INNOVATION AS A PUBLIC INTEREST OF A DEMOCRATIC STATE: A COMPARATIVE STATISTICAL ANALYSIS OF THE EU MEMBER STATES

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Today we are living in the so-called 6th wave of innovation, which is focused on the development of digital innovation, artificial intelligence and robotics. The role of the state in its fundamental function of looking after the public interest and safeguarding values in this process is of paramount importance, not only to support its success, but also because of the immeasurable consequences that these new innovative solutions have for society. Based on this background, the purpose of this paper is twofold: 1) firstly, through a descriptive summary of the review of existing literature and research, to highlight the arguments in favour of the need for the state's presence in innovation activities, through the support of different types governmental policy measures; and 2) to empirically verify which of those measures in force in EU member states are positivelly associated with the innovation success of countries. The analysis is based on the European Commission's Innovation Index Scorecard database, V-Dem Democracy and the Corruption Perception Index, and is statistically analysed using correlation tests and linear regression. The results show a clear political-geographical distribution of countries in terms of innovation performance along the lines of the development of democracies and democratic practices between 1) Western and 2) post-socialist democracies of Central and Baltic Europe and 3) Eastern Europe. The statistical analysis confirms a strong positive correlation between the high innovation performance of countries and an overall high perception of democracy, the rule of law and a low

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perception of corruption. The analysis also shows a correlation between the innovation index and variables measuring entrepreneurial education and research policies, while financial policy measures show moderate effects.

Key words: democracy; innovation; policy measures; entrepreneurial knowledge; correlation.

1 INTRODUCTION

In today's world, driven by a wave of artificial intelligence, virtual social media and virtual reality, the creation of related technological innovations is supposed to be closely linked to the ability to create and transform relevant support that enables the successful use of these innovations for real, everyday needs. Innovation is usually defined as new creations of economic and social importance, either or both of: 1) product innovation (i.e.: new – or improved – material goods as well as new intangible services as a matter of what is produced) and/or: 2) process innovation (i.e.: new ways of producing goods and services; a matter of how things are technologically or organisationally produced). If these innovations are guided or supported by government or international organisations that influence innovation processes by the use of various policy measures or instruments as tools to influence innovation processes we are beginning to talk about the existence of a specific innovation policy and the recognition of innovation as part of the public interest of the state (Borrás and Edquist 2013).

To the stated end, a number of traditional, mostly 'hard' regulation and economic policy measures, such as the share of GDP devoted to innovation incentives; as well as various 'soft' ones, aimed at the support and promotion of education and research, and campaign awarness by the state, should be applied and implemented in order to enable a public interest and value-based support of innovation. In this context, not only concrete policy measures, predominantly targeting science and technology have been applied (Borrás and Edquist 2013; Schot and Steinmüller 2018), but in successful and mature innovation cases, a broader political system support for innovation has been ensured through the 'culture of the entrepreneurial state' (Klein Woolthuis, Lankhuizen and Gilsing 2005; Mazzucato 2015; Maggor 2021). In this understanding, nation states or international organisations formulate new policies or adapt existing policies in response to changing circumstances, emerging issues or identified needs to address societal challenges, improve public services or achieve specific policy objectives to promote further growth and development through innovation, which is commonly known and defined as (innovation) policy (Radosevic 2012).

Based on such an understanding, the central aim of the paper is to examine the extent and potential strenghth the above-mentioned generally 'proverbial' state policy measures can leave on EU member states index of innovation growth in current times.[2] In doing so, we predict that there will be a strong support and consequently link between a state's innovation performance and its support for

[2] For a detailed and diverse measurement of national innovation performance, see also Iking (2009), Grupp and Schubert (2010), Adam (2014), Onea (2020).

various types of policy measures in supporting its innovation opportunities disclosed and as such also state's public interest towards innovations confirmed. In so doing various empirical data of the European Union (EU) countries will be applied to conduct the following:

- a description and classification of the current map of innovation development in and within the EU Member States and in relation to innovation in the world
- to examine and compare the strength and correlation of different types of policy measures to support innovation performance across EU Member States.

The main purpose of the paper will be to identify and assess how countries, through the use of different types of policy measures contribute to the development of new innovations, and thus to see how the states in EU understand the so-called public interest and values of innovation in their territory. We assume that it is possible to identify patterns of similarity between the development of innovation and government focus on the use of different policy measures to foster innovation. In the conclusion of the paper we will reflect on the existing typology of the EU member states innovation scale, with a special commentary on the types of governmental measures that, through a statistical analysis, prove to be strong supporters of innovation success.

2 ON THE ENTREPRENEURIAL STATE AND INNOVATION

The concept of the entrepreneurial state has been developed by advocates of a strong public sector that, through appropriate and well-designed public policy measures, promote innovative entrepreneurial private and public initiatives to foster innovation to ensure the conditions for an inclusive economic and social development power of the state (Lundvall 1992; Nelson 1993; Freeman 1995; Mazzucato 2015; Mazzucato 2016; Mazzucato 2018; Magor 2021).

Before unpacking the various policy measures that proponents of the entrepreneurial state cite to promote entrepreneurship and thus innovation through the state, it is necessary to say a few words about entrepreneurship in relation to innovation itself, while it is almost commonplace in various communities today to claim that innovation ecosystems emerge through the co-evolution of entrepreneurial activities and policy initiatives and related policy measures or instruments (Gifford, McKelvey and Saemundsson 2021).

