Shaping Competitiveness for Driving FDI in CEE Countries

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Abstract: *In the current situation, shaped by the relocation of multinational companies following the disruption of global value chains, the efforts for attracting foreign direct investments (FDI) should be better focused on enhancing the flows that create value in the economy, stimulate the local business environment, and are destined to sectors with high value added. The aim of this paper is to identify the factors shaping competitiveness in Central and Eastern European countries that also matter for the foreign investors' decision regarding location. We have taken an innovative approach in dealing with the large range of FDI determinants and we have used the machine-learning based random forest methodology to identify the most important predictors of FDI in CEE countries from a set of 15 indicators also present in the calculation of the European Regional Competitiveness Index 2019. Our results show that countries' particularities, market size, digitalization of the economy, labour force characteristics (such as population in tertiary education and employment in knowledge-intensive services and high-tech manufacturing sectors), and economic potential market are the factors with the highest contribution in attracting FDI in the CEE region.*

Keywords: *foreign direct investment, competitiveness, random forest, Central and Eastern Europe.*

Introduction

Foreign direct investment (FDI) continues to be seen as an important source of capital, with high contribution to the development of the economies, given the positive spillovers generated in host economies (Popovici et al., 2020; Hayat, 2019; Gorbunova, 2012). Studies generally indicate a positive direct impact of FDI for host locations in terms of accumulating financial capital, benefits from the transfer of technology, innovation, managerial expertise and know-how, the development of the labour force, contributions to the state budget, impact on the structure of the economy, benefits of multinational companies' social involvement, while indirect impact is related to the demonstration effect for the local companies (Horobet and Popovici, 2017; Meyer and Sinani, 2009). More recently, Adarov and Stehrer (2020) proved that FDI drives the participation in global value chains of local companies and enhances value added trade.

Therefore, the quest for the most appropriate combination of factors which could enhance FDI inflows remains of high interest for governments and economists alike. The actual situation is conducive to a relocation of multinational companies

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(MNEs), as many countries and companies have announced a potential transfer of activities closer to the their respective home country given the devastating impact of Covid-19 on global supply chains. Moreover, a general reconsideration of global value chains is envisaged. However, the efforts should not reside only in attracting FDI, but in being able to attract those types of FDI creating value in the economy, stimulating the local business environment, or destined to sectors with high value added and, thus, having lasting effects on the economy of the host location.

Therefore, the aim of our paper is to assess which are the most important factors investors envisage when deciding to invest in Central and Eastern European (CEE) countries. We start from the assumption that the competitiveness of host locations has an important role in the FDI decision-making process and, using random forest models we identify the most important factors considered by investors. A similar approach was used by Arel-Bundock (2017) in dealing with FDI. We have opted for the random forest models given their efficiency in dealing with large number of variables, which is the case for FDI determinants when inspecting the literature. We have focused on seven countries in the CEE region (Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, and Slovakia) due to their European Union (EU) member status and their attempts to cover the development gap compared to Western EU countries, and we considered the period after the financial crisis, from 2008 to 2017, given the change in FDI determinants that studies in this area indicate.

The paper is structured as follows. In the next section we focus on the literature on the impact of host countries' competitiveness on FDI with attention towards the CEE region after the crisis, to capture changes in the factors important for FDI location decision. We also provide a section where we analyse the structure of FDI per sectors in the CEE countries, with the aim of describing the actual distribution of FDI, as a framework for further building more specific policies which could be enacted in favour of guiding FDI in targeted areas. The next section describes the data collection process and the research methodology, followed by the Results section that provides the major findings and their discussion in relation to similar studies in the literature. The last section presents the Conclusion, accompanied by recommendations for policies for increasing FDI inflows in CEE countries.

Literature review

There is a rich literature on FDI determinants starting with the 1980s which also refers the linkages between competitiveness and FDI. However, in this section of the paper we focus on results of studies that addressed the factors attracting FDI after the Global financial crisis in 2007-2008. The attempt is daringly since there is no consensus on the definition of competitiveness, a reason for which the number of papers in this area is low (Stankov et al., 2018). Moreover, we will take a closer look at the literature on FDI determinants in the CEE region. Although richer than on other countries in Europe due to their experience with the transition to the market economy and the impact FDI had in the development process, studies became scarce in analysing the period after the Global financial crisis.

