Investment attractiveness of the country: social, ecological, economic dimension

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Abstract: Effective state regulation of the economy requires clear mechanisms for assessing investment attractiveness, a scientifically and consistent approach to identifying determinants of its improvement to achieve competitive advantages. The imbalances in a country's social, ecological, economic development decrease its investment attractiveness, the confidence level on the part of foreign stakeholders, the outflow of investment resources, the ability to achieve sustainable development goals, etc. The paper conducts a benchmarking analysis of approaches to assessing the social, ecological, economic components of the country's investment attractiveness. A method for assessing the country's investment attractiveness is developed. The paper presents the analysis of European countries during 2000–2019, which showed that Ukraine has the lowest level of investment attractiveness among the studied countries. The study results could be used in the development of mechanisms to increase investment attractiveness by identifying inhibitors and catalysts for managerial influence.

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1   Introduction

In recent decades, the problem of investment resources movement between countries has become relevant among the economists' and business analysts' studies. A significant number of determinants affect the redistribution process of resources. Their significance

degree depends on the investment type and most stakeholders' interests. Countries around the world take various measures to increase their competitiveness, including the investment attractiveness increase. The most valuable investments aim to create new jobs, increase gross domestic product, and develop infrastructure. With this in mind, governments seek to stimulate foreign direct investment inflows. Besides, the amount of foreign direct investment in the country and the intensity of their inflow allow for the country's qualitative transformations of economic, social, environmental development.

The investment attractiveness of the national economy is a complex concept and depends on the investment activity of all participants in the investment process. In addition to macroeconomic determinants, as well as the impact of the external environment on the national economy, there are many factors, which determine the formation and development vector of the investment attractiveness.

The paper contains four parts: literature review – explanation the scientific backgrounds on approaches to estimating the investment attractiveness; methods – explanation the research methodology, methods to test the hypothesis of the investigation; results – explanation the findings of the developed methodology for assessment of investment attractiveness; conclusion – contains the recommendations to increase the investment attractiveness of the country.

2   Literature review

The authors of the studies (Galán and González-Benito, 2006; Buckley et al., 2010; Villaverde and Maza, 2012; Blonigen and Piger, 2014; Petrushenko et al., 2020; Dzwigol, 2020; Saługa et al., 2020; Kuzmenko et al., 2020) proposed scientific and methodic approaches to evaluate a determinant of increasing the foreign capital volume in origin countries. Dunning (2001) relate sources of raw materials, markets, efficiency and availability of strategic assets to the main determinants of increasing foreign direct investment in the country. The author uses the OLI paradigm (ownership, localisation, internalisation), which describes the principles of stakeholders' use of their available resources: the benefits of participation in the capital (ownership); advantages of geographical location; application of economic strategy aimed at reducing or eliminating negative externalities by turning them into internal (internalisation).

In contrast to Dunning (2001), Mathews (2006) proposes to use a three-factor model LLL (linkage, leverage, learning) to find the determinants of increasing foreign direct investment in the country. Gloria and Ding (2009) using the LLL model on the example of Southeast Asian countries, empirically confirm that foreign investors are mainly motivated to find new markets. The authors of Hoshi and Kiyota (2019) have a similar opinion.

An empirical study of the interaction between macroeconomic indices of the national economy and the volume of attracted foreign investment was carried out in Xia et al. (2014), Hu and Cui (2014), Boyko and Roienko (2014), Hobdari and Gammeltoft (2017), Paul and Benito (2018). As illustrated in the Chinese statistics, the authors of the work (Ali et al., 2018) evaluated the interdependence of the dynamics of gross domestic product growth and foreign direct investment using the autoregression model (ARDL).

Hobdari and Gammeltoft (2017) describe the main benefits of attracting foreign direct investment for both developing and developed countries. The authors conclude that attracting investment in the national economy of developed countries allows creating

high-margin production. Hoshi and Kiyota (2019) note that the investment attractiveness assessment should be based on identifying the main determinants of fluctuations in foreign direct investment. Thus, the authors concluded that the effective government of Japan has created mechanisms to minimise fluctuations in foreign direct investment.

The process of attracting foreign direct investment involves cross-border movement of resources and intercultural communication. Thus, Ghemawat (2003) proposes a CAGE model (cultural, administrative, geographic, economic) to assess the investment attractiveness. It uses the factor of differences in cultural, administrative and socio-economic aspects along with macroeconomic indices, to consider the "cultural distance".

The inclusion of environmental factors in investment decisions changes the stakeholders' priorities (Samusevych et al., 2021). Thus, effective environmental legislation allows increasing production in certain industries that may pollute the environment. It considers both the presence and attractiveness possibility of legal barriers (Erdogan, 2014). It should be highlighted that a huge range of the scientists investigated the environmental factors as a key of the countries' sustainable development (Didenko et al., 2020; El Amri et al., 2021; Czyżewski et al., 2019; Dzwigol and Dzwigol-Barosz, 2020), competitiveness (Cathleen et al., 2020), healthcare (Shipko et al., 2020; Smiianov et al., 2020; Kuzmenko et al., 2020; Letunovska et al., 2021) social progress (Hrytsenko et al., 2017; Starchenko et al., 2021), energy efficiency (Paskannaya and Shaban, 2019; Pavlyk, 2020; Panchenko et al., 2020; Miskiewicz, 2020; Ziabina et al., 2020; Rosokhata et al., 2021) which safe equilibrium between economics, social and ecological goals. In the papers (Lentjushenkova et al., 2019; Titko et al., 2017; Vasylieva et al., 2017) the authors confirmed that transparency of the investment market and reports could increase the investment attractiveness of the country.

