The Digital Entrepreneurship Ecosystem in the Central Eastern European Countries

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Abstract

While the economic transition from a planned economy to a market economy seems to be over for most countries after 25 years, a socialist heritage could have long lasting effects. In this paper we aim to answer to the following two research questions: (1) How deeply have Central and Eastern European (CEE) countries proceeded in digital entrepreneurship? (2) Are there some specific digital entrepreneurship characteristics of the CEE countries that can be explained by their socialist heritage? We applied the Digital Entrepreneurship Ecosystem (DEE) Index methodology that relies upon a dataset for 170 countries to evaluate the former socialist CEE countries' performance in the development of a digital entrepreneurship ecosystem. The non-EU Western countries are the best performers in Europe, but Western EU member states are close behind. The Southern European country group's performance is close to the EU CEE country cluster, implying that these countries have caught up with most Southern European countries in their DEE development. The former SU country group and the non-EU Balkan country groups are very similar to each other. We also examined the four sub-indices and the twelve pillars and concluded that DEE scores vary significantly among European countries, but these differences can be explained by economic development and not the long-lasting effects of the socialist system. We also provided a detailed DEE profile for Russia, which explains Russia's modest performance in the development of a digital entrepreneurship ecosystem.

Keywords: Digital Entrepreneurship Ecosystem; DEE index; Central Eastern European region; Russia

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Introduction

Digital technologies have reshaped our world over the last few decades. Digitalization, as a general technology has affected all industries and all aspects of our lives (Chui et al 2023; Dwivedi, 2021). At the firm level, digitalization contributes to increasing sales, technology development, product innovation, and efficiency (Kreuzer et al., 2022). It also enhances new business creation and increases overall productivity (Zahra et al., 2023).

Digitalization and most importantly the internet have also changed the nature of entrepreneurship as (1) entrepreneurial processes become more fluid and less bounded and (2) entrepreneurial agency increasingly relies on a more diverse and frequently growing number of actors (Nambisan, 2017). Digitalization has contributed to the development of business processes, business resource and business model transformation that has led to the appearance and evolution of digital entrepreneurship ecosystems (Kraus et al., 2019; Kollmann et al., 2022; Paul et al., 2023). Digital innovations include not only technology development: Platformization has transformed how businesses are organized and contributed to the emergence of giant, multitrillion-dollar companies. Platforms, connecting the two sides of the market, have become the dominant form of business replacing traditional corporate organizations (Acs et al., 2021; Kenney, Zysman, 2016).

However, the spread of digitalization is not even, there are considerable differences. The first level of the digital divide refers to the groups of countries that do not have proper or equal access to digital tools (Van Dijk, 2017). The second level of the digital divide is associated with digital literacy, the lack of the "ability to efficiently and effectively find information on the Web" (Hargittai, 2002). A third degree of the digital divide was identified recently as inequality in the tangible outcomes of internet use (Scheerder et al., 2017). Therefore, the positive effects of digitalization are unevenly distributed across and within countries, calling for government involvement in shaping the widely interpreted environment of digital technology. At the same time, governments have limited power to influence the spontaneous evolution of the ecosystem, so instead of the direct interventions, indirect participation methods seem to be more useful. Nevertheless, government policy should be appropriately targeted to achieve the desired effects, which require the proper measure of digital technologies in their environment.

One way is to examine new digital technology creation capacity and the other is to examine to what extent countries are digitalized. While new technology innovation is mostly concentrated on a limited number of countries and regions[1], all countries are digitalized to a certain extent. The ecosystem approach provides us a useful way to conceptualize digitalization and examine it on a country level.

In this paper, we focus on a specific group of nations, the former socialist countries in Europe that transitioned from a planned to market economy system. While transition research was a popular topic in the 1990s and 2000s, interest had declined by the 2010s. Now these countries are viewed as variants of the capitalist system (Kitov, 2009, Dilli et al., 2018). However, current research shows that their socialist past has not passed without a trace (Havrylyshyn, 2009). Magyar and Madlovics (2020) claim that behind the formally transferred institutions, there are path-dependent 'stubborn structures' that exist with hidden, informal arrangements that undermine the formal institutions. Szerb and Trumbull (2016) found that Central and Eastern European (CEE) countries' cultural support for business creation lags behind Western European nations. In addition, CEE countries' performance is not uniform – there are considerable differences (Chepurenko, 2017). While the CEE EU members' handicaps are diminishing, Balkan countries are falling behind Western Europe significantly. These countries face a new challenge of digitalization, but digital technologies could also provide an alternative way to close the development lag. So, it is worth investigating how the CEE countries perform in a digital technology-fueled entrepreneurship.

In the following, we provide a short description of the evolution of digital entrepreneurship. Next, we explain the Digital Entrepreneurship Ecosystem (DEE) Index construction and methodology. With the help of the DEE, we analyze European country performances in the digital entrepreneurship ecosystem and their components by emphasizing the CEE nations. Unlike other approaches that interpret CEE countries as formerly socialist EU members (Brodny, Tutak, 2022; Huang, 2023; Trașcă et al., 2019) we consider all Central and Eastern European nations, including the Balkans and former Soviet Union (SU) successor states from Europe. Our highlighted case is Russia, the largest country in the CEE region with vast natural resources but a limited level of entrepreneurship (Obraztsova, Chepurenko, 2020; Szerb, Trumbull, 2018). Based on the Digital Entrepreneurship Ecosystem (DEE) Index, we provide a full picture of Russia's digital entrepreneurship ecosystem, its development, as well as strong and weak points over the 2020-2022 period.

The Evolution of Digital Entrepreneurship – from Digital Technology Creation to a Digital Ecosystem

The development of digital technologies has changed the business environment and ignited digital business. This in turn has breathed new life into traditional industries, enabling them to survive and adapt (Gao et al., 2013), and also enabled the creation of new businesses and digital start-ups that incorporate new technology as a core element of their business model and operations

[1] Like US (Silicon Valey, Seattle, Boston), China (Beijing, Hong Kong, Shanghai), India (Mumbai), Singapore, and the United Kingdom (London).

(Elia et al., 2020). Businesses nowadays are using information and communication technology (ICT) tools[2] to automate a variety of business activities that require significant human involvement (Paul et al., 2023). The impact of these technologies goes beyond incremental changes and challenges entrenched in business strategies, models, and processes (Bharadwaj et al., 2013).