In studies related to FDI, competitiveness is usually seen as the performance in foreign trade as compared to the GDP level (Villaverde and Maza, 2015). Usually, studies identified a positive and significant impact of trade openness on FDI level, for both advanced and developing countries (Dellis et al., 2017; Lucke and Eichler, 2015). Depending on the economic development of the analysed sample, it could be even more important than the size and potential of the market (Anyanwu, 2012; Singhania, 2018). In the same vein, Villaverde and Maza (2015) articulated competitiveness as the share of exports and imports in GDP and the manufacturing sector share, and

concluded that, alongside the economic potential, the characteristics of the labour market and the technological progress, they are relevant factors for FDI in the EU regions from 2000 to 2006. Other studies extended the definition of competitiveness. Prime et al. (2012) related to the Porter's framework, describing the competitiveness of nations in terms of demand, factor conditions and firm strategy, structure, and rivalry. The authors argued that besides these factors, government policies and chance had an important contribution to China's improved performance compared to India's in terms of FDI inflows. Cui et al. (2019) also started from Porter's framework to describe the competitiveness of regions in China related to the entry and exit of multinational companies. Better economic conditions were found to be essential for FDI inflows, as well as reduced government intervention.

Anastassopoulos (2007) carried out an empirical analysis between 2003 and 20016 where the impact of international competitiveness on FDI attraction was assessed for Northern versus Southern located EU countries. The framework of the competitiveness concept was built on the World Competitiveness Yearbook definition, which at that moment comprised four pillars: economic performance, efficiency of the government, efficiency of the business environment and infrastructure. He found different factors impacting FDI attraction for the two groups of countries. For countries in the North of the EU, the significant factors were the market size, the efficiency in dealing with bureaucracy and trade openness. For countries in the South, the most important determinants were the efficiency of the government and the capacity to reduce the investment risk.

Pusterla and Resmini (2005) focused on four CEE countries (Bulgaria, Hungary, Poland, and Romania) and found that agglomeration forces, as well as demand factors were the most important when locating there. The study was carried out using firm-level data for the manufacturing sector during 1995-2001. Moreover, the authors revealed that high-tech companies are usually looking for market potential, access to the other markets in the surroundings, country risk and agglomeration economies.

More recent studies, such as Halaszovich and Kinra (2020), encompass new factors which could be investigated under the general competitiveness framework, as described by Porter's diamond, or the factors considered in the development of the Global Competitiveness Reports (Schwab, 2019). The authors found four factors that contribute to attracting FDI in several developing countries in Asia: the institutional environment, the economic development level, the geographic location, and the logistics systems environment (the national transportation systems).

Countries in the CEE region have experienced a shift in FDI determinants, which occurred with the end of the transition and/or the accession to the EU (Das, 2020; Popovici, 2015a; Gorbunova et al., 2012). A similar change in investors' priorities and motives was evidenced by Sakali (2015) after the Global financial crisis, as a transition from traditional determinants (dimension and potential of the host market, trade openness, labour costs or other gravity factors) to those better reflecting macroeconomic conditions (risk, market liquidity etc.). Other studies pointed to a superior importance granted to created resources (such as technology, improved qualification for the labour force, the institutional environment etc.) than to natural resources (Antonakakis and Tondl, 2010).

Dauti (2015) established the importance of institutional factors in FDI location decision in the new EU member countries. Jimborean and Keller (2017) extended the list of determinants in CEE countries with significant impact in attracting FDI to past level of investments, the dimension of the market, the growth potential, the human capital trade openness, low geographical distance to Western EU countries, endowment with infrastructure, the corporate tax system and competitiveness, which was considered