Accordingly, the investment attractiveness of a particular economy will be affected by environmental regulation in the country: multinational companies experience competitive disadvantages related to countries or regions where such rules exist (Cole et al., 2017). Investors are ready to invest in economies where environmental laws are less binding. This principle is known as the pollution haven hypothesis since the motive for cost optimisation and profit maximisation is crucial for choosing an investment object (Mohai et al., 2009).

Systematisation of scientific achievements on the assessment of the investment attractiveness of the national economy shows the lack of a unified approach generally accepted by the scientific community to evaluating the investment attractiveness of the national economy.

3 Methodology

Comparative analysis of the theoretical basis for assessing the investment attractiveness of the national economy showed that to the greatest extent the requirement to ensure the comparison reliability of different countries and achieve the main public policy objectives to increase the investment attractiveness of the national economy is performed using a system-structural approach to investment attractiveness.

At the first stage, a set of system-forming determinants of the investment attractiveness of the national economy was formed to build the information base of the study, which includes external (ability to attract new investment resources from abroad) and internal (ability of the economy to use existing resources efficiently). The external

ones include the number of foreign tourists (X1); the level of economic openness (X2); amount of attracted foreign investments (X3). The main vectors of internal determinants include:

- *Vector 1 (socio-economic)*: GDP per capita (SE1), share of working population in total (SE2), amount of fixed capital in the country (SE3), unemployment rate in the country (SE4).

- *Vector 2 (infrastructural)*: losses of electricity during its transportation (In1), the volume of passenger traffic on air transport (In2), the number of cellular network users (In3).

- *Vector 3 (innovation research)*: number of registered patents (SI1), research and development costs (SI2), number of scientists in the field of research and development (SI3).

- *Vector 4 (energy resources)*: the share of the population with access to electricity (EM1), the energy consumption from fossil fuels (EM2), the rent for natural resources (EM3), the energy consumption from renewable sources in final energy consumption (EM4).

- *Vector 5 (agricultural resource)*: share of arable land in total area (AR1), value added of agriculture, forestry and fisheries, % of GDP (AR2), forest area (% of land area) (AR3).

The system regarding the indicators for external and internal factors of investment attractiveness of the national economy is based on the benchmarking analysis of methodologies for assessing individual components of countries' investment attractiveness and their competitiveness by leading world agencies (Solability, World Economic Forum, The European House – Ambrosetti, World Intellectual Property Organization, World Bank, etc.).

The information base of the study for the national economy of Ukraine and six member states of the European Union (Bulgaria, Croatia, Lithuania, Latvia, Poland and Romania) for the period 2000–2019 was formed on the basis of World Data Bank (2021) statistics. Bulgaria, Croatia, Lithuania, Latvia, Poland and Romania have similar start economic position and historical roots with Ukraine as the Post-Soviet countries. After joining the EU, all chosen countries demonstrate economic growth. In this case, as Ukraine have chosen the EU vector for the development their experience could be valuable and applicable to Ukraine.

At the second stage, it is necessary to implement the procedure of their normalisation to prevent the dimensionality and multi-vector nature of the selected indices. The disincentive indices include index of unemployment rate (S4) and losses during transmission and distribution of electricity (% of total) – In1. Other indices are stimulators. The core principle for dividing into stimulators and disincentive was the following: the stimulators – increasing of indices provokes the increase of the investment attractiveness; disincentive – increasing lead to declining integrated index of investment attractiveness.

Accordingly, the normalisation of determinants - stimulators is proposed to be carried out according to formula 1, for disincentives 2.

$$A_{i,j} = \frac{Y_{i,j} - Y_{min}}{Y_{max} - Y_{min}},$$

(1)

$$A_{i,j} = \frac{Y_{max} - Y_{i,j}}{Y_{max} - Y_{min}},$$

(2)

where $A_{i,j}$ is the normalised value for the indicator i of the subgroups of investment attractiveness determinants j; $Y_{i,j}$ is the actual value of i–indicator ($i = 1, \ldots, m$) of j–subgroup ($j = 1, \ldots, m$) of the investment attractiveness; Y_{min} is the minimum actual value of i–indicator of j–subgroup; Y_{max} is the maximum actual value of i–indicator of j–subgroup.

The weights of normalised indicators are determined using the entropy approach at the third stage of investment attractiveness assessment (formulas (3)–(5)).

$$I_{i,j} = \left(1 + A_{i,j}\right) + \sum_{i=1}^{m} \left(1 + A_{i,j}\right),$$

(3)

where $I_{i,j}$ is the specific weight of i–indicator of investment attractiveness of j–subgroup; $A_{i,j}$ is the normalised value of i–indicator ($i = 1, \ldots, m$) of j–subgroup ($j = 1, \ldots, n$) of the investment attractiveness.

$$e_i = -\frac{1}{\ln(n)} \times \sum_{i=1}^{m} I_{i,j} \times \ln\left(I_{i,j}\right),$$

(4)

where e_i is the entropy value of i–indicator of the investment attractiveness.

$$\omega_i = \left(1 - e_i\right) + \sum_{i=1}^{n} \left(1 - e_i\right),$$

(5)

where ω_i is the the weighting factor value of i–indicator of the investment attractiveness.

