneurial innovation so pronounced in some nations and ambiguous in others? Is the problem determined by the regulatory efficiency, sources of funding innovation or are there any more determinative factors, i.e. the socio-cultural ones?

4.2. Business R&D expenditure: indicator of entrepreneurial innovation competitiveness

Business enterprise R&D per capita expenditure (Annex 1) is one of the most important indicators representing the competitiveness of entrepreneurial sector and its innovation performance and was selected as a quantitative measure of entrepreneurial innovation. Accordingly, the higher is the level of the entrepreneurial R&D spending the more the business environment from a certain country is prepared to undertake ambitious projects requiring high organisation and coordination readiness. Consequently, this indicator is an important measure reflecting the level of entrepreneurial innovation development within a nation. Thus, in 2016 the most performant countries in terms of business R&D were Sweden with per capita R&D investments of 1070 EUR, followed by Denmark, 919, Austria, 896, Germany, 765, and Finland, 711, while the least competitive EU states in this field being Cyprus, 36, Romania, 23, and Latvia, 14. Thus, there can be noticed a colossal dis-equilibrium at the level of the European Union in terms of business R&D in high tech sectors. These discrepancies among the European Union nations in terms of entrepreneurial innovation decrease the growth prospects of the community as a whole.

The countries which have increased their R&D spending in the innovation-related sectors the most are Austria, plus 357 EUR within the period of 2006-2016, followed by Germany, 266, Belgium, 257, Denmark, EUR 251. Romania, Greece and Lithuania have enhanced their investments in this area, yet insignificantly, while Luxembourg registered a decrease of EUR 445. The countries which spend the least on business enterprise R&D are the least competitive European Union economies in terms of entrepreneurial innovation. Moreover, it can be observed that the most attractive countries from the perspective of venture capital tend to have stronger businesses capable of investing more in developing entrepreneurial innovation while those which are least attractive tend to have lowest R&D spending performances. Thus, Sweden has the highest

level of business R&D expenditure and is ranked as the fifth most attractive European economy from the point of view of venture capital, Denmark 2nd and, respectively 3rd, Germany 4th and, respectively, 2nd, Finland 5th and respectively 4th. Cyprus, Romania and Latvia have the lowest business R&D expenditure and respectively record low positions in terms of venture capital attractiveness being ranked 26th, 18th, and respectively 21st. This fact motivates the further differentiation of the European nations in terms of economic development and entrepreneurial growth. Consequently, the weakest states in terms of entrepreneurship and innovation should provide more favourable regulatory framework to attract and motivate businesses to undertake venture projects to revive their economic potential as to be capable of improving their economic power.

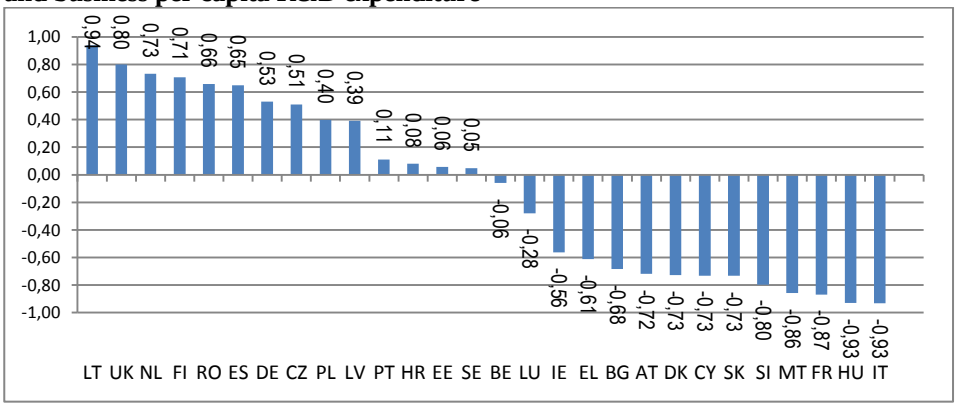
4.3. Governance quality & Economic freedom: indicators of regulatory efficiency

This paragraph is aimed to provide a quantitative analysis of the extent to which regulatory efficiency reflected through the prism of governance quality and economic freedom determines the entrepreneurial innovation performance of the European Union nations. Governance quality and economic freedom were selected as representative indicators of regulatory efficiency since they provide a comprehensive picture of overall institutional processes and their impact upon market relations. Thus, the higher the standards of governance, the more transparent, efficiency-driven and resilient an economy will be due to more clear and reasonable norms in terms of corruption control, accountability, government effectiveness as well as political and social stability. Consequently, economic freedom reflects the degree to which the existing regulatory framework within an economy allows entrepreneurs to operate without meeting tax, bureaucratic and integrity related barriers. Also, it considers the degree of market openness, judicial and regulatory effectiveness.