Entrepreneurship ecosystems (EE) is often referred to as a 'new buzzword' among researchers and managers (Spigel and Harrison 2018), and can therefore be defined so broadly that what it really addresses is often left undefined (Duane and Webb 2007; Brown and Mason 2017).[3] Nevertheless, it is generally agreed that entrepreneurship here is mainly used to speak in the name of constant innovation (Sánchez 2011). Thus assessed, entrepreneurship brings benefits both at the macro or system level of innovation development and at the micro

[3] Historically, the term entrepreneur first appeared in Cantillon's Essai Sur la Nature du Commerce en Général (1755) to describe a person who buys products at known prices in order to resell them on the market at unknown prices. Later, the differences between the entrepreneur and the investor in terms of their expectations and the related evolutionary processes of their actions were pointed out. Schumpeter (1965) identified entrepreneurs as "creative destroyers" who break tight market cycles by introducing an innovation that allows them to set a price high above the cost of the resources used in production. Therefore, what really distinguishes the entrepreneur is a development process characterised by constant innovation (Sánchez 2011).

level of personal achievement and satisfaction, providing benefits of social and economic growth and development by being seen as the seedbed of new industries, renewal of industrial employment and wealth creation, and thus also social adjustment, class, race and gender barriers, as well as a source of satisfying individual satisfaction, fulfilment and achievement (Jack and Anderson 2002). Due to the wider public interest potential of entrepreneurship, governments also recognise it as an important part of their responsibility care and thus introduce special entrepreneurship policies and policy measures (Andersson et all 2012).

In the framework described, a so-called top-down exploration of innovation, as approached by policy makers through various institutional, financial and regulatory instruments of the state, is central, but as emphasised by Gifford, McKelvey and Saemundsson (2020), a bottom-up knowledge-intensive entrepreneurial activity and knowledge-related policies, implemented by various knowledge-based approaches and communities, can be a crucial point of ultimate success in order to progress towards sustainable development as well.

3 PUBLIC POLICY MEASURES AND TOOLS FOR ENTREPRENEURSHIP AND INNOVATION

Public poliy measures and tools refer to a set of different strategies, instruments and mechanisms that governments and public authorities use to implement and thus achieve policy goals and promote the public interest as defined by their own decision-making, executive or legislative institutions. Talking about different definitions of possible types of public policy measures and instruments (Howlett 1991; Vedung 1998; Hood and Margetts 2007), we can distinguish between the following sets, which serve either to restrict or to promote our activities by the state: a) institutional; b) legislative or regulatory; c) financial; c) education and research ones; d) information and campaigning. Thus, through institutional tools or measures, the state establishes its own set of institutions through the work of which it manages to tackle the set of its administrative and also public control and/or support objectives. With the adoption of legislative and other obligatory regulatory acts, documents and policies the state institutions define and manage the fields and issues of the state concern, while with financial tools they financially support certain fields and issues in a positive (like with a dedicated share of the state budget, provision of subsidies, offered to help) or negative (like taxes, tariffs, taken for state services) way. In addition to the above-mentioned instruments, which often have a direct and immediate impact, there are other types of policy instruments or measures, such as education, research, information and campaigns, which serve as a kind of soft aid provided by the state and which do not necessarily have an immediate impact. The latter types of policy instruments are mostly used to promote changes in attitudes, skills and values towards issues and topics of common interest and value systems of the wider society (e.g. public interest of the state).

Governments support for innovation includes a set of traditional regulation, institutional and financial offers (Freeman 1995; Mazzucato 2015, Piketty 2020; Gifford, McKelvey, Saemundsson, 2020), as well as specific public policy measures, especially in the area of entrepreneurial knowledge, education and research (Leitão and Baptista 2020).

As summarised by Borrás and Edquist (2013), governments and public agencies in different countries and at different times have used different types of policy

instrument (e.g. measure) mixes, including those that are highly political or purely instrumental in nature, in relation to the formulation and further implementation of innovation policy (Klein Woolthuis, Lankhuizen and Gilsing 2005; Schot and Steinmüller 2018; Maggor 2021).

4 GENERAL FACTS ABOUT (NOT)SUCCESSFUL POLICY MEASURES AND DEMOCRATIC EXPERIENCE

Although it seems that most of the time all the policy measures adopted by the states with the aim of positively supporting and stimulating the development and growth of entrepreneurial activities that promote innovation count, many scholars and researchers confirm through their studies that this is not always necessarily the case. It was Marianne Mazzucato, in her work on the Entrepreneurial State (2015), who, when advocating the existence of the public sector in the promotion of entrepreneurial activities and innovations, warned against six myths or false expectations about the state-supported drivers of innovation.[4] She analytically confirmed that the state's financial policy measures that support research for innovation, knowledge economy that promotes only patents, low taxation on business investment and the state's reserved attitude towards venture capital have negative rather than positive results for the successful development and growth of innovations and effective innovation policies in this regard (ibid., 101-123).[5]

Further, government educational policy measures initially linked with support for special curicular programs or courses on entrepreneurship knowledge through various educational ladders from compulsory to lifelong learning education cycles turn out to have positive impact on innovation success (Galvão, Marques and Ferreira 2020). This leads to the development of specific courses, being known as Entrepreneurial Education and Training (ETT), which represents academic education or formal training interventions that share the broad aim of equipping individuals with the entrepreneurial mindsets and skills to support their participation and performance in a range of entrepreneurial activities, including mindsets and socio-emotional skills such as self-confidence, leadership, creativity, risk-taking, motivation, resilience and self-efficacy; general awareness and perceptions of entrepreneurship as necessary skills for innovation success (Eurydice 2012; Valerio, Parton and Robb 2014).[6]

Last but not least, it is also a temporal and political-geographical moment that we need to respect when assessing the success of various public policy measures to achieve and promote certain files and issues of public interest. Undoubtedly, there has been a scientific voice of support for various entrepreneurial activities to promote greater innovation success for many years, but the nature of

[4] Mazzucato (2015, 83-112) identifies the following 6 myths about drivers of innovation and ineffective innovation policy: Myth 1: Innovation is about R&D; Myth 2: Small is Beautiful; Myth 3: Venture Capital is Risk Loving; Myth 4: We Live in a Knowledge Economy – Just Look at all the Patents!; Myth 5: Europe's Problem is all about Commercialization; Myth 6: Business Investment Requires 'Less Tax and Red Tape'.

[5] Interestengly, all the stated resonate with a worldwide survey conducted by 'real-life' entrepreneurs, who cite that in-adavnced skilled mindset and knowledge can often be a potential barrier to their entrepreneurial opportunity and success (GEM 2023).