These digital technologies in the entrepreneurial sphere take the form of three distinct but interrelated elements – digital artifacts, digital platforms, and digital infrastructure (Nambisan, 2017). A digital artifact is defined as a digital component, application, or media content that is part of a new product (or service) and offers a specific function or value to the end user (Ekbia, 2009; Kallinikos et al., 2013). Digital platforms are a complex mix of software, hardware, operations, and networks. Most importantly, they provide a common set of techniques, technologies, and interfaces for a wide range of users to build what they want. These platforms often upend the existing organization of economic activity by resetting the barriers to entry, changing the logic of value creation and capture, playing regulatory arbitrage, repackaging work, or repositioning power in the economic system (Kenney, Zysman, 2016). Digital infrastructure refers to digital technology tools and systems that provide communication, collaboration, or computing capabilities to support innovation and entrepreneurship (Nambisan, 2017). Kobzev et al (2020) have also found that the increase in productivity and competitiveness of industrial enterprises is directly related to the use of digital technologies. These digital technologies, like big data, new algorithms, and cloud computing are changing the nature of work and the structure of the economy. But as Kenney and Zysman (2016) highlight, the exact nature of this change will be determined by our social, political, and business choices.

As the world is moving toward digitalization, transforming into a virtual world, entrepreneurship is following digitalization trends to quietly transform into digital entrepreneurship (Paul et al., 2023). This is because digital technologies democratize entrepreneurship by reducing the barriers between invention and the creation of new businesses (Aldrich, 2014; Kelly, 2016). Digital entrepreneurship refers not only to the creation of new businesses but also the transformation of existing businesses by developing new digital technologies or experimenting with new uses of them (European Commission, 2015; Zhao, Collier, 2016; Shen et al., 2018). Nowadays, digitalization is widespread across most industries and business types, with only very traditional businesses not yet fully affected (Elia et al., 2020). According to Paul et al. (2023), typical traditional enterprises follow six steps on their way to digitalization: 1. Digital Knowledge Base Creation, 2. Digital Technology Adoption, 3. Digital Platform Readiness, 4. Digitalization Process, 5. Transition to Digital Ecosystem, and 6. Successful Digital Transformation of a Traditional Enterprise into a Digital Enterprise. Kraus et al. (2019) identified six research areas focusing on digital entrepreneurship: digital business models, digital entrepreneurship process, platform strategies, digital ecosystem, entrepreneurship education, and social digital entrepreneurship. Platform organization has become the new dominant business organization where digital technology fuelled network effects contribute to the emergence of giant digital enterprises (Acs et al., 2021).

The digitalization activity of new businesses does not depend on a single firm, but on the entire entrepreneurial ecosystem (Zahra et al., 2023). Our approach is based on Sussan and Acs (2017), who define the digital entrepreneurship ecosystem as the integration of "the entrepreneurial ecosystem with its focus on agency and the role of institutions and the digital ecosystem with its focus on digital infrastructure and users" (p. 62). An entrepreneurial ecosystem can be described in terms of the actors and stakeholders involved, who contribute directly or indirectly to the achievement of the same ecosystem's goals through different roles and responsibilities (Elia et al., 2020). Levchenko and Konvisarova (2022) also stress that the digital economy is thus an important driver of economic development, offering innovative solutions to global problems, increasing the efficiency of public administration decisions, and promoting the active participation of businesses and civil society in shaping the country's economic well-being. Digitalization is changing society, creating new patterns of interaction and interdependence between technology and citizens, organizations and citizens, and technology and organizations (Stratu-Strelet et al., 2023).

The Digital Entrepreneurship Ecosystem (DEE) Concept

The DEE concept views digitalization via the lens of entrepreneurship. The DEE is built out of two ecosystems, namely, the digital ecosystem and the entrepreneurial ecosystem. The newly developed framework positions digital entrepreneurship within the wider context of digital infrastructure, users, institutions, and agents in such a way that users and agents constitute an individual agency, and the digital infrastructure and digital platforms form the external environment (Sussan, Acs, 2017). Song (2019) provides a refinement of the original DEE concept that helps us measure the DEE and its components.

The DEE Index was created to present a country-level measure of the DEE. The DEE Index consists of four sub-indices: Digital Technology Infrastructure (DTI), Digital User Citizenship (DUC), Digital Multisided Platforms (DMSP), and Digital Technology Entrepre-

[2] Such as artificial intelligence, chatbots, mobile applications (apps), social media platforms, cloud-based services, enterprise resource planning systems, big data and business analytics, web-based services, and a host of other internet-based technologies.

neurship (DTE). These sub-indices include the key economic, business, social, and policy issues: competition, privacy, innovation, and security, respectively. Each sub-index consists of three pillars and each pillar has two types of components, called variables. One variable always represents the entrepreneurship component and the other, that of the digital ecosystem (Sussan, Acs, 2017; Song, 2019; Szerb et al., 2020).

The twelve pillars are the central features of the DEE Index providing sufficient specifics about the configuration of the various DEE characteristics but not getting lost in the details. Table 1 provides a short description of the pillars.

Table 2 shows the structure of the DEE and provides a brief description of each variable. Each pillar is built from two to five indicators from various online sources such as GSMA Mobile Connectivity Index, UNCTAD, International Telecommunication Union, World Bank, Kaspersky, United Nations, and so on. The data collection covers the period of 2020-2022.

The Transition of the CEE Countries

Our focus countries from Central and Eastern Europe share partially common cultural and historical roots – most importantly a long lasting socialist, planned economy system (Brodny, Tutak, 2022). However, these countries have gone through different phases and development paths since they started their transition to a market economy (Dyba et al., 2018; Farkas, 2016). Half of these countries joined the European Union between 2004-2013, and Balkan countries also aim for accession to the EU. The former Soviet Union (SU) countries, with the exception of the Baltic states, chose other ways of development that deviate from the initially intended market economy and are often consider to have experience a backside transition (Gevorkyan, 2018; Chepurenko, Szanyi, 2022).

The transition from a planned economy to a market economy was a unique transformation experiment without previous historical examples and experiences (Blanchard, 1996; Blith, 2002). While it was believed that stabilization, the institutional reforms for the establishment of market-based institutions and privatization, and the dominance of private property at the cost of state ownership form the basis of the economic transition, the actual steps, their order, speed, and depth varied significantly between countries (De Melo et al., 1996; Kornai, 2006; Sachs, 1996). At the later stages of the transition, economic restructuring and the rise of productivity turned into the center of interest (Aghion et al., 1997). Capital shortages, the lack of proper management skills, and the low level of technology absorption capacities were the major obstacles impeding further development in this phase. Many transitional countries, most importantly the EU member CEE nations, supported export-oriented growth and foreign direct investment (FDI) (Csaba, 2005; Medve-Bálint, 2014; Szanyi, 2022). Albeit, to varying degrees, this policy has led to a dual-economy structure in many transitional countries, similar to other developing nations, with the presence of a high productive foreign and a low productive domestic sector (Farkas, 2016). In the Balkans and the former Soviet countries, the institutional reforms even reversed, which caused a transitional backslide phenomenon (Chepurenko, Szanyi, 2022).