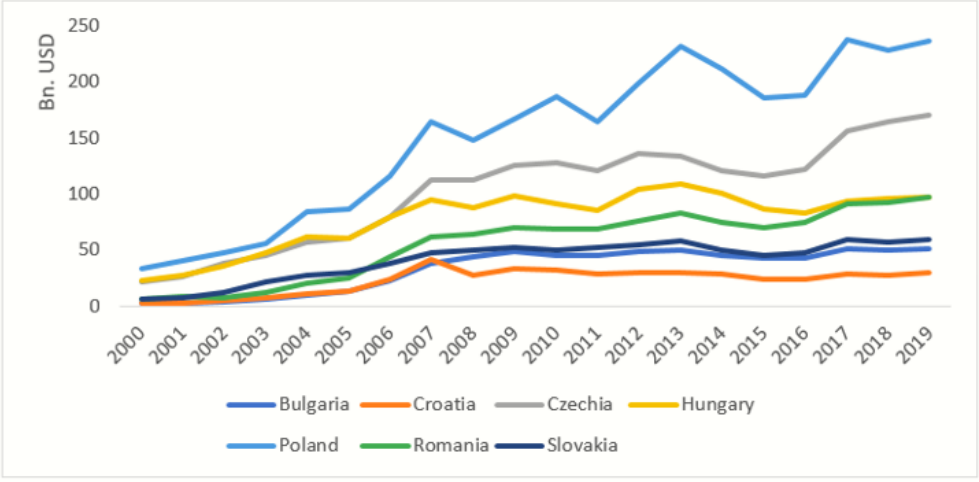
under the aspects of unit labour costs evolution. In assessing the reasons explaining German companies investments in CEE countries, Becker and Cieslik (2020) found that improved market access, a smaller distance and increasing similarities between home and host location have driven investments from 1996 to 2016 in the region. Kurtovic et al. (2020) concluded that, besides traditional determinants, the urbanisation rate, the agglomeration in the services sector, and the institutional environment also contributed to choosing Western Balkan countries as FDI locations between 2007 and 2017.

The range of determinants is therefore large and the particularities of the analysed sample and period have an important impact when assessing which FDI determinants to consider. A sectoral approach of FDI provides even more interesting results. For example, Pecaric et al. (2021) found that FDI inflows in various sectors have different impact on the economic development of the host location; thus, FDI in manufacturing were more important for economic growth than those in services. Moreover, the authors identified different determinants in attracting FDI in these sectors, therefore they concluded that specific policies should be drawn to guide FDI inflows in the targeted sectors. In this context which derives from the larger perspective of factors attracting FDI, an important task is to ascertain the focus and the interest of public measures and policies to increase efforts for guiding FDI in the desired direction.

An overview of FDI distribution in CEE countries

Figure 1 shows Poland having the lead in FDI stocks in the last decade, followed by the Czech Republic. Both managed to obtain good performances in terms of stocks volume, significantly higher than the rest of the countries. The third place is claimed by either Hungary or Romania, especially in the period 2017-2018, as the FDI volume level was almost similar. We have used the UNCTAD set of data since it provides comparable results in terms of FDI stocks for the most recent years, for all the countries we have investigated.

Figure 1. Evolution of FDI stocks, 2000-2019, bn. USD



Source: Authors' representation based on UNCTAD data

However, if we adjust the FDI volume by the GDP level or the population, thus providing a comparable picture of these countries' performance in attracting FDI, the

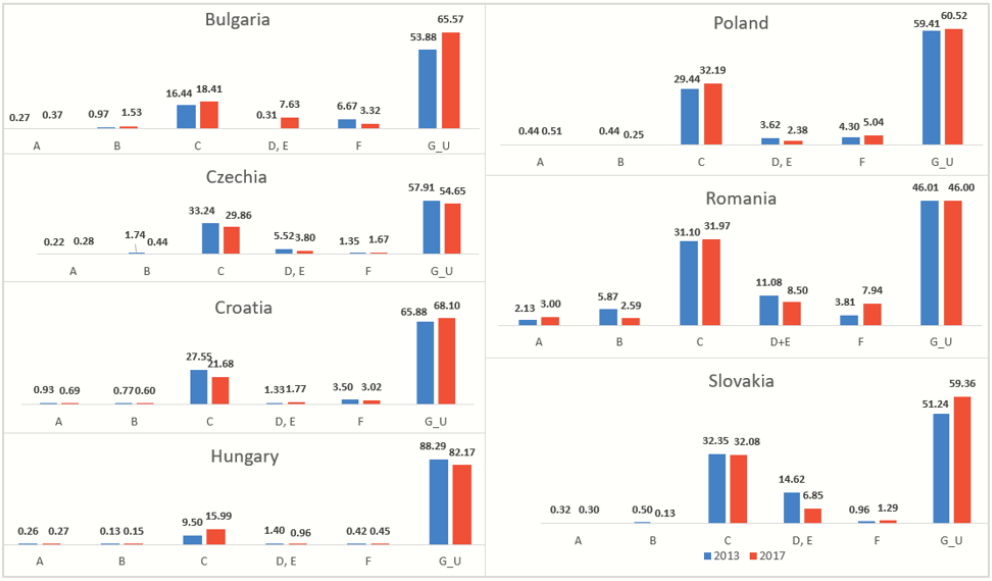
ranking is changing. The most performing country remains the Czech Republic, which is on the first place when looking at FDI stock per capita and the second one when expressing it as a share of GDP, according to UNCTAD data. Romania, however, is on the last place in both these rankings, raising doubts about the performance in attracting FDI or, at least, indicating that there remains a large room for continuing efforts in directing FDI in this location. A similar result is found by Popovici et al. (2020).