[6] Even in the context of debates about whether entrepreneurship can be learned, there is a growing global interest in EET, as evidenced by the increase in course offerings in educational institutions (Kuratko 2005) and its inclusion in international agendas and programmes, such as the European Commission's Oslo Agenda and the Global Entrepreneurship Monitor.

innovation, the nature of public problems, as well as also political conditions have been changing all the time. Every era in which we live is full of more or less unpredictable natural and human, and therefore also political trials and tribulations faced by economically and politically stable and strong countries around the world, as well as much more fragile ones. Including in Europe, where due to their previous authoritarian political history, the post-communist democracies of Central and Eastern Europe (CEE) and the Baltic states face a very different situation from the older Western European democracies by Huntington's first wave of democratisation (Huntington 1991). In this context, fair and regular elections, the rule of law, human rights, including personal, social and economic freedoms, equality, tolerance, transparency and accountability are considered to be the fundamental foundations of democracy and preceding democratisation processes (Huntington 1991; Weingast 1997; Held 2006; Ágh 2022), and a direct negative correlation between economic freedom, entrepreneurship and innovation potential and weak state regulatory frameworks and corruption as the main cause of (also) economic inequality and non-transparency a case (Nwabuzor 2005; Uslaner 2009).

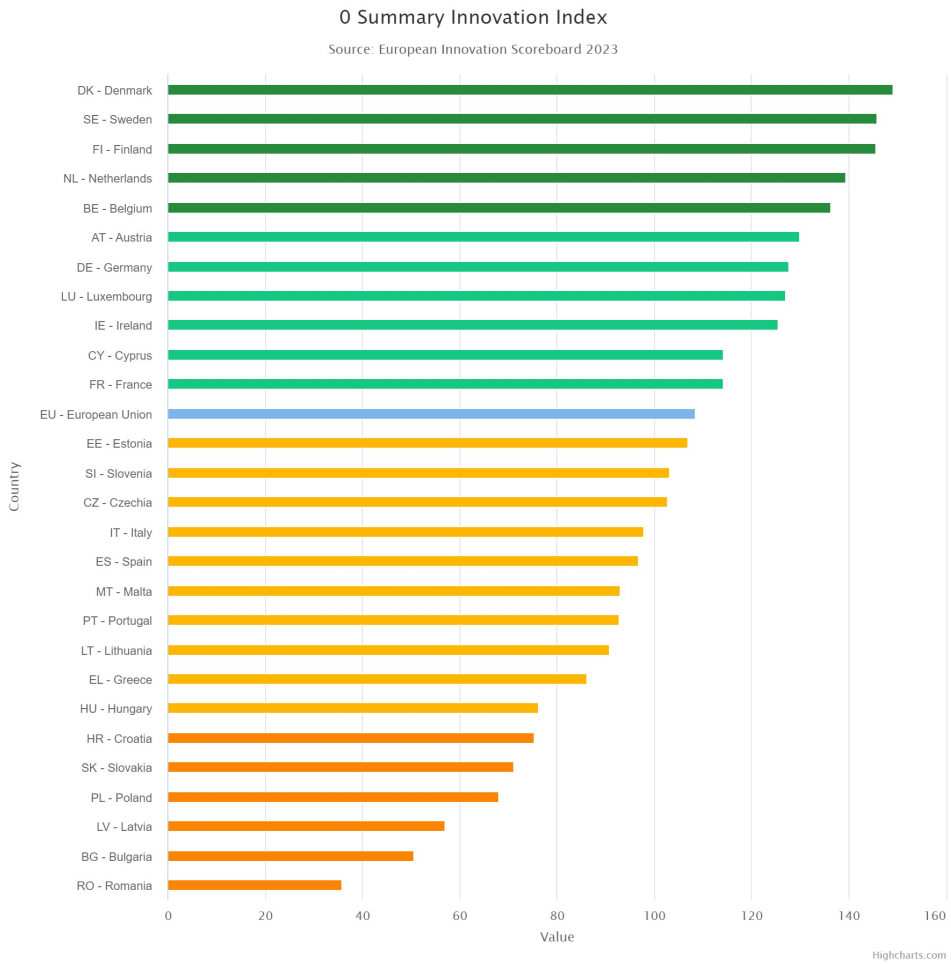
5 EU AND GLOBAL INNOVATION MAP

EU member states can be divided into 4 prevailing groups of country innovators according to the EU Innovation Scoreboard (2023), as monitored by the European Commission: 1) innovation leaders; 2) strong innovators, 3) moderate innovators and 4) emerging innovators.[7] As can be seen for the last year monitored in 2023 (Figure 1), the north- and west-centric old European demoracies are present in either the first or second group of innovation leaders or strong innovators (coloured dark and light green in Figure 1), while the southern European Member States and the post-socialist CEE and Baltic countries are all close to or below the EU average innovation score, either represented in a group of moderate innovator countries (Estonia, Slovenia, Czech Republic, Lithuania, Hungary, coloured dark orange in Figure 1) or emerging ones (Croatia, Slovakia, Poland, Latvia, Bulgaria and Romania, coloured dark orange in Figure 1). Hungary, coloured yellow-orange in Figure 1) or emerging innovators (Croatia, Slovakia, Poland, Latvia, Bulgaria and Romania, coloured dark orange in Figure 1).[8] See Table 1 in the Appendix for details.

[7] The following classification scheme is used to determine performance group membership (ibid): 1) Innovation Leaders are all countries with a relative performance in 2023 above 125% of the EU average in 2023; 2) Strong Innovators are all countries with a relative performance in 2023 between 100% and 125% of the EU average in 2023; 3) Moderate Innovators are all countries with a relative performance in 2023 between 70% and 100% of the EU average in 2023; 4) Emerging Innovators are all countries with a relative performance in 2023 below 70% of the EU average in 2023.

[8] The time series data between 2016 and 2022 show a similar picture, but with an interesting performance growth over time in some of the CEE countries. Positive growth over time can be observed in Estonia, Lithuania and Croatia, while Bulgaria even shows a decline in the innovation growth index. In Slovenia, Slovakia and Latvia there is no visible progress and in Romania, Poland, Hungary and the Czech Republic very little (EC 2023).