Table 1. **Short Descriptions of Sub-indices and their Comprising Pillars**

Subindex	Pillars
The Digital Technology Infrastructure (DTI) subindex addresses the strengths and success of institutions in supporting digital technology infrastructure and its development.	*Digital Openness* pillar encompasses a nation's institutional effort to support the use and development of digital technology infrastructure.
	Digital Freedom pillar integrates the government regulation effort to freely use the internet with competition in the ICT sector.
	Digital Security pillar captures the success of laws and regulation to protect from piracy and cybercrime.
The Digital User Citizenship (DUC) subindex aims to describe the influence of institutions, both the explicit legitimization and the implicit social norms, on the users of digital technology.	*Digital Literacy* pillar refers to the ability of the country's population to use the digital tools and the effort of the government to support digitalization.
	Digital Access pillar measures how well citizens could access digital infrastructure and how well the institutions support it.
	Digital Rights pillar include the strength of the institutions in terms of fundamental rights, individual rights, and private property rights and how it supports citizens in the use of the digital infrastructure and how it protects their privacy.
Digital Multisided Platforms (DMSP) is where users of the digital ecosystem and agents of the entrepreneurship ecosystem interact. DMSPs can be viewed as an intermediary for trade and a medium for knowledge exchange.	*Networking* pillar aims to grasp the network effects of DMSPs. The network effect is a kind of externality when the value of the product or service depends upon the number of users.
	Matchmaking pillar applies in the case of two-sided platforms and aims to capture the value depending on the matching of a seller and a buyer.
	Financial Facilitation pillar includes platform-based alternative finance where users patronize businesses and financial technology firms provide alternative payment tools for users.
The Digital Technology Entrepreneurship (DTE) sub-index is comprised of those agents that partake in the alternative use and the development of digital technologies. It measures how entrepreneurial agents rely on digital technologies.	*Digital Tech Usage* pillar components reflect the entrepreneurial agents' basic ability to use digital technologies.
	Technology Adoption pillar measures how entrepreneurial agents can adopt existing digital technologies.
	Technology Diffusion pillar considers the capability of entrepreneurial agents not only to adopt but to diffuse these technologies.

Note: a full description of all 54 indicators can be found in the supplementary data to the article: https://foresight-journal.hse.ru/article/view/24109

Source: compiled by the authors

The transitional countries were affected by the 2008 global crisis very differently and their responses were also varied without one being able to generalize their responses (Biledeux, 2014). By the 2020s, divergent growth models emerged even in the EU member CEE countries with significant differences in terms of institutional development, the governments' expenditures (as percentage of GDP), innovation performance, human capital development, and financial conditions (EU transfer). As Győrffy (2022) reported, the most successful countries, the Czech Republic, Estonia, Lithuania, and Slovenia, demonstrate common characteristics with strong institutions, a knowledge focus, and favorable financial conditions. A lack of institutions characterizes Hungary and Romania, while Bulgaria, Croatia, and Slovakia face institutional/educational difficulties coupled with unfavorable finances.

Below we use the Bertelsmann Stiftung BTI Transformation Index to illustration the variations of the examined countries in terms of political, economic, and governance transitions. The BTI Index consists of the Status Index and the Governance Index based on 17 criteria and 49 questions. The Status Index reports on the countries based on the state of their democracy and market economy. The Governance Index gives details about the performance of the respective country's leadership. In 2024, there were 137 countries in the dataset (BTI, 2024). Table 3 contains the latest 2024 report data where we calculated the overall BTI score based on the average of the political, economic, and governance scores.

It is clear that the transitional scores in each sub-category coincide with the level of development, albeit the Baltic countries have higher scores than the other countries with the exception of the per capita GDP leader, Czech Republic. Hungary looks like an outlier in the EU member CEE group mostly because of governance performance. The Balkan countries have somewhat better performance than former Soviet countries that are not members of the EU, where Belarus and Russia are at the bottom. Out of the three main categories, governance, reflecting to quality of political management, has the lowest scores in all three country groups indicating that transition has not fully finished. As Győrffy (2022) claims, while the convergence of the EU member CEE countries continued in the 2010s, none of them could overcome the middle-income trap and reaching the average per capita GDP of the EU.

Table 2. **The Structure of the DEE Index for Digital Platform Economy**

Pillars	Variables (entrepreneurship / digital)	Variable content
Digital Technology Infrastructure		
Digital openness	Institutions	Capturing ICT and internet regulation,
	Technology	Network coverage and internet subscription
Digital freedom	Institutions	Business, world press, general freedom and internet competition combined with mobile tariffs
	Technology	Mobile tariffs and handset prices
Digital protection	Institutions	Measuring laws and regulations on cybercrime and cybersecurity
	Technology	Secure internet servers per million population, net infection ratio
Digital User Citizenship		
Digital literacy	Institutions	Human capital, the promotion of e-participation, tertiary education
	Users	Digital skills among the population
Digital access	Institutions	The existence of technical institutions, frameworks, policy coordination institutions, and strategies dealing with cybersecurity
	Users	Percentage of households with internet access
Digital rights	Institutions	Personal rights, fundamental rights, and property rights, internet privacy
	Users	Percentage of individuals using the internet, the gender gap in mobile ownership
Digital Multi-sided Platforms		
Networking	Agents	Language support of internet
	Users	Social media penetration
Matchmaking	Agents	E-government, locally developed apps, language accessibility of top apps
	Users	Mobile ownership
Financial facilitation	Agents	Access to finance, the number of financial technology businesses
	Users	Active mobile broadband subscription, the usage of digital financial solution
Digital Technology Entrepreneurship		
Digital Tech Usage	Agents	Computer software spending, skills, firms with a website
	Technology	Mobile speed, access to electricity
Digital Technology Adaptation	Agents	Industry capacity, adoption of emerging technology
	Technology	Generic top level domains, spectrum
Digital Technology Diffusion	Agents	Research & Development, number of researchers
	Technology	M2M mobile subscriptions, data centers

Source: authors, based on (Szerb, 2021).

Table 3. **The BTI Transformation Index: Political, Economic, and Governance Scores for the CEE Countries (2024)**

Country/region	Transformation			BTI score
	Political	Economic	Governance	
EU member CEE				
Bulgaria	7.20	7.64	5.65	6.83
Croatia	8.55	8.57	6.17	7.76
Czechia	9.20	9.21	6.87	8.43
Estonia	9.75	9.29	7.35	8.80
Hungary	6.30	6.82	3.79	5.64
Latvia	8.95	8.61	7.22	8.26
Lithuania	9.50	9.07	7.45	8.67
Poland	7.40	8.14	5.12	6.89
Romania	7.65	7.57	5.19	6.80
Slovakia	8.60	8.64	6.27	7.84
Slovenia	8.95	9.21	6.41	8.19
Average	**8.37**	**8.44**	**6.13**	**7.65**
Non-EU Balkan				
Albania	7.50	7.04	6.56	7.03
Bosnia and Herzegovina	5.55	6.29	3.64	5.16
Montenegro	7.10	7.14	5.93	6.72
North Macedonia	7.75	7.18	6.27	7.07
Serbia	6.05	6.64	4.43	5.71
Average	**6.79**	**6.86**	**5.37**	**6.34**
Non-EU, Former SU				
Belarus	3.47	5.04	2.22	3.58
Georgia	5.65	5.93	5.21	5.59
Moldova	6.70	6.04	5.69	6.14
Russia	3.43	4.93	2.55	3.64
Ukraine	7.05	5.96	6.04	6.35
Average	**5.26**	**5.58**	**4.34**	**5.06**

Source: authors, using BTI data (https://bti-project.org/en/downloads, accessed 27.07.2024).