4.3.1. The extent to which governance quality determines entrepreneurial innovation

By analysing the information provided in the figure 1, it can be observed that there is high interdependency between governance quality and entrepreneurial innovation in the case of Lithuania (0.94), United Kingdom (0.80), Netherlands (0.73), Finland (0.71), Romania (0.66), Spain (0.65), Germany (0.53), and the Czech Republic (0.51). Medium weak positive interconnection is representative for Poland (0.40), Latvia (0.39). 6 nations including Portugal, Croatia, Estonia, Sweden, Belgium and Luxembourg record weak positive or negative correlation coefficients while the rest of the European Union nations register strong negative correlation. The weak and strong negative interdependence between these indicators could be explained by the differences in the policies the states have promoted during the period of 2006-2016 as well as by the influence of various socio-cultural factors which are out of quantitative assessment. Moreover, weak or negative correlations could result from the structural differences of the economies examined since one can direct its efforts towards some sectors while another can orient its attention to other sectors, i.e. social ones. Generally, it can be observed that for 8 of the EU countries governance quality is crucial to enhance entrepreneurial innovation.

Figure 1. Summary of correlation coefficient between aggregated governance score and business per capita R&D expenditure



Source: Own calculations based on data provided by the World Bank and Eurostat, code [rd_e_gerdtot]

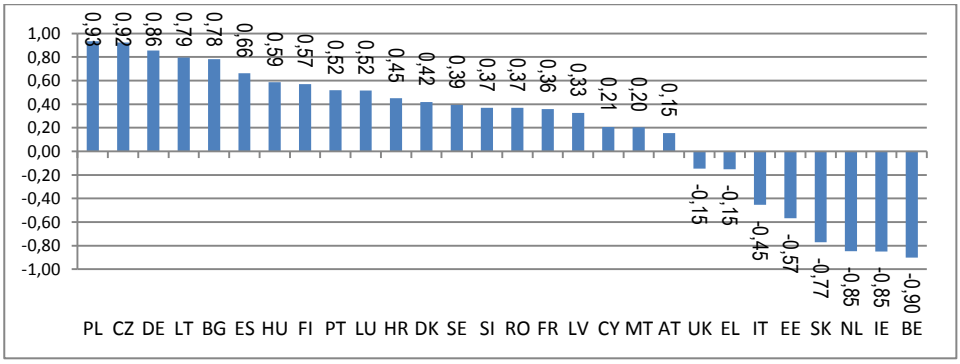
4.3.2. Economic freedom

Economic freedom is one of the most important factors determining entrepreneurship and consequently innovation as it reflects the dynamics in the decisive fields for business activity, including the rule of law, bureaucratic burden, regulatory efficiency and economic openness. By calculating the correlation coefficient between the score according to the index of Economic Freedom and per capita business enterprise R&D expenditure (figure 2) it can be demonstrated that for the majority of the EU countries economic liberty score is interdependent with entrepreneurial innovation. Thus, 10 out of 28 states record strong correlation, i.e. Poland (0.93), the Czech Republic (0.92) to Luxembourg (0.52), while 7 medium-weak correlations starting with Croatia (0.45) and finishing with Latvia (0.33). At the same time, it can be noted that 11 out of 28 countries registered weak positive to strong negative correlations i.e. Cyprus (0.21) to Belgium (-0.90). These coefficients can result from the specific differences and characteristics of the social, cultural and economic environments. Furthermore, they can be influenced by political fluctuations, governmental policies, public procurement and business investments cycles.