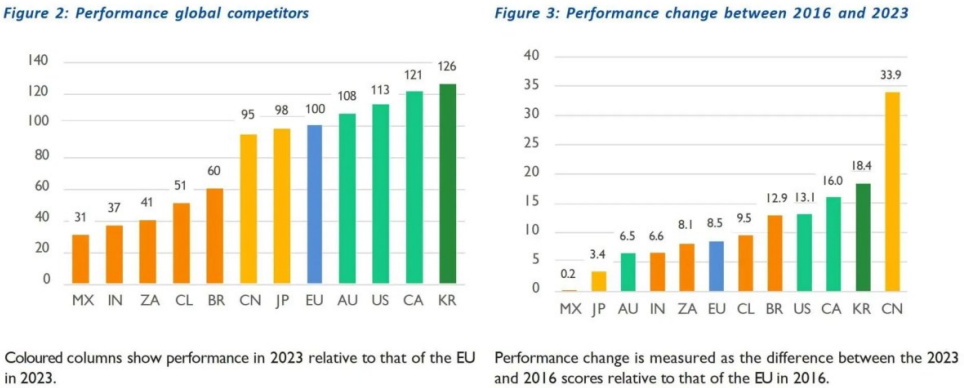
FIGURE 1: EU SUMMARY INNOVATION INDEX 2023



Source: EU Innovation Scoreboard (EC 2023).

Placing the current innovation performance of the EU Member States in a wider global innovation system (Figure 2), we can see that the EU is close to or slightly behind the best innovating countries from North America, Australia and the leading Asian countries of South Korea, China and Japan, as well as Brazil (ibid., 34-47).

FIGURE 2: PERFORMANCE OF EU MEMBER STATES IN THE GLOBAL INNOVATION SYSTEM ENVIRONMENT IN 2023 AND IN THE LAST SEVEN YEARS (2016-2023)



Coloured columns show performance in 2023 relative to that of the EU in 2023.

Performance change is measured as the difference between the 2023 and 2016 scores relative to that of the EU in 2016.

Source: EU Innovation Scoreboard (EC 2023, 6).

6 EMPIRICAL ANALYSIS

Methodological notes
The main motive of the empirical part of the paper is to use the database of the EU Innovation Scoreboard Index (2023) to test the described theoretical assumptions about the (dis)links between the innovation maturity of a country and its pursuit of regulatory and financial policy measures and more specific entrepreneurial and educational ones to achieve innovation success in the current period in the EU Member States. Thus, on the basis of the empirical background described in the empirical part of the paper, we assume that a higher level of support of a country through a variety of measures to promote business ideas and knowledge is reflected in a higher level of innovation maturity of a country, which is reflected through general regulatory measures to ensure a stable liberal democratic environment respecting the rule of law and democratic principles of transparency (e. e.g. the perception of a low level of corruption in a country), as well as support for financial, entrepreneurial and educational policy measures, but not necessarily (judging by the results of the literature review) also public financial support for R&D or related financial policy measures.

We have used the correlation test for the aims to test the below stated hypothesis, using the data provided on the website data.europa.eu in the European Innovation Scoreboard (2023), where the performance of EU national innovation systems is measured by the Summary Innovation Index (SII), which is a composite indicator obtained by taking an unweighted average of the 32 indicators (the underlined indicators in the Appendix to Table 2) (ibid).

H1: Correlation between selected policy regulatory mechanisms of democracy, such as the perception of the rule of law, the corruption perception index and thus the liberal democracy index, and the SII exists.

H2: There is no correlation between selected financial policy measures, such as the annual GDP growth, total entreprenurial activity, government procurement of advanced technology products and SII.

H3: Correlation between educational policy measures, such as the entrepreneurial and training scholl courses, employment in knowledge-intensive services and SII exists.

All the results will also provide an up-to-date picture of the so-called entrepreneurial state in the case of the EU Member States, with their different histories of democratic and state-centred practices, also in terms of the state's attitude towards either more liberal private or state-regulated monopolistic support for entrepreneurship and innovation.

7 RESULTS

In all of the following results, the correlation between two numerical variables has been examined.

From a statistical point of view, the following hypothesis was used as the null hypothesis in the correlation test: There is no correlation between the two numerical variables, and

Null hypothesis: there is no correlation between the two numerical variables (the correlation coefficient is zero).

Alternative hypothesis: there is a correlation between the two numerical variables (the correlation coefficient is not equal to zero).

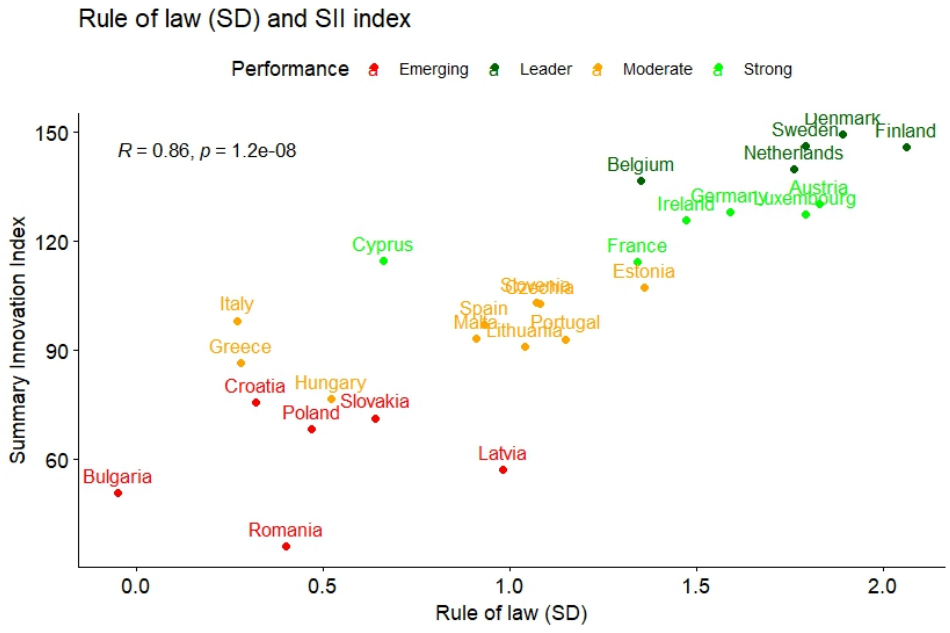
If the calculated p-value in the test is less than the 0.05 significance level, the results are statistically significant and the correlation is confirmed. If the calculated p-value is greater than the significance level, the results are not statistically significant and the correlation cannot be confirmed.