Weighting factors allow to consider the variation degree of each indicator and eliminate the subjective nature of their evaluation.

At the fourth stage, an integrated assessment regarding the investment attractiveness coefficients of the analysed countries was carried out. Authors used a taxonomic method based on the calculation of Euclidean distances of the actual values of investment attractiveness indices from their reference values (formulas (6)–(7)).

$$IP_i = IP_{SE} + IP_X + IP_{In} + IP_{SI} + IP_{AR} + IP_{EM},$$

(6)

Given that the index of the investment attractiveness component is calculated as the sum of the weighting factor products and the corresponding component of investment attractiveness, the formula 6 was interpreted as follows:

$$IP_i = \sum_{i=1}^{n} \omega_i \times SE_i + \sum_{i=1}^{n} \omega_i \times X_i + \sum_{i=1}^{n} \omega_i \times In_i + \sum_{i=1}^{n} \omega_i \times SI_i + \sum_{i=1}^{n} \omega_i \times AR_i + \sum_{i=1}^{n} \omega_i \times EM_i,$$

(7)

where IP_i is the integral index of the investment attractiveness of i-country; $IP_{SE}, IP_X, IP_{In}, IP_{SI}, IP_{AR}, IP_{EM}$ is the respectively socio-economic, external, infrastructural,

innovation-research, agricultural and energy-resource components of investment attractiveness; *SE*, *X*, *In*, *SI*, *AR* and *EM* − normalised indicators of the investment attractiveness components.

4   Results

Table 1 shows the results of calculating the weight coefficients of the system-forming determinants in the investment attractiveness of the national economy using the entropy method.

Table 1   Weight coefficients of system-forming determinants in the investment attractiveness of the national economy using the entropy method

Index	X1	X2	X3	SE1	SE2	SE3	SE4	In1	In2	In3
Weight coefficient	0.084	0.040	0.051	0.033	0.048	0.030	0.045	0.034	0.042	0.050
Index	SI1	SI2	SI3	SI4	AR1	AR2	AR3	EM1	EM2	EM3
Weight coefficient	0.049	0.055	0.041	0.052	0.068	0.062	0.060	0.045	0.044	0.069

Source: Calculated and compiled by the author

The sum of all weight coefficients of the investment attractiveness integrated index is equal to 1. According to the calculations given in Table 1, the most important indicator is the net increase in foreign investment ($X1 = 0.084$), the least significant – gross domestic product per capita (0.033). The external components of investment attractiveness in general have a weight coefficient – 0.17.5%, socio-economic component – 15.5%; infrastructure component – 12.5%; innovation and research – 19.7%; agricultural – 19.0%; energy resources – 15.8%.

Tables 2–7 give the results of calculating the coefficients regarding the investment attractiveness integral indices $IP_{SE}, IP_X, IP_{In}, IP_{SI}, IP_{AR}, IP_{EM}$ for the analysed countries during 2000–2019.

The calculation results regarding the external component of investment attractiveness, shown in Table 2, demonstrate that Poland has the best attractiveness of this component during the entire analysis. Thus, in 2019, this ratio reached 0.1369, while the average value for the entire period was over 0.104. According to the results of 2019, the worst value of this coefficient was in Ukraine – 0.0336, with the average period for the analysis – 0.045.

According to the National Economic Strategy of Ukraine (2021) for the period up to 2030, the following goals were set in the framework of improving the external component of investment attractiveness:

- increase the net inflow of foreign direct investment to at least 15 billion US dollars per year starting in 2025

- export growth to 150 billion US dollars.

Thus, Ukraine did not create an attractive and competitive environment for foreign investment and tourism. Besides, compared to other analysed countries, the volume of

export-import transactions is the lowest in relative terms. Thus, in 2019, foreign investment was three times lower than in Poland and five times lower than private remittances to Ukraine (National Economic Strategy of Ukraine, 2021).

Table 2 The results of calculating the external influence component on investment attractiveness (IP_X)