In a highly cited paper, McMillan and Woodruff (2002) claimed that the success of transition ultimately depends on the performance of the country's entrepreneurs. The examined former socialist countries started the entrepreneurial transition from a disadvantaged position (Estrin et al., 2006). It was believed that supporting institutions would create productive entrepreneurship (Baumol, 1990). Over years, many transitional countries initiated entrepreneurship supporting programs while informal, culturally embedded institutional factors delayed the entrepreneurial transition, in particular in the new, formerly Soviet states (Estrin, Mickiewicz, 2011). Instead of a unified convergence to the Western, market economy countries, several strange forms of capitalist models have emerged, such as cronyism, oligarchy, clientelism, and nomenclature entrepreneurship frequently associated with the large role played by the state and state-owned enterprises (Bałtowski et al., 2022; Chepurenko, Szanyi, 2022; Ivlevs et al., 2021). While these characteristics mostly refer to the Baltic and the former SU countries, recently there are signs in Hungary and in Poland of the strengthening of patronage (rent seeking) entrepreneurship (Szanyi, 2022).

Digital Entrepreneurship in the CEE Context

The digitalization revolution reached the former socialist countries when the transition was nearly finished at least in the most advanced EU member CEE countries. Trașcă et al. (2019) find that CEE countries that are part of the EU lag far behind the leading countries in terms of digitization and are below the EU average. Brodny and Tutak (2022) show that, despite a common history of political and related economic transformations, there are large differences in the level of digitization between the CEE countries. However, this deviation can be explained more by their lower development levels than their socialist heritage (Lazar et al., 2019).

We examine the digital entrepreneurship ecosystem of the former socialist CEE countries grouped into three categories as EU member CEE countries (11 countries)[3], non-EU Balkan countries (5)[4], and non-EU former Soviet countries (5).[5] We also report three other groups' performances as Western EU (10 countries)[6], Southern EU (6),[7] and non-EU Western Europe (4).[8] As a country case, we will elaborate upon Russia's DEE profile.

We aim to answer to the following two research questions: (1) How deeply have CEE countries progressed in digital entrepreneurship? (2) Are there some specific digital entrepreneurship characteristics of the CEE countries that can be explained by their socialist heritage? Particularly, we are looking for specific DEE pillars that are significantly weaker or stronger than the other examined country groups. We examine the different levels of the digital entrepreneurship ecosystem including the super-index DEE score, its four sub-indices, twelve pillars, the entrepreneurship, and the digital components. In addition, by identifying the bottlenecks, we provide some policy recommendations based on improvements of the weak pillars.

First, we provide the basic ranking of the countries based on the overall DEE score. According to Appendix 1, developed countries lead the DEE ranking. Denmark is number one and Western European countries,

[3] Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia.

[4] Albania, Bosnia and Herzegovina, North Macedonia, Montenegro, Serbia. We have no data for Kosovo.

[5] Belarus, Georgia, Moldova, Russia, Ukraine.

[6] Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, Netherlands, Sweden.

[7] Cyprus, Greece, Italy, Malta, Portugal, Spain.

[8] Iceland, Norway, Switzerland, United Kingdom.

Table 4. **The DEE Index Score Development for the European Country Groups and Russia between 2020–2022**

Country group	DEE 2020	DEE 2021	DEE 2022	Development over 2020-2022 (%)	Development over 2020-2022
Non-EU Western Europe	75.8	77.5	80.3	5.9%	4.5
Western EU	72.3	74.1	77.2	6.9%	5.0
Southern EU	63.4	65.0	68.4	8.0%	5.1
EU member CEE	57.9	60.5	62.4	7.7%	4.5
Non EU-Former SU	41.6	43.0	43.8	5.1%	2.1
Non EU Balkan	36.2	37.5	39.9	10.0%	3.6
Russia	52.6	54.2	53.7	2.1%	1.1
Overall average	33.8	35.2	36.5	7.9%	2.7

Source: authors.

both EU members and non-EU members are not far behind the leader. Southern EU countries have similar scores as the best three CEE countries, Estonia, Slovenia, and the Czech Republic. The EU member CEE countries occupy the DEE Index ranking between 19th (Estonia) and 47th (Romania) out of the 170 countries. Only one non-EU former socialist country, Russia, has similar performance at 44th place. Other non-EU former SU countries include Georgia (56th), Ukraine (57th), Moldova (70th), and Belarus (73rd). Non-EU Balkan countries have a similar ranking as the previous former SU group, Serbia being the best (53rd) and Bosnia and Herzegovina the worst (87th).

By examining the development of the DEE Index scores over the 2020-2022 period (Table 4), we can see that there was notable development in the digital entrepreneurship ecosystem in Europe, a 7.9% increase on average. However, there are considerable differences among the countries and country groups. In relative terms, the most lagging non-EU Balkan countries progressed the most, followed by Southern EU nations. EU member CEE country DEE scores' increase was slightly below the EU average and the non-EU former SU countries are at the bottom with 5.1% increase in the DEE score. However, the differences between the leading nations and the CEE country groups increased in absolute terms. Russia performed worse than its group average, with 2.1% growth in its digital entrepreneurship ecosystem. In fact, Russia's DEE index score somewhat decreased from 2021 to 2022.

Table 5 goes further into the the DEE Index by showing the four sub-index values, the Digital Ecosystem (DE), and the Entrepreneurship Ecosystem (EE) scores in 2022.

According to Table 4, the ranking of the country groups for the four sub-indices mostly follow the DEE Index score ranking except for DTI, where the non-EU Western European countries are ahead of the Western EU country group. The differences between the EU member CEE countries and the other former socialist countries are significant, more than 50% in each sub-index, except DUC, so it seemingly pays off to be an EU member. The DE scores are higher than the EE ones in each country group indicating that the digital ecosystem is more advanced than the entrepreneurship ecosystem. The difference is high in the case of Russia, where DE scores exceed the EE scores by 19% implying significant inequalities between the two components.