The distribution of FDI stocks per sectors of economic activity (*Figure 2*) indicates a tendency of concentration in the services sector, following the growing importance of the tertiary sector and the development of technologies (Popovici et al., 2020), according to Eurostat data[2]. Usually, more than half of total stocks are in this sector, the highest levels in 2017 being recorded in Hungary (over 82%) and Croatia (68.1%). Romania is the only country which does not fit into this picture, as the percentage of FDI stocks in services is only 46%. Moreover, we can see an increase in FDI stocks in services in almost all investigated countries, except for Hungary, whose FDI share in services has decreased, and Romania, where the share has stagnated between 2013 and 2017.

Another observation relevant for almost all countries is CEE is that almost one third of all FDI stocks were oriented towards Manufacturing (sector C), apart from Hungary and Bulgaria, the only countries with a smaller FDI share. For the rest of the sectors, the picture is somehow similar, FDI stocks in Agriculture, forestry and fishing (A), Mining and quarrying (B) and for most of them, even Electricity, gas, steam and air conditioning supply and Water supply; sewerage, waste management and remediation activities (sectors D and E) and Construction (F) having very low shares in the total volume in that country. The only exception is again Romania, for which the shares of FDI in these sectors are almost always higher than in each of the rest of the countries. This signals a higher focus of FDI in Romania on low value-added sectors. In fact, looking at the gross value added (GVA) of each sector and the FDI level per sector, Popovici et al. (2020) showed that Romania received FDI in low value-added sectors, while FDI in the neighbouring countries were rather oriented in sectors which have a higher contribution to the total GVA. Their conclusions also show a certain level of specialization in each country, based on each country's volume of FDI in each sector. For example, Hungary has the highest level of FDI in Services (sectors G_U: 42% of the total volume of FDI in services in all the 7 countries under consideration), Poland is the leader of FDI stocks in Manufacturing (34%) and in Construction (47%), while Romania attracted most of FDI stocks in Agriculture, forestry and fishing (45%) and Mining and quarrying; Electricity, gas, steam and air conditioning supply and Water supply; sewage, waste management and remediation activities (28%) respectively.

[2] We have computed the data using only those sectors for which data was available in each country. The whole amount does not represent the total value of FDI in Manufacturing (C sectors) as the difference of up to 100% is due to the lack of data for certain sectors. The FDI stocks in the analyzed sector account for more than 78% of total FDI in the C sector in each country, except for Poland (60.7%) and Hungary (52.8%) in 2016.

Figure 2. Share of FDI stocks in CEE countries by economic sectors, 2013 vs. 2017 (% of total)