7.1 Strong positive impacts between regulatory policy measures of democracy and innovation

The first variable we are interested in is the Rule of Law. Trust is important for creating a business environment for undertaking risky innovative activities. Measures of the rule of law capture differences in the extent to which people have confidence in and abide by the rules of society. The Rule of law Index measures differences in the quality of contract enforcement, property rights, the police, the judicial system, as well as the prevalence of crime and violence (European Innovation Scoreboard 2023).

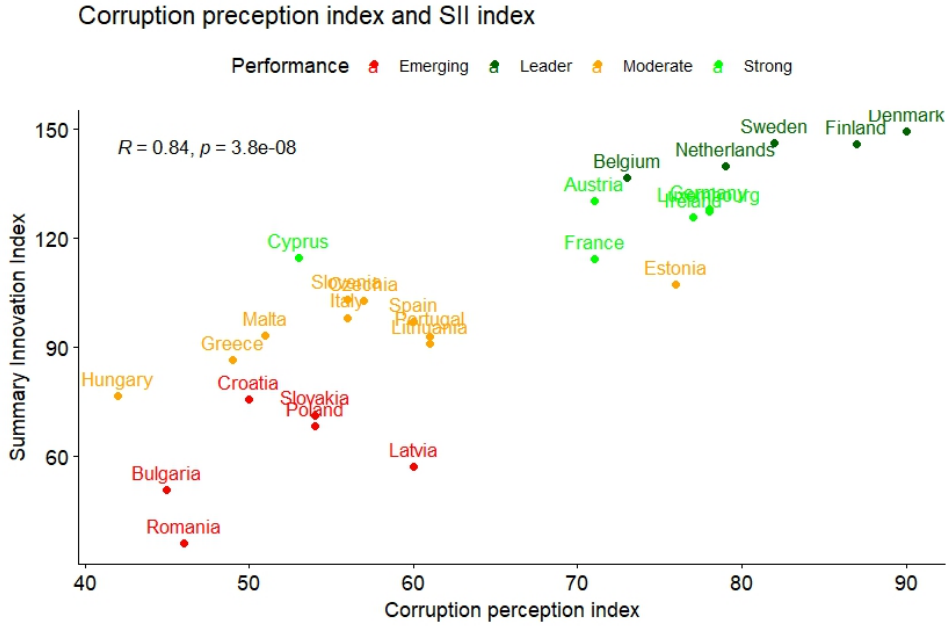
The Rule of Law can take values from -2.5 to 2.5. We have used the Spearman correlation test, while the data do not necessarily come from a bivariate normal distribution. The p-value of the test was 0.000000012 and the.computed measure of association is 0.86, which shows strong positive correlation. On Figure 3 can be observed that Latvia is the country that stands out with relatively high value for Rule of Law 0.98, but low value of Summary Innovation Index of 56.967. Also Romania has the Rule of Law value at 0.40 and the SII Index 35.852. This is quite low compared to Croatia, Poland and Hungary which have similar Rule of Law scores but significantely higher SII Index.

FIGURE 3: CORRELATION BETWEEN RULE OF LAW AND SII INDEX



A linear regression model was also used in the statistical evaluation of the comparison between the Rule of Law Index and the SII Index. When testing the linear relationship with the null hypothesis that there is no relationship and the alternative hypothesis that there is a linear relationship, the calculated p-value is 1.74e-08 at the 0.05 level of significance, which confirms the alternative hypothesis. The estimated regression line would be SII = 54.526 + 44.597*(Rule of Law).

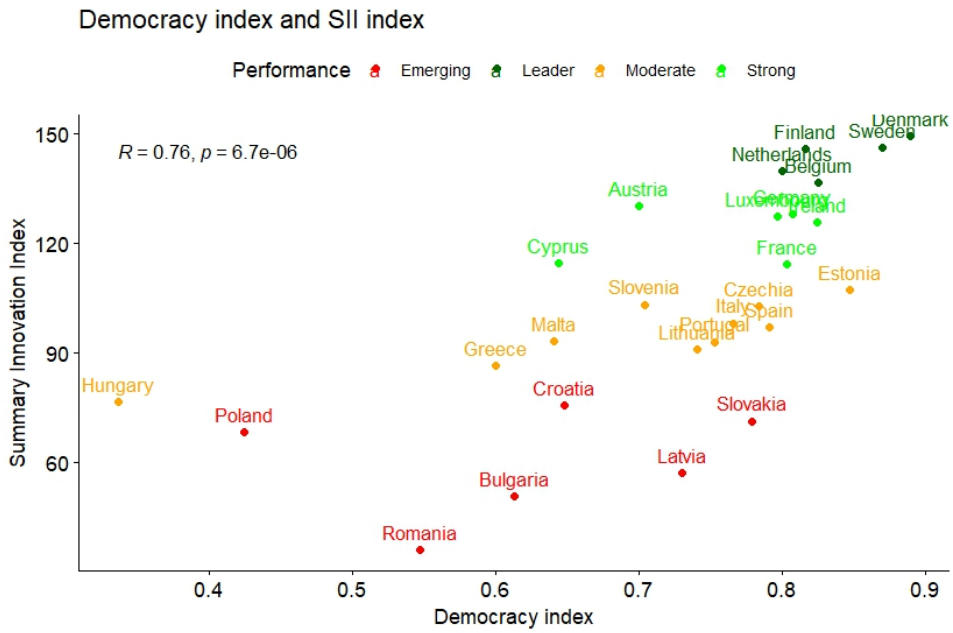
FIGURE 4: CORRELATION FOR CORRUPTION PRECEPTION AND SUMMARY INNOVATION INDEX



The next variable of interest was the Corruption Prevention Index. Transparency International published the 2023 Corruption Preception Index for 180 countries and territories around the world, using scores ranging from 0 for highly corrupt to 100 for very clean. We have used the data for 27 EU countries and examined whether there is any correlation between the Corruption Preception variable and the SII Index. The results show that the calculated p-value is 0.000000038 and the calculated correlation coefficient is 0.84, which means that there is a strong positive correlation. The results are presented in Figure 4.