Table 6 serves to present the twelve pillar values for our EU regions. We also show the lowest and the highest pillar values for each country group and the relative lag of the particular country group as compared to the leading group. The pillar values of the country groups mostly follow the previous rankings: Developed European countries, both EU members and non-EU mem-

Table 5. **The Four Sub-Index Scores and the DE and EE Scores of the European Country Groups and Russia (2022 data)**

Country	DTI score	DUC Score	DMSP score	DTE score	DE score	EE score	DE/EE ratio	DEE Index score
Non-EU Western Europe	79.3	83.2	79.1	79.9	92.2	83.9	1.099	80.3
Western EU	79.9	77.3	73.3	78.5	88.9	84.7	1.050	77.2
Southern EU	71.3	69.5	71.6	61.3	82.9	78.9	1.050	68.4
EU member CEE	67.9	63.2	62.2	56.1	80.3	74.7	1.075	62.4
Non EU-Former SU	44.2	46.1	47.1	37.6	70.0	59.4	1.178	43.8
Non EU Balkan	44.6	43.9	38.6	32.6	67.6	57.2	1.181	39.9
Russia	48.6	58.2	58.6	49.6	77.7	65.3	1.190	53.7
Overall average	38.1	35.8	36.2	36.0	57.5	52.9	1.088	36.5

Source: compiled by the authors

Table 6. **The Twelve Pillar Scores and the Gap between the European Country Groups and Russia (2022 data)**

DEE Direction (gap value in brackets)	Non-EU Western Europe	Western EU	Southern EU	EU member CEE	Non EU Former SU	Non EU Balkan	Russia	Overall average
Digital Access	84.1 (0.0%)	81.9 (2.6%)	**81.3** (3.3%)	68.2 (19.0%)	37.5 (55.4%)	51.7 (38.5%)	***34.8*** (58.6%)	37.0
Digital Freedom	84.1 (0.0%)	81.1 (3.6%)	61.6 (26.8%)	65.8 (21.7%)	36.9 (56.2%)	39.1 (53.5%)	37.5 (55.4%)	35.6
Digital Protection	76.9 (12.0%)	**87.4** (0.0%)	77.6 (11.1%)	**78.5** (10.1%)	**66.5** (23.9%)	**53.2** (39.1%)	**83.6** (4.3%)	48.3
Digital Literacy	85.6 (0.0%)	77.1 (9.9%)	69.4 (18.9%)	62.4 (27.1%)	54.5 (36.4%)	50.1 (41.5%)	68.9 (19.5%)	36.5
Digital Openness	88.2 (0.0%)	85.9 (2.7%)	77.4 (12.3%)	70.0 (20.6%)	51.9 (41.2%)	45.3 (48.6%)	79.1 (10.3%)	39.7
Digital Rights	84.9 (0.0%)	78.3 (7.8%)	66.3 (21.9%)	63.5 (25.2%)	39.3 (53.6%)	46.1 (45.7%)	40.5 (52.3%)	37.9
Networking	81.5 (0.0%)	75.8 (6.9%)	80.7 (1.0%)	66.4 (18.4%)	56.8 (30.3%)	45.2 (44.6%)	72.2 (11.4%)	39.5
Matchmaking	***73.3*** (0.0%)	***71.5*** (2.5%)	72.4 (1.3%)	65.5 (10.6%)	55.4 (24.5%)	45.0 (38.6%)	74.2 (-1.2%)	38.4
Financial Facilitation	**89.7** (0.0%)	79.4 (11.6%)	69.3 (22.7%)	59.7 (33.5%)	37.4 (58.3%)	32.2 (64.1%)	42.6 (52.5%)	37.4
Technology Usage	87.6 (0.0%)	81.7 (6.7%)	67.6 (22.9%)	57.7 (34.2%)	42.6 (51.4%)	43.3 (50.6%)	48.2 (45.0%)	41.9
Digital Adoption	78.6 (6.3%)	83.9 (0.0%)	59.6 (28.9%)	60.9 (27.4%)	***35.2*** (58.0%)	31.0 (63.1%)	46.3 (44.8%)	35.6
Technology Diffusion	81.2 (0.0%)	79.2 (2.5%)	***58.0*** (28.6%)	***51.8*** (36.2%)	37.3 (54.0%)	***26.5*** (67.4%)	58.2 (28.3%)	36.0

Legend: Bold letter: highest pillar; Bold and Italic letter: lowest pillar.
Source: compiled by the authors

bers, lead, followed by Southern EU and CEE countries. We also report a gap between the leading and other country groups for each pillar: Non-EU member Western countries lead in ten out of the twelve pillars, EU member Western countries lead in two cases (Digital Protection and Digital Adoption). In a surprising turn, Russia's Matchmaking value is higher than that of the non-EU Western country average. While the average gap between the non-EU and the EU Western countries is below 5%, Southern EU countries are behind by 17%, CEE countries by 23.7%, non-EU former SU countries by 45.3%, and non-EU Balkan countries by almost 50%, implying significant differences in digital entrepreneurship ecosystem development. Russia's average lag is 31.8%. Viewing the strong and weak pillars, there are, again, some alterations, however, there is only one case, Digital Protection, which seems to be the strongest pillar of former socialist countries. This pillar is particularly high in Russia, probably not independently from military applications. In the other cases, we do recognize any systematic differences that could be associated with socialist heritages.

Case Analysis of Russia

In a seminal study, Baumol (1990) posited that the level of entrepreneurship over time is about the same. However, the usefulness of entrepreneurial activity depends upon the institutional development. Under weak institutions, there are many non-effective and even destructive entrepreneurial events while strong and favorable institutions make the emergence of productive entrepreneurship possible. Baumol's idea proved to be particularly useful in explaining transitional countries' entrepreneurship. Many researchers concluded that Russia's low entrepreneurial activity and weak entrepreneurial performance is due to institutional deficiencies (Ageev et al., 1995; Aidis et al., 2008; Welter, Smallbone, 2017). Russia's institutional environment does not really support innovative startups (Veselovsky et al., 2017). Besides the institutional factors, the differences of actors, both businesses and individuals, regarding entrepreneurial skills, attitudes, and innovative behavior is also important. Szerb and Trumbull (2018) also highlight the importance of institutional development in Russia, but they called the attention to the individual factors that also explain why Russia is different than the transitional country group.

The shift to the digitalization of entrepreneurial activity have contributed to raising Russia's economic potential.[9] There are some positive examples of Russia's digital potential such as important tech-based companies – for example, ABBYY FineReader, Ngnix, Kaspersky, VK, and Yandex (Gritsenko et al., 2021). Despite this, the country is lagging behind global benchmarks (Levchenko, Konvisarova, 2022; Askerov et al., 2018). The growth of the high-tech sector in developed countries is accompanied by low efficiency in the Russian high-tech sector (Askerov et al., 2018). The discrepancies in digitization across Russian regions also underlines the need for tar-

[9] Of course, the downside, as for any other country, was an increase in the threats essential for the digital economy: complication of market control, data manipulation, information leakage, increase in fraud and deception, etc. (Makasheva, 2012).