Years	Bulgaria	Croatia	Lithuania	Latvia	Poland	Romania	Ukraine
2000	0.0164	0.0447	0.0164	0.0136	0.1040	0.0061	0.0376
2001	0.0167	0.0493	0.0204	0.0152	0.0733	0.0073	0.0324
2002	0.0159	0.0515	0.0231	0.0143	0.0608	0.0078	0.0318
2003	0.0204	0.0527	0.0211	0.0153	0.0679	0.0109	0.0381
2004	0.0282	0.0548	0.0237	0.0198	0.0952	0.0228	0.0443
2005	0.0330	0.0555	0.0294	0.0234	0.0917	0.0217	0.0524
2006	0.0451	0.0582	0.0338	0.0260	0.1161	0.0319	0.0470
2007	0.0620	0.0625	0.0323	0.0268	0.1254	0.0323	0.0604
2008	0.0560	0.0612	0.0351	0.0230	0.0982	0.0413	0.0662
2009	0.0306	0.0531	0.0230	0.0171	0.0892	0.0193	0.0470
2010	0.0310	0.0556	0.0351	0.0268	0.1049	0.0211	0.0535
2011	0.0370	0.0585	0.0439	0.0338	0.1092	0.0226	0.0584
2012	0.0390	0.0563	0.0446	0.0352	0.0939	0.0244	0.0601
2013	0.0417	0.0582	0.0449	0.0343	0.0859	0.0264	0.0503
2014	0.0403	0.0625	0.0393	0.0349	0.1269	0.0277	0.0326
2015	0.0411	0.0691	0.0390	0.0343	0.1220	0.0295	0.0394
2016	0.0395	0.0713	0.0375	0.0323	0.1329	0.0347	0.0401
2017	0.0442	0.0748	0.0421	0.0364	0.1243	0.0355	0.0390
2018	0.0441	0.0740	0.0436	0.0347	0.1375	0.0393	0.0364
2019	0.0425	0.0774	0.0450	0.0349	0.1361	0.0394	0.0336

Source: Calculated and compiled by the author

According to the results of 2019, Latvia and Lithuania have the highest coefficient of socio-economic component among the analysed countries – 0.095 and 0.094, respectively, while the lowest for this period – in Ukraine (0.051) (Table 3). The dynamics of this ratio in Ukraine is the worst – since 2000 it has only increased by 0.006 points, indicating a low rate of socio-economic development compared to neighbouring countries.

One should note that the average growth rate of gross domestic product in the period from 1996 to 2019 was only 3.6%, while in Central Europe – 6.4%.

Based on the results shown in Table 4, Poland has the best indicator (0.108) for assessing the infrastructure component in 2019. At the same time, the highest average value of this indicator during 2000–2019 is also in Poland – 0.0739. It indicates the effective use of its advantageous geographical location and sufficient attention from the state to improve the infrastructure component.

Table 3   The calculation results regarding the socio-economic component of the investment attractiveness (IP_{SE})

Years	Bulgaria	Croatia	Lithuania	Latvia	Poland	Romania	Ukraine
2000	0.0140	0.0336	0.0455	0.0460	0.0322	0.0655	0.0466
2001	0.0139	0.0350	0.0418	0.0514	0.0243	0.0650	0.0447
2002	0.0167	0.0363	0.0520	0.0531	0.0150	0.0493	0.0471
2003	0.0258	0.0499	0.0604	0.0569	0.0148	0.0521	0.0523
2004	0.0353	0.0513	0.0596	0.0625	0.0148	0.0505	0.0560
2005	0.0448	0.0570	0.0643	0.0712	0.0208	0.0488	0.0590
2006	0.0571	0.0705	0.0713	0.0883	0.0307	0.0564	0.0631
2007	0.0690	0.0848	0.0799	0.0984	0.0443	0.0679	0.0675
2008	0.0828	0.0942	0.0739	0.0930	0.0537	0.0715	0.0657
2009	0.0709	0.0746	0.0455	0.0526	0.0512	0.0550	0.0492
2010	0.0523	0.0523	0.0353	0.0418	0.0483	0.0602	0.0509
2011	0.0459	0.0412	0.0473	0.0540	0.0499	0.0588	0.0533
2012	0.0465	0.0349	0.0527	0.0656	0.0497	0.0625	0.0549
2013	0.0485	0.0274	0.0600	0.0702	0.0492	0.0586	0.0555
2014	0.0543	0.0477	0.0669	0.0732	0.0565	0.0610	0.0423
2015	0.0613	0.0336	0.0731	0.0785	0.0618	0.0625	0.0431
2016	0.0607	0.0412	0.0809	0.0782	0.0649	0.0617	0.0450
2017	0.0721	0.0493	0.0848	0.0846	0.0699	0.0689	0.0456
2018	0.0758	0.0622	0.0921	0.0928	0.0752	0.0707	0.0501
2019	0.0832	0.0688	0.0942	0.0945	0.0779	0.0770	0.0505

Source: Calculated and compiled by the author

Table 4   The calculation results of the infrastructure component (IP_{In})

Years	Bulgaria	Croatia	Lithuania	Latvia	Poland	Romania	Ukraine
2000	0.0178	0.0201	0.0240	0.0069	0.0354	0.0250	0.0135
2001	0.0216	0.0244	0.0307	0.0113	0.0394	0.0267	0.0122
2002	0.0241	0.0328	0.0385	0.0121	0.0428	0.0283	0.0143
2003	0.0292	0.0311	0.0437	0.0197	0.0478	0.0372	0.0204
2004	0.0374	0.0384	0.0537	0.0305	0.0535	0.0390	0.0311
2005	0.0458	0.0450	0.0634	0.0395	0.0585	0.0457	0.0451
2006	0.0549	0.0524	0.0661	0.0460	0.0656	0.0506	0.0599
2007	0.0615	0.0524	0.0695	0.0465	0.0713	0.0603	0.0606
2008	0.0654	0.0541	0.0728	0.0503	0.0761	0.0672	0.0682
2009	0.0644	0.0522	0.0744	0.0531	0.0751	0.0669	0.0673
2010	0.0650	0.0556	0.0535	0.0645	0.0772	0.0688	0.0696
2011	0.0682	0.0543	0.0535	0.0666	0.0826	0.0676	0.0779
2012	0.0695	0.0515	0.0583	0.0714	0.0872	0.0659	0.0821