Based on the results of the first two regulatory policy measures, the correlation test for the variables Liberal Democracy Index and Summary Innovation Index was also carried out. The Liberal Democracy Index, taken from the Democracy Report of the V-Dem Institute (2023) for the year 2022, is scored from 0 to 1, with 1 being the most liberal. The correlation between the Liberal Democracy Index and the SII can be confirmed, while the p-value for the Spearman test is 0.0000067 and the rate of association is high at 0.76. Upon further attention, the CEE countries, especially Hungary and Poland on the extreme low and Slovakia on the high scale of liberal democracy, appeared of special additional interest (Figure 5).

FIGURE 5: CORRELATION BETWEEN LIBERAL DEMOCRACY INDEX AND SUMMARY INNOVATION INDEX

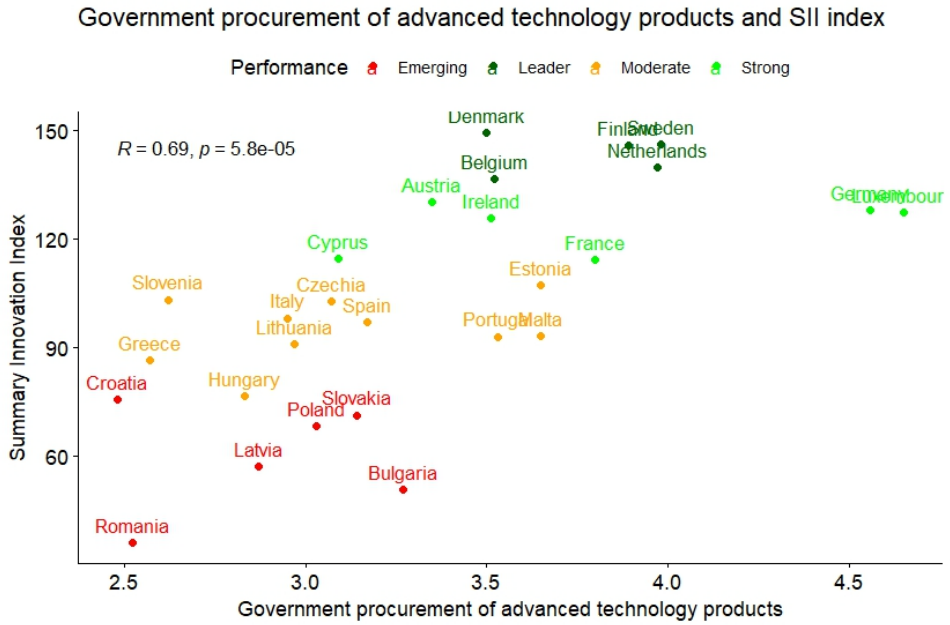


From the tests presented above, we can conclude that there is a strong association between the observed regulatory measures of democracy and innovation, while the Rule of Law, Corruption Perception and, as the icing on the cake, the Liberal Democracy Index are all positively correlated with the Summary Innovation Index. Hypothesis H1 is confirmed.

7.2 Intermediate effects of financial policy measures and innovation

R&D expenditure in the public sector and R&D expenditure in the business sector are two of the 32 indicators included in the average that make up the Summary Innovation Index, which shows the overall importance of investment in R&D as recognised by the European Commission (2023). For this reason, these two variables cannot be included in our research. Therefore, for the research purposes of considering the financial impact associated with innovation, we have considered the variables Annual GDP Growth, Total Entrepreneurial Activity and Government Procurement of Advanced Technology Products from the given data. The data for the Annual GDP Growth variable did not confirm the correlation with the SII Index. The calculated p-value for the Pearson correlation test was 0.08, indicating that the results are not statistically significant. Similarly, the data for the variable total business activity did not confirm the correlation with the SII, while the computed p-value for the Spearman correlation test was 0.47. The variable government procurement of high technology products (from 1 to 7 best) was considered next. The p-value for the correlation test was 0.000058 and the calculated associated rate was 0.69, confirming the positive correlation between the variables. The scatter plot for the given data is shown in Figure 6.