Table 7. **The Development of Russia's DEE Index and the Four Sub-index Scores for 2017–2022**

Year	DTI	DUC	DMSP	DTE	DEE
2017	29.8	43.4	42.8	46.0	40.5
2018	30.5	47.5	44.6	45.9	42.1
2019	34.8	52.9	53.3	48.1	47.3
2020	49.5	59.4	51.8	49.5	52.6
2021	49.3	60.4	58.2	48.9	54.2
2022	48.6	58.2	58.6	49.6	53.7

Source: compiled by the authors

geted technology transition strategies (Zhulikov, Zhulikova, 2022).

The need to develop a digital economy was recognized as a national priority in Russia, expressed in a 2017 governmental order titled "Digital Economy of the Russian Federation". The project has ambitious aims to modernize Russia and to establish the digital economy ecosystem via the creation of the required institutional and infrastructural factors. The program targets the development of high-tech businesses as well as traditional industries and SMEs and an overall increase in the competitiveness of the Russian industries. This program emphasized digital security and the use of local software by federal and local governments and organizations (Abalakin et al., 2023). While the program highlights the micro level – markets and industries – and the environmental – institutional and infrastructural – factors, it does not deal with the digital platforms and technologies that are also vital for the entire digital entrepreneurship ecosystem (Lowry, 2022). Lukashov et al. (2021) also note that there are some contradictions between the program's ambitious goals and the its implementation.

Below, we use some of the digital economy program targets to evaluate the progress of Russia's digital economy.

Looking at Russia's digital entrepreneurship ecosystem development, we have shown previously that Russia ranked 44th in the DEE Index with a score of 53.7 (2022). With this performance Russia is leading its country group and precedes two EU-member CEE countries: Romania and Bulgaria. In 2022, DTI (48.6) proved to be the weakest and DMSP (58.6) was the best performing sub-index. DUC (58.2) and DTE (49.6) were between these two. In Table 7 we provide the development of Russia's DEE Index and its four sub-indices over 2017–2022.

Over the six years of 2017-2022, Russia's DEE Index scores increased from 40.5 to 53.7, which is a 33% increase. However, the improvement over 2020-2022 was only 2.1% as compared to the 7.9% average European increase. There was a decrease of the DEE Index scores from 2021 to 2022, one can say such a change was not independent of geopolitical tensions. It is also clear that the DTI scores, reflecting to the development of digital infrastructure, increased the most, by 63%, demonstrating the effectiveness of Russia's digital strategy implementation in this respect. While digital platform improvement was not in the strategy, DMSP proved to be the best sub-index for Russia over the entire period of 2017-2022. However, the DTE scores, expressing the entrepreneurship components, increased by only 8%. This means that Russian businesses' digitalization was very slow, despite the continuous government effort to improve SMEs' digital transition. This is also underlined by the fact that Russia's digital components (77.7) is much higher – by 12.4 points – than the entrepreneurship components (65.3).

Table 8 serves to further evaluate Russia's DEE profile. Viewing the twelve pillars and 24 variables, there are considerable differences. Russia's worst pillar is Digital Openness (34.8), followed by Digital Freedom (37.5). In both cases the main cause of the low values is the institutional weaknesses reflecting the deficiencies in ICT, e-commerce regulation, as well as some political problems and internet competition. Similar problems can be noticed in Digital Rights (40.5) where property rights and privacy seem to be problematic. In the case of Digital Openness, the quality of the digital ecosystem is also relatively low, showing obstacles to the population's use of G2–G5 networks and internet subscription. The improvement of broadband subscriptions and access to the internet was one of the main targets of Russia' digital strategy. The Digital Openness pillar's digital part increased only by 5.5% over 2017–2022, which is low by international standards.

On the brighter side, Russia's best pillars are Digital Protection (83.6), Digital Access (79.1), Matchmaking (74.2), and Networking (72.2). It is interesting that the higher parts in two of the four cases (Digital Access and Networking) are entrepreneurship ecosystem components. Cybersecurity regulation and language support for the internet are the strong points of Russia's entrepreneurship ecosystem, well reflecting the successful implementation of the digital strategy. Digital Literacy (68.9) and Technology Diffusion (58.2) are also at an acceptable level, again demonstrating a positive performance, according to the digital strategy.

Besides the components, ecosystems can be examined based on the ecosystem players/actors. Here we identified four types of actors as the governments representing the institutions, digital infrastructure developers, users, and agents (entrepreneurs). According to Table 8, Digital Technology Infrastructure (48.6) is the weakest component. Users (82.6) seem to be well prepared for changes brought on by the digital revolution, while entrepreneurs are also at an adequate level.

The DEE methodology makes it possible to provide policy recommendation based on the bottlenecks of the digital entrepreneurship ecosystem. Figure 1 shows how many additional resources would be optimally split among the twelve pillars to improve Russia's DEE Index score by ten percent. We report on only those pillars that require development.

According to Figure 1, Russia should improve six out of the twelve pillars to be able to improve its DEE score

Table 8. **Russia's Digital Entrepreneurship Ecosystem Profile (based on 2022 data)**

a) Pillars Scores

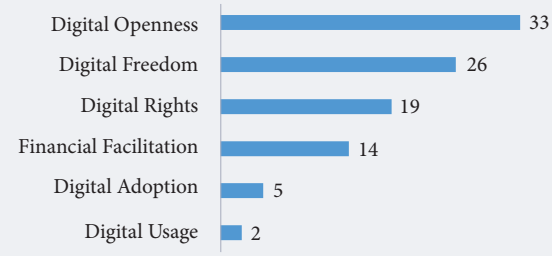
Pillar	Pillar score	Entrepreneurship ecosystem score	Digital ecosystem score
Digital Technology Infrastructure (DTI)			
Digital Openness	34.8	32.9	66.2
Digital Freedom	37.5	26.4	81.3
Digital Protection	83.6	85.8	88.3
Digital User Citizenship (DUC)			
Digital Literacy	68.9	75.6	87.6
Digital Access	79.1	94.6	80.5
Digital Rights	40.5	36.0	89.3
Digital Multi-sided Platform (DMSP)			
Networking	72.2	90.0	74.9
Matchmaking	74.2	81.7	86.2
Financial Facilitation	42.6	53.1	77.2
Digital Technology Entrepreneurship (DTE)			
Digital Usage	48.2	69.2	63.7
Digital Adoption	46.3	62.9	67.1
Technology Diffusion	58.2	75.8	69.8

b) Sub-indices Scores

Sub-index	Score
Users	82.6
Digital infrastructure	72.7
Agents	72.1
Digital Multi-sided Platform (DMSP)	58.6
Institutions (Government)	58.5
Digital User Citizenship (DUC)	58.2
Digital Entrepreneurship Ecosystem Index	53.7
Digital Technology Entrepreneurship (DTE)	49.6
Digital Technology Infrastructure (DTI)	48.6

Source: compiled by the authors

Figure 1. **Digital Platform Economy Optimization Analysis for Russia: the Distribution of Additional Resources for a 10% Increase of the DEE Index Score (2022 data)**



Source: compiled by the authors

by 10%. Most of the additional resources should be allocated toward Digital Openness (33%), Digital Freedom (26%), and Digital Rights (19%). All cases necessitate government involvement. The enhancement of Financial Facilitation (14%) requires relatively fewer resources, because entrepreneurs should be aiming to increase fintech startups. We have not dealt with Financial Facilitation. According to Abalakin et al. (2023), the financial technology market has been growing due to the spread of online payments and remittances and Fintech solutions providing digital services in insurance, lending, and investments. According to our results, the Fintech sector is a rather weak part of the Russian digital entrepreneurship ecosystem. Digital Adoption needs only 5% and Digital Usage 2% of the additional resources to achieve the desired goal.