Table 4 The calculation results of the infrastructure component (IP_{In}) (continued)

Years	Bulgaria	Croatia	Lithuania	Latvia	Poland	Romania	Ukraine
2013	0.0688	0.0548	0.0546	0.0700	0.0906	0.0641	0.0820
2014	0.0658	0.0544	0.0515	0.0677	0.0905	0.0658	0.0807
2015	0.0665	0.0537	0.0537	0.0750	0.0869	0.0680	0.0840
2016	0.0667	0.0547	0.0518	0.0794	0.0905	0.0681	0.0870
2017	0.0659	0.0554	0.0528	0.0812	0.0967	0.0706	0.0916
2018	0.0658	0.0567	0.0503	0.0799	0.1032	0.0731	0.0959
2019	0.0649	0.0575	0.0504	0.0858	0.1076	0.0764	0.0967

Source: Calculated and compiled by the author

Thus, during 2008–2012, Poland, as one of the host countries of the European Football Championship, made significant investments in improving the infrastructure component. Unlike Ukraine, Poland has more domestic resources for redistribution within the country (government expenditure on infrastructure projects). Poland is more attractive to international donors because it is a member of the EU, has a better investor protection, anti-corruption, etc.

One should note that this indicator for Ukraine is 0.0967 in 2019 with an average value of 0.062 for the study period. Besides, according to the results of 2000, Ukraine had one of the lowest coefficients of the infrastructure component, indicating the best growth rates of this indicator among the analysed countries. According to the National Economic Strategy of Ukraine for the period up to 2030, the development goals, are:

- to identify the pilot projects for the development of transportation in the direction of the Silk Road in Ukraine

- to build multilevel transport junction of railways and highways

- to strengthen international cooperation by 2030 to attract foreign direct investment in the development of infrastructure and technologies for clean energy production

- to ensure the creation of infrastructure and accumulation of resources necessary to decommission of power units at nuclear power plants

- to modernise the network infrastructure, to organise the uninterrupted operation of electronic services by building own autonomous system (National Economic Strategy of Ukraine, 2021).

During 2000–2019, the research component of Ukraine deteriorated (Table 5). Thus, if according to the results of 2000, Ukraine had the best coefficient among the analysed countries – 0.095, according to the results of 2019, it was 0.0291. At the same time, Lithuania and Poland improved their performance from 0.0641 and 0.0482 to 0.1149 and 0.116, respectively.

Science and technology are the key to the future competitiveness of the economy, so inadequate support and funding of this area by the state will reduce the economic growth dynamics.

Table 5   The calculation results regarding the innovation and research component of
investment attractiveness (IP_{SI})

Years	Bulgaria	Croatia	Lithuania	Latvia	Poland	Romania	Ukraine
2000	0.0248	0.0755	0.0641	0.0317	0.0482	0.0113	0.0951
2001	0.0216	0.0770	0.0717	0.0271	0.0461	0.0132	0.1100
2002	0.0230	0.0655	0.0606	0.0277	0.0430	0.0154	0.0699
2003	0.0246	0.0724	0.0630	0.0221	0.0426	0.0133	0.0775
2004	0.0253	0.0707	0.0739	0.0263	0.0456	0.0137	0.0924
2005	0.0243	0.0595	0.0760	0.0347	0.0446	0.0169	0.0853
2006	0.0251	0.0535	0.0817	0.0493	0.0432	0.0152	0.0796
2007	0.0266	0.0599	0.0863	0.0459	0.0466	0.0188	0.0727
2008	0.0304	0.0670	0.0870	0.0506	0.0534	0.0295	0.0674
2009	0.0393	0.0691	0.0879	0.0386	0.0643	0.0313	0.0636
2010	0.0405	0.0588	0.0882	0.0510	0.0737	0.0403	0.0625
2011	0.0401	0.0549	0.0937	0.0600	0.0772	0.0373	0.0554
2012	0.0436	0.0616	0.0923	0.0627	0.0943	0.0274	0.0594
2013	0.0496	0.0653	0.1005	0.0668	0.0974	0.0198	0.0607
2014	0.0606	0.0596	0.1105	0.0783	0.1074	0.0212	0.0497
2015	0.0772	0.0715	0.1092	0.0763	0.1207	0.0300	0.0483
2016	0.0722	0.0823	0.0996	0.0554	0.1185	0.0328	0.0370
2017	0.0694	0.0697	0.1055	0.0650	0.1356	0.0331	0.0318
2018	0.0767	0.0727	0.1100	0.0799	0.1502	0.0337	0.0299
2019	0.0775	0.0605	0.1149	0.0757	0.1162	0.0344	0.0291

Source: Calculated and compiled by the author

Summarising the calculation results of the agricultural component coefficients
(Table 6), one can conclude that in 2019 Latvia and Lithuania had the best indicators –
0.1213 and 0.1003, respectively. Besides, Latvia showed better growth dynamics of this
index – by 0.0315 points since 2000. The rest of the analysed countries, including
Ukraine, during this period lost in the assessment of the agricultural component
coefficient.