FIGURE 6: CORRELATION BETWEEN GOVERNMENT PROCUREMENT OF HIGH-TECH PRODUCTS AND THE SII INDEX

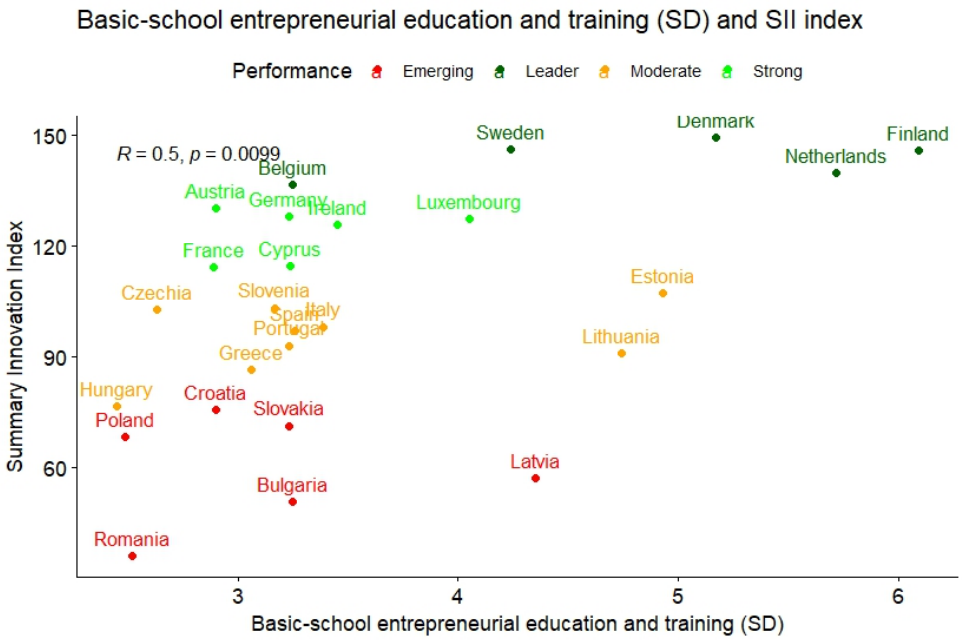


Hypothesis H2 cannot be confirmed, although we found some correlation between the variables Government procurement of advanced technology products, but however we did not confirm the association between Annual GPD Growth and Total Entreprenurial Activity to the SII Index.

7.3 Education policy meassures count for innovation

Given the importance of educationl policy tools and innovations, we analysed whether there is a correlation between the Basic-school entrepreneurial and training and SII Index exists. Basic-school entrepreneurial education and training measures the extent to which training in creating or managing SMEs is incorporated within the education and training system at primary and secondary levels (European Innovation Scoreboard 2023), the bigger value the better the incomporation. Note that there are 27 data included in the statistical test, while data for Basic-school entrepreneurial and training for Malta is missing. We used the Spearman correlation test, where the computed p-value is 0.0099 and computed correlation coefficient R being 0.5, confirmed correlation is moderate. Figure 7 shows that there are some extreme or interesting data. Such a case is Latvia, where the SII index is quite low at 56.967, while the Basic School Entrepreneurial Education and Training is quite high at 4.35.

FIGURE 7: CORRELATION BETWEEN BASIC-SCHOOL ENTREPRENEURIAL AND TRAINING AND THE SII INDEX



The next variable we were interested in was comparing the Employment share in Knowledge-intensive services, but given that this variable is one of the 32 indicators included in the SII Index, the statistical analysis would not be valid. However, it is of a great importance that the European Comission recognises the inclusion of Employment in Knowledge-intensive activities as a part of the Summary Innovation Index. Hypothesis H3 can be confirmed, while basic-school entrepreneurial and training are correlated with the SII Index. Also Employment share in Knowledge-intensive servises is in the direct correlation to the SII, while it is a part of the index.

8 CONCLUDING REMARKS AND COMMENTS

Just as decades ago political scientists classified the maturity of democracies according to the age of their countries' experience of the democratisation process in the first, second and third waves, an identical classification can be applied in the case of their innovation maturity - the countries of the first, second and third innovation growth groups correspond to their historical development of democratic processes as of the first, second and third group of democracies. Thus, the most important and powerful finding of the study is the recognition that democracy and innovation go hand in hand in today's EU Member States. Highly innovative EU Member States are those that, while taking a top-down approach with their own policy designs to stimulate support for innovation by providing a predictable, stable and transparent democratic and legal environment, also recognise the bottom-up importance of fostering knowledge focused on entrepreneurial behaviour and innovation skills of the relevant expert and innovation communities. As in several studies that preceded this analysis, it appears that the long-term success of a country is not based solely on its money, but even more on the trust, security and regulatory predictability of its functioning.

All these findings provide further motivation to study the impact of existing and potentially new smart regulation and related policy measures to serve future innovation growth, as well as also various 'soft' campaign and promotion policy measures to raise public awareness of the importance of innovation for the further development and growth of society, together with the innovation governance modes of succesful bottom-up triggers.

Finally, it is also worth noting that the findings presented in this paper apply to the case of EU Member States, but have not been tested for the rest of the world (Figure 2), especially for those countries that perform even better than the EU and its most mature innovation members.

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APPENDIX

TABLE 1: INNOVATION ENVIRONMENT WITH A FOCUS ON CEE AND THE BALTIC STATES

	Innovation index in 2023[2]	Patents granted by EPO in 2022[3]	GDP growth (%) in 2022[1]	GDP for R&D in 2020[1]	GDP for education in 2021[1]	Rule of law[4]	Corruption perception Index in 2023 (CPI)[5]	Entrepren. norms[6]
Romania	33,1	16	4,8	0,47	3,7	8,3	46	3,61
Bulgaria	46,7	22	3,4	0,85	4	7,5	45	n.a.
Latvia	52,5	9	2	0,71	6	8,5	60	5,83
Poland	62,8	188	4,9	1,39	5,3	7,8	54	4,23
Slovakia	65,6	17	1,7	0,91	4,6	8,3	54	n.a.
Croatia	69,6	13	6,3	1,25	5,5	7,3	50	3,38
CEE and Baltics	70,3	43,9	4	1,31	5,1	8,3	54,6	n.a.
Hungary	70,4	54	4,6	1,61	4,8	6,3	42	4,09
Lithuania	83,8	20	1,9	1,16	4	9,8	61	6,41
Italy	90,3	2637	3,7	1,53	4,3	n.a.	56	4,43
Czech Republik	94,7	85	2,5	1,99	5,1	9	57	n.a.
Slovenia	95,1	46	5,4	2,15	5,8	8,5	56	3,88
Estonia	98,6	13	-1,3	1,79	6,6	10	76	n.a.
EU	100	30546	3,5	2,32	5,1	n.a.	65	n.a.
Germany	117,8	12563	1,8	3,14	4,7	n.a.	78	4,65
Austria	119,9	1151	5	3,2	5,1	n.a.	71	3,86
OECD	n.a.	n.a.	2,8	2,96	5,3	n.a.	n.a.	n.a.
World	n.a.	81754	3,1	2,63	4,3	n.a.	n.a.	n.a.

Sources: [1]World Bank Data (2023), [2]European Commission (2023), [3]EPO (2023)[9], [4]Bertelsmann Transformation Index (2023)[10], [5]Transparency International (2023)[11], [6]GEM (2023)[12].