Thus, for some of the European Union countries, improving the level of the economic freedom will be an important step forward towards making their economies more dynamic and, as a result, increase the level of entrepreneurial innovation. According to OECD (2017), general government revenue % of GDP in the European Union in 2016 was 44.6% (growing with 1% over the period), which means that almost half of all of the economic welfare created within the community is bureaucratically controlled in comparison to only 32.9% in the USA, and the tendency is growing. Therefore, it is necessary to simplify the excessive regulation in order to minimise governmental control over the economy which is impeding venture capital and innovation-related projects where increased flexibility is required. Therefore, the businesses should be offered a more competitive environment which is decisive to consolidate innovation. The present rigid entrepreneurial regulation in most of the European states reduce the flexibility of

businesses and increase the operating cost, which are conditions that have a negative impact upon the overall business activity. Unless more favourable for business liberalistic regulation is provided, the European Union will stagnate and lose competitive ground to more adaptable economies-developing and emerging countries.

Figure 2. Summary of correlation coefficient between Index of Economic Freedom Score and Business per capita R&D expenditure

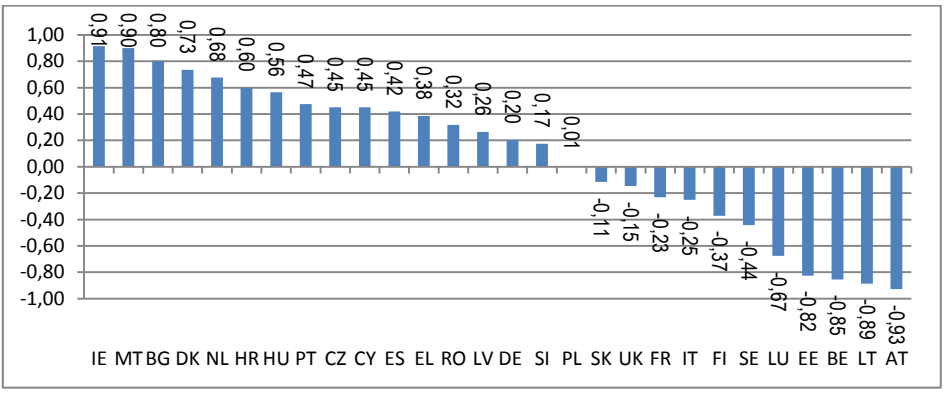


Source: Own calculations based on data provided by the Heritage Foundation and Eurostat ,code [rd_e_gerdtot].

4.4. What is the source of financing entrepreneurial innovation?

The next step of the analysis is to find out what is the driving force of entrepreneurship, i.e. debt securities, currency & deposits, or both. According to figure 3, it can be stated that for Ireland (0.91), Malta, Bulgaria, Denmark, Netherlands, Croatia, Hungary, Portugal, Czech Republic, Cyprus and Spain (0.42) debt securities are strongly or medium-strongly interconnected with the level of entrepreneurial R&D expenditure. Therefore, for these countries debt is one of the drivers of innovation. Thus, the national governments in these states should undertake initiatives to make the market of debt securities more liquid since they facilitate the investments of the business sector into innovation. In this respect, entrepreneurship is boosted, and the reward opportunities are increased. Regulation allowing stronger dynamics in the high tech sector will enhance the business adaptability and resilience. Nevertheless, it is necessary to remark that 5 nations register weak positive correlation, i.e. Greece (0.38) to Slovenia (0.17) and Poland (0.01) and other 11 nations are characterised by negative correlation coefficients. This fact could be caused by the differences in the policies promoted, as well as heterogeneity of economic structure, the structure of financial markets or states' economic priorities. Furthermore, it is necessary to analyse the proper structure of debt which can have different motivations, i.e. consumption or investments not necessarily linked to entrepreneurial innovation.

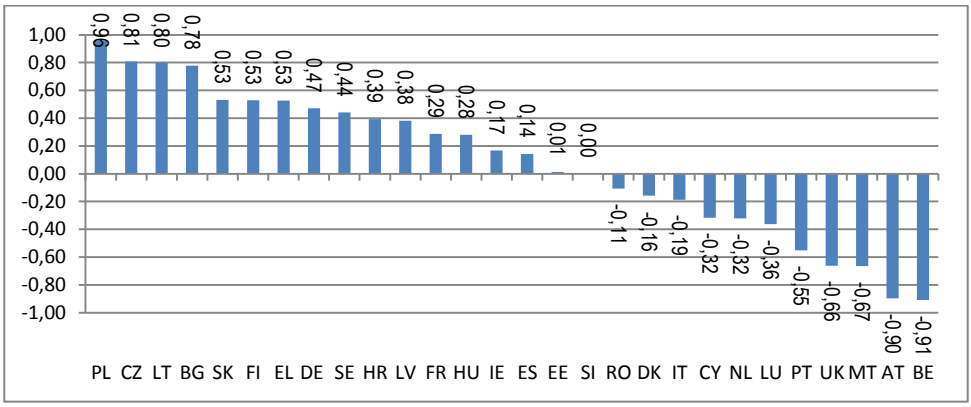
Fig. 3 Summary of correlation coefficient between Business enterprise R&D expenditure per capita & Debt securities percentage of gross domestic product (GDP)