Table 6   The calculation results of the agricultural component of the investment attractiveness
(IP_{AR})

Years	Bulgaria	Croatia	Lithuania	Latvia	Poland	Romania	Ukraine
2000	0.0921	0.0404	0.1092	0.0898	0.0803	0.0857	0.1132
2001	0.0909	0.0415	0.0680	0.0899	0.0430	0.0982	0.1130
2002	0.0871	0.0411	0.0685	0.0918	0.0389	0.0899	0.1068
2003	0.0844	0.0367	0.0639	0.0890	0.0373	0.0932	0.0962
2004	0.0818	0.0388	0.0665	0.0936	0.0410	0.0953	0.0966
2005	0.0748	0.0367	0.0779	0.0959	0.0379	0.0744	0.0886
2006	0.0690	0.0376	0.0759	0.0998	0.0375	0.0711	0.0810

Table 6   The calculation results of the agricultural component of the investment attractiveness (IP_{AR}) (continued)

Years	Bulgaria	Croatia	Lithuania	Latvia	Poland	Romania	Ukraine
2007	0.0618	0.0355	0.0736	0.1000	0.0380	0.0587	0.0763
2008	0.0689	0.0368	0.0745	0.0983	0.0364	0.0639	0.0784
2009	0.0622	0.0377	0.0783	0.1008	0.0364	0.0637	0.0804
2010	0.0624	0.0370	0.0852	0.1068	0.0347	0.0603	0.0821
2011	0.0671	0.0368	0.0914	0.1035	0.0367	0.0666	0.0863
2012	0.0675	0.0353	0.0977	0.1050	0.0354	0.0583	0.0847
2013	0.0708	0.0355	0.0975	0.1073	0.0360	0.0623	0.0905
2014	0.0717	0.0307	0.0999	0.1099	0.0353	0.0597	0.0979
2015	0.0701	0.0318	0.0942	0.1114	0.0329	0.0578	0.1080
2016	0.0704	0.0333	0.0926	0.1141	0.0336	0.0566	0.1065
2017	0.0709	0.0314	0.0944	0.1165	0.0356	0.0579	0.0990
2018	0.0679	0.0317	0.0925	0.1176	0.0332	0.0590	0.0994
2019	0.0682	0.0323	0.1003	0.1213	0.0314	0.0580	0.0941

Source: Calculated and compiled by the author

An important feature of the agricultural component (as well as the entire agro-industrial sector of the national economy) in addition to physical and absolute dimensions, there are quality ones. Ukraine has the largest area of quality soil for agriculture in Europe. Still, the margin of cultivated products lags behind developed countries: exports of agricultural goods from the Netherlands (the whole country is less than Odesa and Vinnytsia regions) exceed Ukraine's exports more than 15 times: 101 billion against about 6 billion Euro in 2020. At the same time, the Netherlands is one of the largest importers of domestic products.

Based on the results in Table 7, the energy and resource component of investment attractiveness in Ukraine in 2019 is the worst among the analysed countries – this figure decreased to 0.0410 (in 2000, it was equal to 0.5). The best values of this component were achieved by Croatia, Latvia and Latvia – 0.077, 0.076 and 0.075, respectively. At the same time, Bulgaria achieved the highest growth rates for the period 2000–2019 – its indicator increased from 0.0377 at the beginning of the analysed period and was equal to 0.0604 according to the results of 2019.

Table 7   The calculation results of energy-resource component of investment attractiveness (IP_{ME})

Years	Bulgaria	Croatia	Lithuania	Latvia	Poland	Romania	Ukraine
2000	0.0377	0.0750	0.0381	0.0828	0.0569	0.0746	0.0500
2001	0.0368	0.0751	0.0374	0.0800	0.0584	0.0718	0.0557
2002	0.0351	0.0724	0.0332	0.0765	0.0574	0.0697	0.0503
2003	0.0394	0.0718	0.0318	0.0766	0.0577	0.0708	0.0499
2004	0.0445	0.0731	0.0328	0.0784	0.0615	0.0710	0.0519
2005	0.0432	0.0727	0.0381	0.0776	0.0603	0.0710	0.0596