[9] The European Patent Office (EPO) examines European patent applications, enabling inventors, researchers and companies from around the world to obtain protection for their inventions in up to 45 countries through a centralised and uniform procedure that requires just one application. It provides EPO Data Hub containing data covering the last five years for European patent applications and granted patents at global and country levels. For more see EPO (2023), available at https://www.epo.org/en/about-us/statistics.

[10] The Bertelsmann Stiftung's Transformation Index (BTI) analyses transformation process towards democracy and market economy in younger democracies, like CEE countries are. For more see: BTI (2023) at https://bti-project.org/en/?&cb=00000.

[11] The CPI ranks 180 countries and territories around the globe by their perceived levels of public sector corruption, scoring on a scale of 0 (highly corrupt) to 100 (very clean). CPI is provided by Transparency Intrenational. For more see CPI (2023), available at https://www.transparency.org/en/cpi/2023.

[12] Global Entrepreneurship Monitor (GEM) carries out survey-based research on entrepreneurship and entrepreneurship ecosystems around the world. It is a networked consortium of national country teams primarily associated with top academic institutions, collecting data on entrepreneurship directly from individual entrepreneurs. The GEM entreprenurial norms data in the table covers the extent to which social and cultural norms encourage or allow actions leading to new business methods or activities. For more see GEM (2023), available at https://www.gemconsortium.org/data.

TABLE 2: 32 INDICATORS WHICH COMBINE THE SUMMARY INNOVATION INDEX (UNDERLINED)

1.1 Human resources
1.1.1 New doctorate graduates
1.1.2 Population with tertiary education
1.1.3 Population involved in lifelong learning
1.2 Attractive research systems
1.2.1 International scientific co-publications
1.2.2 Scientific publications among the top 10% most cited
1.2.3 Foreign doctorate students as a % of all doctorate students
1.3 Digitalisation
1.3.1 Broadband penetration
1.3.2 Individuals with above basic overall digital skills
2.1 Finance and support
2.1.1 R&D expenditure in the public sector
2.1.2 Venture capital expenditures
2.1.3 Direct and indirect government support of business R&D
2.2 Firm investments
2.2.1 R&D expenditure in the business sector
2.2.2 Non-R&D innovation expenditures
2.2.3 Innovation expenditures per person employed
2.3 Use of information technologies
2.3.1 Enterprises providing ICT training
2.3.2 Employed ICT specialists
3.1 Innovators
3.1.1 SMEs introducing product innovations
3.1.2 SMEs introducing business process innovations
3.2 Linkages
3.2.1 Innovative SMEs collaborating with others
3.2.2 Public-private co-publications
3.2.3 Job-to-job mobility of HRST
3.3 Intellectual assets
3.3.1 PCT patent applications
3.3.2 Trademark applications
3.3.3 Design applications
4.1 Employment impacts
4.1.1 Employment in knowledge-intensive activities
4.1.2 Employment in innovative enterprises
4.2 Sales impacts
4.2.1 Exports of medium and high technology products
4.2.2 Knowledge-intensive services exports
4.2.3 Sales of new-to-market and new-to-firm innovations
4.3 Environmental sustainability
4.3.1 Resource productivity
4.3.2 Air emissions by fine particulates
4.3.3 Environment-related technologies

INOVACIJE KOT JAVNI INTERES DEMOKRATIČNE DRŽAVE: PRIMERJALNA STATISTIČNA ANALIZA DRŽAV ČLANIC EU

Danes živimo v tako imenovanem šestem inovacijskem valu, ki se osredotoča na razvoj digitalnih inovacij, umetne inteligence in robotike. Vloga države v njeni temeljni funkciji skrbi za javni interes in varovanje vrednot v tem procesu je izrednega pomena. Država podpira uspešni inovacijski razvoj, hkrati s tem pa tudi raznolike posledice, ki jih imajo te nove inovativne rešitve za družbo. Namen tega prispevka je dvojen: 1) najprej z deskriptivno metodo pregleda obstoječe literature in raziskav izpostaviti argumente v prid potrebi po prisotnosti države v inovacijskih dejavnostih, ki mora biti v primeru javnega interesa in družbenih vrednot najprej usmerjena na temeljno sistemsko raven, predvsem skozi podpiranje različnih vrst javnopolitičnih ukrepov; in 2) empirično preveriti, kateri vladni javnopolitični ukrepi v državah članicah EU so pozitivno povezani z njihovo inovacijsko uspešnostjo. Empirične podatke za preverjanje bomo pridobili iz podatkovnih zbirk Innovation Index Scorecard Evropske komisije ter V-Dem Democracy in Corruption Perception Indexa ter jih statistično analizirali z uporabo korelacijskih testov in linearne regresije. Dobljeni rezultati pokažejo jasno politično-geografsko porazdelitev držav glede na inovacijsko uspešnost v skladu z razvojem demokracij in demokratičnih praks med 1) zahodnimi in 2) postsocialističnimi demokracijami srednje in baltske Evrope ter 3) vzhodno Evropo. Statistična analiza potrjuje močno pozitivno korelacijo med visoko inovacijsko zrelostjo držav in splošno visoko zaznavo demokracije, pravne države in nizko zaznavo korupcije. Analiza pokaže tudi povezavo med inovacijskim indeksom in spremenljivkami, ki merijo javnopolitične ukrepe držav, povezane s podporo podjetniškemu izobraževanju in raziskovalnimi politikami, medtem ko neposredni finančni ukrepi kažejo zmerne učinke. Zaključki članka nesporno pokažejo na pomembno pozitivno povezanost med predvidljivo in stabilno državno oporo inovacijam ter dejansko inovacijsko uspešnostjo demokratično razvitih držav. Takšne države inovacije prepoznavajo kot eno od pomembnih nalog v skrbi za splošni razvoj ne zgolj ozko posamičnih inovacij, temveč tudi širšega družbenega, gospodarskega, pa tudi političnega razvoja, utemeljenega na predvidljivih ter transparentnih pravilih in inovacijske kulture, oprte na vrednotah znanja.

Ključne besede: demokracija; inovacije; javnopolitični ukrepi; podjetniško znanje; korelacija.