Source: Own calculations based on data provided by Eurostat, indicators' codes [rd_e_gerdtot] & [nasa_10_f_bs]

As it can be noticed in figure 4, there is strong correlation between business R&D spending and the level of currency and deposits for the following states - Poland, Czech Republic, Lithuania, Bulgaria, Slovakia, Finland and Greece. Thus, 7 countries out of 28 have strong correlation coefficient, and 6 medium to weak correlations, i.e. Germany (0.47) to Hungary (0.28). This fact demonstrates that for many EU states the growth in the level of deposits and currency favourably influences the investments of businesses for innovation projects. From the point of view of the present research, the stable monetary policy promoted in most of the European Union states favourably influences the trust of population and of business in the banking system which facilitates directing savings to innovation investments. Monetary stability is one of the advantages of the European Union compared to other countries, since trust allows developing long term projects, including those in the field of innovation and venture capital. Thus, according to Eurostat (2016), the average annual rate of inflation during the period of 2006-2016 in the European Union was 1.8%, and 1.5% in the Eurozone. Nevertheless, it is necessary to mention that 15 nations out of 28 registered weak positive correlation, i.e. Ireland (0.17) to strong negative one i.e. Belgium (-0.92). This differentiation could be explained by the heterogeneity of the economic structures and the availability of other instruments of financing innovation. Also, it can be stressed that bank deposits can be directed to economic sectors not necessarily connected to entrepreneurial innovation.

Fig. 4 Summary of correlation coefficient between Business R&D expenditure per capita & Currency and deposits percentage of gross domestic product (GDP)



Source: Own calculations based on data provided by Eurostat, indicators' codes [rd_e_gerdtot] & [nasa_10_f_bs]

Conclusion

Economic freedom, governance quality and entrepreneurial innovation are interdependent for many of the European Union member states, since business requires flexibility and transparent environment in order to succeed. This fact is particularly true when speaking about venture and innovation activities which are characterised by a high degree of uncertainty and inefficient regulation could raise the cost of business which in turn is by far not small. Thus, at the level of the European Union, the countries with the most attractive potential for innovation and venture investments record the highest business R&D spending and the best dynamics in economic freedom and governance quality.

Particularly, the relation between the level of business R&D spending per capita, governance quality and economic freedom has been analysed. Consequently, many of the European Union states registered either strong positive or medium correlation coefficients (Table 2). This demonstrates that entrepreneurial innovation represented through the respective level of business R&D expenditures is sensitive to the regulatory performance of countries. In this respect, governments should consider initiatives not to restrict the businesses' liberty, since doing otherwise will increase the costs including that of failure or of the start-up. Nevertheless, there are countries where there is no negative interdependence between these datasets, which can be explained by the heterogeneity of the environment in terms of policies promoted, socio-economic conditions, financial resources availability or the particular country characteristics.

Another important part of the research was to find out what is the relation between business innovation & the level of debt securities and of currency and deposits (table 2). Therefore, it could be underlined that for some of the European Union states the business R&D is interdependent with the level of debt securities in the economy. The same could be remarked for the currency and deposits, or even for both. Considering this fact, it is necessary to highlight that at the level of the European Union and of national states

should be improved the liquidity of financial markets and attractiveness of saving. The minimisation of costs in this field will boost the capacities of businesses to undertake innovation projects due to the opportunity of getting more accessible financing.

The present research has several limitations. First, it is necessary to find out in more detail how the socio-cultural environment effects the relation between entrepreneurial innovation, regulatory effectiveness and financing opportunities. Moreover, the impact of the European Union policies in the field of innovation and entrepreneurship should be studied, especially in regard to the Eastern European nations. Finally, there could be an analysis of the key determinants of entrepreneurial innovation success based on the experience of the most performing and innovative economies of the European Union.