Table 7   The calculation results of energy-resource component of investment attractiveness
(IP_{ME}) (continued)

| Years	Bulgaria	Croatia	Lithuania	Latvia	Poland	Romania	Ukraine
2006	0.0479	0.0723	0.0392	0.0746	0.0621	0.0710	0.0603
2007	0.0500	0.0691	0.0380	0.0724	0.0603	0.0679	0.0664
2008	0.0512	0.0707	0.0393	0.0721	0.0639	0.0702	0.0757
2009	0.0457	0.0734	0.0372	0.0771	0.0597	0.0674	0.0612
2010	0.0549	0.0764	0.0596	0.0743	0.0619	0.0703	0.0714
2011	0.0564	0.0737	0.0615	0.0755	0.0648	0.0703	0.0748
2012	0.0555	0.0748	0.0623	0.0794	0.0622	0.0695	0.0606
2013	0.0552	0.0792	0.0634	0.0779	0.0614	0.0675	0.0581
2014	0.0531	0.0788	0.0636	0.0767	0.0601	0.0668	0.0523
2015	0.0557	0.0780	0.0704	0.0756	0.0605	0.0632	0.0476
2016	0.0533	0.0748	0.0686	0.0766	0.0598	0.0638	0.0443
2017	0.0551	0.0757	0.0713	0.0770	0.0607	0.0648	0.0459
2018	0.0559	0.0764	0.0738	0.0762	0.0608	0.0657	0.0446
2019	0.0604	0.0770	0.0762	0.0754	0.0622	0.0643	0.0410

Source: compiled by the author

The integrated coefficient of investment attractiveness of Ukraine and the studied
member states of the European Union in terms of investment attractiveness components
are shown in Figure 1.

According to the results of 2019, the integrated index of Ukraine's investment
attractiveness is the lowest among the studied countries. At the same time, Ukraine's
investment attractiveness was the only one that decreased in 2019 compared to 2000
(Figure 1). In the integrated index of investment attractiveness structure, the agricultural
and infrastructure components took the largest share in 2019 – 0.094 and 0.096,
respectively, innovation research – the smallest (0.029). An essential negative aspect of
the innovation and research component development is the emigration of young and
qualified specialists and scientists abroad searching for employment. Thus, a particular
share of government expenditures on science and education does not improve the national
economy, export, and investment attractiveness. It provides opportunities to strengthen
Ukraine's competitors in the international market: higher salaries for qualified personnel
in neighbouring countries allow them to attract Ukrainian specialty and establish the
production of products, competitive advantages of which Ukraine had before.

Socio-economic and energy-resource components occupied a significant share in the
structure of the integrated index of investment attractiveness throughout the analysis
period. Compared to other analysed countries, powerful fuel and energy complex and the
heavy industry sector were formed during the Soviet era. Since then, due to lack of
investment, it was morally and physically obsolete in modernisation.

One should note that over the last five years in Ukraine, there has been an annual
reduction in CO_2 emissions, but the coal intensity of industrial production is higher than
in the European Union. Ukraine has much lower rates in terms of gross domestic product
per unit of energy emissions than most EU countries. Thus, there is 2.64 US dollars per
one kilogram of CO_2 emissions in Ukraine, and in Poland – 3.61 US dollars.

Figure 1 The assessment results of the integrated index of investment attractiveness (see online version for colours)
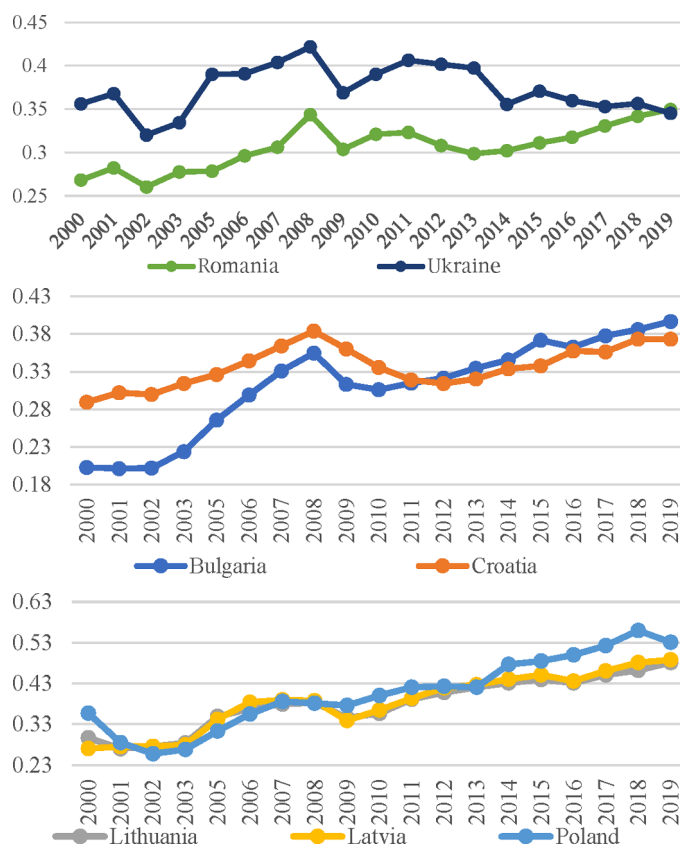
Source: Calculated and compiled by the author

The government estimates (National Economic Strategy of Ukraine, 2021) that the mining sector needs about $7 billion in investment by 2030 to conduct geological explorations. Meanwhile, the electricity industry needs more than $25 billion by 2030 to modernise its energy infrastructure.

The index of investment attractiveness reached its highest value in 2008, and at that time, it was the largest indicator among all countries studied under this model – 0.4217. This year was the period of high economic growth (2004–2008), which was stopped by the global financial crisis. Thus, we can conclude that Ukraine's investment attractiveness is currently underestimated and has significant internal resources for further development.