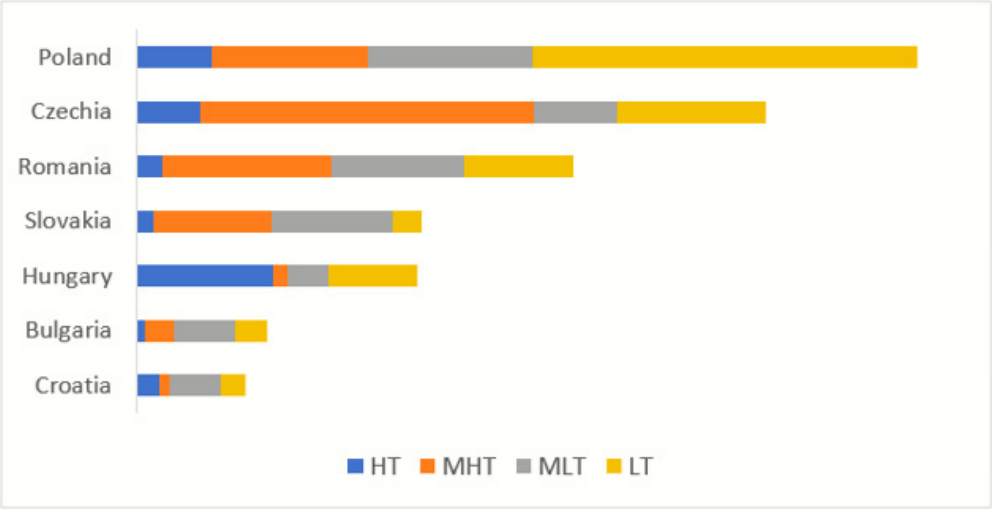


Source: Authors' calculations and representation based on Eurostat data

The distribution of FDI in manufacturing sectors based on the level of technological intensity[3] (*Figure 3*) shows that Hungary attracted the largest share of FDI in high-tech (HT) sectors. The lowest levels were in Romania (5.9%) and Slovakia (6.2%). The Czech Republic is the country with the highest level of FDI in medium high-tech (MHT) sectors (52.9%), while the largest amount of FDI in medium low-tech (MLT) sectors were in Croatia (47%) and Bulgaria (46.9%). Poland has almost half (49.3%) of FDI in low-tech sectors. In fact, FDI in MLT and LT sectors are mostly present in Bulgaria (71.7% of the total amount of FDI volume in these sectors in Manufacturing), and Poland (70.4%). A more balanced situation could be found in Romania (55.3% of FDI in MLT and LT sectors), Slovakia (52.5%) and Hungary (46.3%), while the Czech Republic is the only country which manages to have most of FDI in HT and MHT sectors, those in MLT and LT representing only 36.9% of total.

[3] We have used the European Commission classification of manufacturing industries available here: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:High-tech_classification_of_manufacturing_industries.

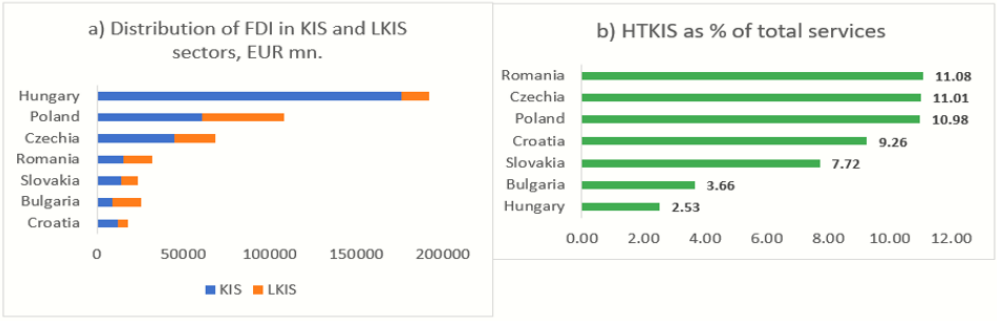
Figure 3. FDI stocks distribution per manufacturing sectors based on technological intensity, bn. EUR, 2016



Source: Authors' calculations and representation based on Eurostat data

For the services sector, Hungary had the best performance in attracting FDI in knowledge-intensive services (KIS) sectors[4] (91.7% of the total FDI volume). The remaining countries obtained lower volumes of FDI (*Figure 4a*), but hey gathered more than half of FDI volume in KIS sector. Only in Bulgaria and Romania, the FDI stocks' share in less knowledge intensive services (LKIS) was higher (64.9% and 53.1%, respectively). However, Romania gathered the largest share of FDI in High-tech knowledge intensive services (HTKIS) in total FDI in services, mostly following the attractiveness of the Information and Telecommunications sector for investors. The competition is harsh, as both Czechia and Poland had an almost similar share of FDI in the HTKIS sector (*Figure 4b*).

Figure 4. FDI stocks distribution in services sector, 2016



Source: Authors' calculations and representation based on Eurostat data

Research methodology

For this analysis we used FDI stocks and a set of 15 indicators that reflect determinants of FDI which are partly present in the calculation of the European Regional Competitiveness Index 2019. We have used extant literature to build the list

[4] We have used the European Commission taxonomy of services based on their level of knowledge intensity – see here: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Knowledge-intensive_services_(KIS).

of indicators, but data availability was a major restriction for our data set. However, as evidenced in the Results section, we believe that our findings are insightful into FDI drivers' importance in the CEE region. The indicators were collected with annual frequency between 2008 and 2017 for seven countries included in our analysis - Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, and Slovakia - from various databases (see *Table 1*). The 15 indicators or variables that are determinants of FDI have been included in five categories, as follows: Infrastructure, Economic sophistication, Market size, Labour market, and Digitalization.