Summary and Conclusion

In this paper we use the DEE Index methodology and scores to evaluate the performance of former socialist CEE countries with regard to their digital entrepreneurship ecosystems and identify some common features.

Since the start of the transition, former socialist countries have gone through significant changes. While initially these countries were handled as being one relatively homogeneous group, the unified, one-size-fits-all type of suggestions and policies proved to be only partially successful. The transition to a market economy caused a decline in per capita GDP as well as increased inequalities. The recovery was slower than expected, and the catch up with regard to developed countries has been unsuccessful even after 30 years. By the 2000s, most of the market economy institutions have been adopted, however, the institutional development was undermined by informal rules and corruption in many countries. The transitional literature called these alterations simply varieties of capitalism. The 2008 crisis also hit the transitional countries, and they selected different paths of recovery and development which led to increased divergencies. The different responses pinpointed the importance of path dependencies and the historical heritages that could explain the sluggish developments. These findings highlight the importance of analyzing these countries further not as a homogeneous group. Here we selected Russia as an example for such an individual case.

We grouped the transitional countries into three categories and included three groups of other developed European countries to examine their digital entrepreneurship ecosystem performance. To do so, we applied the DEE Index, which is a composite indicator, built from four sub-indices, twelve pillars, and 24 variables. Unlike other indices, the DEE has a solid theoretical basis and a large sample size of 170 countries that makes it possible to compare data from various countries.

While Denmark led the DEE Index 2022 rankings, the non-EU Western countries are the best performers in Europe. EU-member Western countries are close to

them. The Southern European country group performance is similar to that of the EU-member CEE country group, implying that the leaders of these former socialist countries – Estonia, Czech Republic, Slovenia, and Lithuania - have reached the level of most Southern European countries in their DEE development. The former SU country group and the non-EU Balkan country cluster are very similar to each other but with significantly lower DEE Index scores than the most advanced Western countries. However, the former SU countries perform slightly better than the Balkan countries. These finding reflect the developments of these countries and not the planned economy heritage – the Pearson correlation between the DEE Index scores and the per capita GDP was 0.90 based on the 2022 data. Over the 2020-2022 period, the non-EU Balkan countries decreased their arrears in a somewhat similar manner to the Southern European nations.

We consider the balanced performances in terms of the digital ecosystem and entrepreneurship ecosystem components, with the four subindices and the twelve pillars assessed as optimal. At the macro level, we have found that almost all European countries have better performance in the digital ecosystem as compared to the entrepreneurship ecosystem. The digital entrepreneurship component is significantly lower in the Balkan and former Soviet countries as compared to the EU member countries. This may imply that the entrepreneurs in these states still cannot fully exploit the potential of the digital ecosystem. Looking at differences at the sub-index level, it seems that the smallest lag between the leading group and the transitional countries was in terms of digital infrastructure (DTI) and the largest gap was observed for digital technology entrepreneurship (DTE). The underdevelopment of the entrepreneurial components could be explained, at least partially, by the socialist heritage, a period of time when entrepreneurship was restricted or even outright banned.

The weakest and strongest pillars vary across the six country groups with some surprises. Digital Adoption, Digital Diffusion, and Digital Literacy are the three weakest pillars in Europe, showing that there is room for improvement. The Western countries, both EU members and those outside the organization, have a relatively low level of the Digital Protection pillar.

Digging deeper at the pillar level, there are some country-group specific characteristics. We should highlight the Digital Protection pillar, which is the highest pillar for all former socialist countries. Similarly, a small lag can be noticed in the Matchmaking pillar showing that digital platforms are popular in these countries. The largest differences can be detected in Financial Facilitation, which is somewhat surprising given that fintech businesses flourish even in countries with poor infrastructure, such as some in Africa. Maybe regulation in the former socialist countries still favors classical finance and banks. The Digital Freedom and Digital Rights pillars also show significant differences between the leading country group and the transitional countries. These findings reflect some deficiencies in the political systems; however, such a situation does influence the smooth operation of the whole digital entrepreneurship ecosystem.

The usefulness of the DEE Index can be really seen when it is applied to a single country to explore that state's individual strengths and weaknesses. This type of investigation helps identify individual characteristics and provide tailor-made policy suggestions instead of bulk, group-specific recommendations. Our selected case was Russia. In the 2010s, Russia recognized its backwardness in the digital economy ecosystem and initiated a strategy with ambitious goals about the enhancement of Russia's digital economy. Based on the DEE Index approach, we could follow the strategy's implementation.

The DEE analysis puts Russia at 44th place in the DEE Index ranking with a score of 53.7, which reflects the development of the country. With this performance Russia is the best in the non-EU member country groups and ahead of Romania and Bulgaria. Over the examined six years – 2017–2022 – Russia has improved its DEE scores by 34%, however, this improvement slowed down in 2020–2022. Russia's digital entrepreneurship components are imbalanced: the digital component is almost 20% higher than the entrepreneurship ecosystem one. Based on the four sub-indices, Russia spent a lot of resources on improving its digital infrastructure, however, the enhancement of digital technology entrepreneurship has been lacking. The DMSP is Russia's best sub-index showing strengths in two out of its three pillars, Matchmaking and Networking. Russia's best pillar is Digital Protection, which is higher than many developed Western countries. Cybersecurity regulation and language support as well as the improvement of the population's digital literacy reflect the successful implementation of the digital strategy. However, there are some problematic points. Digital Openness, Digital Freedom, and Digital Rights show institutional deficiencies in regulation and internet competition. According to the bottleneck analysis, Russia should spend most of its additional resources for these three pillars and Financial Facilitation to increase its DEE Index scores by ten percent. Digital technology users are well prepared while institutions have the lowest values by far. This finding confirms the conclusions of the comparative economics literature about Russia's weak institutional development.