The highest integrated index of investment attractiveness of Romania reached in 2019 and amounted to 0.3496. This value, along with Ukraine, is the lowest among the analysed countries. One should note that during the analysis, the investment attractiveness of Romania, in contrast to Ukraine, showed growth: from 0.2682 in 2000 to 0.3496 in 2019. In the early 2000s, Romania's economy was agriculturally oriented with a historically developed fuel and energy complex. Membership in the European Union since 2007 has helped Romania to improve the state of innovation, research and

infrastructure components in the capacity structure, which have increased tripled in 2000–2019.

In the structure of Bulgaria's investment attractiveness in 2000, the agricultural component took a significant share (0.0921 or about half of the total investment attractiveness). After gaining membership in the European Union in 2007, the structure of the integrated index of investment attractiveness of Bulgaria began to change, increasing knowledge-intensive and high-margin industries (innovation-research, socio-economic, infrastructure). During the analysis, this country's integrated index of investment attractiveness increased from 0.203 in 2000 to 0.3967, showing the highest growth rates among the studied countries. Among the analysed countries, Bulgaria has the agricultural attractiveness closest to Ukraine. The global economic crisis in 2008 significantly reduced the assessment of all components of the integrated index of investment attractiveness. Bulgaria's pre-crisis value of 0.3548 was reached only in 2016. According to the results of 2019, Bulgaria has a balanced structure of investment attractiveness and a pronounced growth trend.

The highest integrated index of investment attractiveness of Croatia reached in 2008 – 0.3840 (Figure 1). The beginning of the global economic crisis provoked a deep recession, after which the Croatian economy could not make up for the lost even in 2019 (the figure was 0.373). During the analysis period, the country's investment attractiveness increased from 0.2894 in 2000 to 0.3733 or almost 30%. According to the results of 2019, the essential components of attractiveness are energy resources (0.0769) and external resources (0.0774). It explains the importance of the tourism industry and the fuel and energy complex for the Croatian economy.

Lithuania's maximum integrated index of investment attractiveness reached in 2019 (0.4811) (Figure 1). During the analysis period, this indicator increased by 0.184 points or more than 60%, indicating the state policy effectiveness to stimulate the investment attractiveness development of Lithuania. The most significant components of the investment attractiveness in 2019 were innovation and research (0.115) and agricultural (0.100) since it focuses on knowledge-intensive industries and stimulating the development of high-margin areas in agriculture.

The crisis of 2001–2002 had insignificant effects on Latvia's investment attractiveness, but there was no growth during this period either (Figure 1). The maximum integrated index of investment attractiveness reached in 2019 (0.4877).

During the analysis period, the highest growth rates were shown by the infrastructure component: from 0.0069 in 2000 to 0.0858 in 2019 (or more than 11 times). The most significant components of attractiveness as of the last reporting date are agricultural (0.1213) and socio-economic (0.0945) components.

5   Conclusion

Poland has the highest integrated index of investment attractiveness among the studied countries – 0.5314 in 2019 (Figure 1). Besides, Poland's investment attractiveness showed some of the best growth rates – by 48% during the analysis period and the highest average value of this indicator – 0.402. In the structure of Poland's attractiveness in 2019, a significant share is taken by the external component (0.1361) and research (0.1162). The agricultural component has the lowest indicator in the structure of the total (0.062).

The calculation results of the integrated indices of investment attractiveness in the studied countries revealed three clusters of countries according to the convergence level of trends in the integrated index of investment attractiveness of the national economy:

Cluster 1: Ukraine and Romania (until 2014, the ascending and descending cycles have a similar character, the highest level of investment attractiveness of the national economy for Ukraine – 0.42 (2008), the period from 2014 to 2019 in Ukraine is characterised by permanent declining dynamics of investment attractiveness of the national economy to a minimum of 0.345 in 2019).

Cluster 2: Croatia and Bulgaria (growing dynamics of the investment attractiveness with a bifurcation point in 2008, due to the global financial crisis).

Cluster 3: Lithuania, Latvia and Poland (growing dynamics of the investment attractiveness of the national economy, the highest level was Poland – 0.56 in 2018).

On the one hand, calculations show that Ukraine has the lowest level of investment attractiveness of the national economy among the studied countries; on the other hand – the prerequisites for its effective disclosure by identifying inhibitors and catalysts for the managerial impact of increasing the investment attractiveness of the national economy. The findings of the paper correlate with the results of the paper (Erdogan, 2014; Galán et al., 2006; Hobdari and Gammeltoft, 2017; Hoshi et al., 2019).

Considering the findings Ukraine should provide the affordable conditions for accumulation of intellectual capital. As one of the disruptive impacts on the investment attractiveness is emigration of young and qualified specialists and scientists. Besides, it is necessary to increase the share of government expenditures on science and education. Regarding the results, the national program on modernisation the fuel and energy industry considering the principals of carbon free economy should be developed and implemented.

The findings of the benchmarking analysis of experience for improving the investment attractiveness among the chosen countries allow allocating the following direction increasing the Ukrainian investment attractiveness: provide the mechanism for transparency of the investment market; develop the affordable business climate in the country; eliminate the corruption; implement the incentive instruments for agricultural and energy industries considering the principles of green growth.

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