Further research on this matter could be undertaken to determine the impact of culture and social conditions on the attitude towards entrepreneurship and innovation. Also, the most viable and appropriate social environments for innovative projects at the level of the European Union could be determined. Moreover, there could be a research identifying the impediments for entrepreneurship and innovation de-motivating business to invest in new technologies, especially in the countries with low per capita entrepreneurial R&D spending (Annex 1).

Table 2: Summary of correlations between Business R&D expenditure per capita & selected indicators

	Gov. quality	Economic freedom	Debt securities	Currency and deposits		Gov. quality	Economic freedom	Debt securities	Currency and deposits
AT	-0,72	0,15	-0,93	-0,90	IE	-0,56	-0,85	0,91	0,17
BE	-0,06	-0,90	-0,85	-0,91	IT	-0,93	-0,45	-0,25	-0,19
BG	-0,68	0,78	0,80	0,78	LT	0,94	0,79	-0,89	0,80
CY	-0,73	0,21	0,45	-0,32	LU	-0,28	0,52	-0,67	-0,36
CZ	0,51	0,92	0,45	0,81	LV	0,39	0,33	0,26	0,38
DE	0,53	0,86	0,20	0,47	MT	-0,86	0,20	0,90	-0,67
DK	-0,73	0,42	0,73	-0,16	NL	0,73	-0,85	0,68	-0,32
EE	0,06	-0,57	-0,82	0,01	PL	0,40	0,93	0,01	0,96
EL	-0,61	-0,15	0,38	0,53	PT	0,11	0,52	0,47	-0,55
ES	0,65	0,66	0,42	0,14	RO	0,66	0,37	0,32	-0,11
FI	0,71	0,57	-0,37	0,53	SE	0,05	0,39	-0,44	0,44
FR	-0,87	0,36	-0,23	0,29	SI	-0,80	0,37	0,17	0,00
HR	0,08	0,45	0,60	0,39	SK	-0,73	-0,77	-0,11	0,53
HU	-0.93	0,59	0,56	0,28	UK	0,80	-0,15	-0,15	-0,66

Source: Own calculations

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Annex 1. Business enterprise R&D expenditure per capita (EUR)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
SE	968	930	993	819	874	965	993	1039	946	1048	1070
DK	668	753	855	895	859	876	892	869	878	908	919
AT	539	585	630	611	661	680	778	802	856	874	896
DE	499	523	560	552	574	637	670	665	706	751	765
FI	782	855	963	910	907	939	869	848	809	740	711
BE	391	418	436	425	464	510	555	571	597	630	648
LU	1034	1040	996	954	797	813	591	592	616	607	589
IE	349	369	378	413	403	407	428	440	458	482	485
FR	378	389	403	411	425	444	460	466	472	476	:
NL	336	336	321	297	315	416	423	423	442	454	479
UK	346	374	324	283	300	318	332	340	384	444	415
EU	276	293	303	292	304	326	340	344	360	382	386
SI	146	149	198	209	247	322	342	348	334	315	296
IT	141	162	173	174	179	182	187	192	203	212	208
CZ	88	101	111	102	116	135	147	154	165	168	172
ES	149	166	177	164	162	159	152	148	146	149	155
HU	43	49	55	61	67	75	83	99	104	113	103
EE	50	61	67	66	88	183	165	118	95	106	106
PT	70	96	123	124	120	115	109	102	99	100	109
MT	51	52	53	49	59	72	82	73	79	86	89
PL	13	14	18	16	18	23	34	39	47	53	71
EL	33	35	45	49	48	44	41	44	46	52	67
SK	17	19	24	23	33	32	45	52	46	48	60
HR	25	33	44	36	34	35	35	42	39	45	41
BG	4	6	7	7	15	16	21	22	31	44	38
LT	16	20	19	17	21	24	27	29	40	37	36
CY	19	21	22	21	18	16	16	20	23	23	36
LV	25	19	16	14	19	19	16	20	29	19	14
RO	10	13	12	11	11	12	13	9	12	17	23

Source: Eurostat, indicator's code [rd_e_gerdtot]