Finally, we should mention some limitations of our DEE Index and analysis. Like any other composite indicator, DEE Index is also based on available data. For 170 countries, it is very difficult to obtain data for many years. Besides that, we use 54 indicators, for which data can be lacking, mostly in the advanced application of digital technologies and their supporting environment. We did not go into detail about the country ranking, which might not reflect the general perception of the importance of the nation in digital technology development - especially China and India. Note that we used

country-level data and these countries have relatively small advanced regions, however, their overall development is still relatively low. Perhaps a regional analysis would be more appropriate especially when we aim to examine the creation of new technologies. However, our DEE Index is built to focus on the application and not the creation of these technologies. Moreover, the digital entrepreneurship ecosystem has been rapidly evolving with a roughly 5% yearly increase. Infrastructure developments are not continuous, and this causes sudden changes of country values and rankings. Therefore, policy suggestions might not reflect the situation by the time of data publication.

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Appendix 1. **The Rank and Scores of the Countries in DEE (2022)**

Rank	Country	DEE 2022	Rank	Country	DEE 2022	Rank	Country	DEE 2022	Rank	Country	DEE 2022
1	Denmark	**89.9**	44	Russian Federation	**53.7**	87	Bosnia and Herzegovina	**30.9**	130	Pakistan	**15.9**
2	USA	**85.6**	45	Bulgaria	**53.4**	88	Egypt	**29.8**	131	Iraq	**15.6**
3	Norway	**85.4**	46	Turkey	**53.3**	89	Tunisia	**29.5**	132	Libya	**15.0**
4	Finland	**84.9**	47	Romania	**53.2**	90	Paraguay	**28.5**	133	Myanmar	**15.0**
5	Australia	**82.7**	48	Qatar	**50.8**	91	Jamaica	**28.2**	134	Uganda	**14.7**
6	Singapore	**82.0**	49	China	**50.4**	92	Fiji	**27.2**	135	Tanzania	**14.2**
7	Sweden	**79.4**	50	Bahrain	**48.2**	93	India	**27.2**	136	Zambia	**14.2**
8	Switzerland	**79.2**	51	Saudi Arabia	**48.2**	94	Maldives	**27.1**	137	Timor-Leste	**14.1**
9	Iceland	**79.2**	52	Argentina	**48.0**	95	Lebanon	**27.0**	138	Rwanda	**13.1**
10	Ireland	**78.5**	53	Serbia	**47.5**	96	Kyrgyzstan	**26.9**	139	Cameroon	**13.0**
11	Canada	**78.4**	54	Costa Rica	**46.7**	97	Sri Lanka	**26.7**	140	Benin	**12.5**
12	United Kingdom	**77.5**	55	Thailand	**45.7**	98	Belize	**26.5**	141	Papua New Guinea	**12.3**
13	Netherlands	**76.8**	56	Georgia	**45.7**	99	Botswana	**26.1**	142	Tajikistan	**12.3**
14	New Zealand	**76.5**	57	Ukraine	**45.6**	100	Saint Lucia	**26.1**	143	Gambia	**11.7**
15	Germany	**76.5**	58	Kuwait	**43.9**	101	Samoa	**25.7**	144	Zimbabwe	**11.4**
16	Spain	**75.0**	59	Mauritius	**43.0**	102	St. Vincent & Grenadines	**24.9**	145	Angola	**11.3**
17	France	**74.6**	60	North Macedonia	**42.6**	103	Uzbekistan	**24.8**	146	Mauritania	**10.9**
18	Luxembourg	**74.2**	61	Kazakhstan	**42.2**	104	Bhutan	**24.4**	147	Mali	**10.8**
19	Estonia	**73.8**	62	Mexico	**41.5**	105	Suriname	**23.8**	148	Togo	**10.7**
20	Belgium	**72.3**	63	South Africa	**41.2**	106	Cabo Verde	**23.7**	149	Sierra Leone	**10.5**
21	Korea, South	**71.7**	64	Oman	**40.7**	107	Bolivia	**23.6**	150	Liberia	**10.1**
22	Portugal	**70.3**	65	Vietnam	**39.7**	108	El Salvador	**23.2**	151	Burkina Faso	**9.1**
23	Japan	**69.7**	66	Montenegro	**39.6**	109	Venezuela	**22.9**	152	Sudan	**9.0**
24	Hong Kong	**69.2**	67	Panama	**39.1**	110	Tonga	**22.5**	153	Congo	**8.9**
25	Cyprus	**68.8**	68	Albania	**38.7**	111	Ghana	**22.1**	154	Malawi	**8.5**
26	Czech Republic	**68.8**	69	Colombia	**38.4**	112	Kenya	**20.8**	155	Solomon Islands	**8.5**
27	Italy	**68.8**	70	Moldova	**37.0**	113	Nepal	**20.5**	156	Haiti	**8.4**
28	Lithuania	**67.4**	71	Indonesia	**36.8**	114	Algeria	**19.8**	157	Yemen	**8.1**
29	Israel	**66.0**	72	Brunei Darussalam	**36.8**	115	Gabon	**19.5**	158	Guinea-Bissau	**8.0**
30	Austria	**65.3**	73	Belarus	**36.8**	116	Cambodia	**19.4**	159	Niger	**7.9**
31	Malta	**64.7**	74	Peru	**36.6**	117	Bangladesh	**18.7**	160	Guinea	**7.8**
32	Latvia	**64.4**	75	Armenia	**36.5**	118	Laos	**18.7**	161	Comoros	**7.6**
33	Slovenia	**63.3**	76	Barbados	**36.0**	119	Honduras	**18.3**	162	Ethiopia	**7.1**
34	Greece	**62.9**	77	Dominican Republic	**35.7**	120	Guyana	**18.2**	163	Madagascar	**7.1**
35	Slovakia	**62.3**	78	Ecuador	**34.5**	121	Nicaragua	**18.0**	164	Central Africa	**6.9**
36	Hungary	**62.1**	79	Mongolia	**34.5**	122	Guatemala	**17.5**	165	Mozambique	**6.9**
37	United Arab Emirates	**61.4**	80	Trinidad and Tobago	**34.2**	123	Vanuatu	**17.3**	166	Afghanistan	**6.3**
38	Poland	**59.9**	81	Bahamas	**33.7**	124	Senegal	**17.0**	167	Congo, D.R.	**5.2**
39	Chile	**57.6**	82	Jordan	**33.4**	125	Cote d'Ivoire	**16.8**	168	Burundi	**4.5**
40	Brazil	**57.4**	83	Azerbaijan	**31.9**	126	Eswatini	**16.7**	169	Chad	**4.4**
41	Croatia	**57.3**	84	Philippines	**31.9**	127	Nigeria	**16.7**	170	South Sudan	**3.7**
42	Uruguay	**55.6**	85	Morocco	**31.5**	128	Namibia	**16.0**			
43	Malaysia	**54.3**	86	Iran	**31.2**	129	Lesotho	**16.0**			

Legend: Light blue – Western EU, Brown – Southern EU; Green – Non-EU Western Europe; Yellow – EU member CEE; Blue – Balkan non-EU; Grey – Non-EU former SU countries

Source: authors.