Table 1. Description of indicators

Variable	Notation	Variable definition	Database/ Source
Foreign direct investment stock	STOCK_FDI	Direct investment stocks - Million EUR	Eurostat For Poland: Calculated by the authors on data from Polish Central Bank For Hungary 2008-2017: Hungary Central Bank
Infrastructure			
Infrastructure size	INFR	Kilometres of highway per 1 million inhabitants	Eurostat
Infrastructure quality	TRQAL	People killed and injured in accidents, per million inhabitants	
Economic sophistication			
Employment in high-tech manufacturing	HTMAN	Employment in technology and knowledge-intensive sectors, High and medium high-technology manufacturing, Percentage of total employment	
Employment in low-tech manufacturing	LTMAN	Employment in technology and knowledge-intensive sectors, Low-technology manufacturing, Percentage of total employment	
Employment in knowledge-intensive services	KISER	Employment in technology and knowledge-intensive sectors, Total knowledge-intensive services, Percentage of total employment	
R&D expenditure	RD	Intramural R&D expenditure, Euro per inhabitant	
Total factor productivity	TFP	Total Factor Productivity at Constant National Prices, Index 2011=1, Not Seasonally Adjusted	Federal Reserve Economic Data (FRED)
Market size			
GDP per capita	GDPC	GDP per capita in PPS, Volume indices of real expenditure per capita in PPS (EU28=100)	Eurostat
Population	POP	Population on 1 January by age and sex (number)	
Urban population	URB	Urban population (% of total population)	World Bank Database

Labour market			
Total employment	EMP	Total employment in all NACE activities without agriculture, From 15 to 64 years, Thousand	Eurostat
Population in secondary education	SEC	Population aged 25-64 in upper secondary and post-secondary non-tertiary education (levels 3 and 4), %	
Population in tertiary education	TER	Population aged 25-64 in Tertiary education (levels 5-8), %	
Digitalization			
Access to Internet	NET	Households with access to the internet at home, Percentage of households	
Information and Communication Technologies sector	ICT	Percentage of ICT sector in GDP (%)	

Source: Authors' compilation

Table 2 shows the brief descriptive statistics of variables for all countries between 2008 and 2017. Across all variables there are differences between the seven CEE countries and over the years, but some variables show interesting patterns that will be further explored in the Results section of the paper.

Table 2. Descriptive statistics of variables, all countries and years (2008-2017)

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
STOCK_FDI	86436.55	58915.00	226953.00	22093.60	61251.25
INFR	108.01	77.73	315.34	13.05	88.80
TRQAL	2129.80	1857.00	5348.00	1124.00	977.72
HTMAN	6.68	5.40	11.50	3.10	2.85
LTMAN	8.72	8.50	13.70	6.30	1.68
KISER	30.24	31.20	36.10	19.00	4.54
RDEUR	106.17	88.70	324.50	22.20	75.69
TFP	1.02	1.00	1.18	0.94	0.04
GDPC	64.38	64.00	89.00	43.00	12.29
POP	13.29	9.91	38.14	4.15	10.82
URB	62.99	60.65	74.67	53.57	8.36
EMP	4878.58	3654.00	14247.00	1351.00	3750.67
SEC	63.67	61.10	76.40	54.10	6.44
TER	20.76	21.10	28.70	12.80	3.98
NET	63.42	67.00	83.00	25.00	14.21
ICT	4.29	4.34	5.97	3.03	0.87

Source: Authors' calculations

Our research uses the machine-learning based random forest methodology, proposed by Breiman (2001) as an improved alternative to the linear and logistic regressions (Brian Gray, & Fan, 2008). As the name puts it, the random forest algorithm generates an ensemble of decision trees that describe the predictive relationship between

a dependent variable and a set of independent variables (continuous or categorical). An important superior feature of the random forest methodology, compared to traditional dependent-independent variables models, is the departure from the implicit assumption of linear relationships between variables. Hence, the model has the ability of identifying relationships between variables that might be otherwise difficult to determine (Hayes et al., 2015). Furthermore, feature sampling that selects different sets of independent variables to build the random forest can address multicollinearity between regressors (Garg and Tai, 2013).

The random forest algorithm begins with all observations and subsequently splits the data into nodes whose final structure resembles an upside-down tree. Together, these decision trees form a "forest". When constructing the trees, the random forest methodology uses random sample and feature (or variable) selection, which means that part of the observations included in the algorithm are used for training, while the remaining are used for testing the accuracy of the model. For our models, we have used 30% of the sample of 70 observations (7 countries multiplied by 10 years of data) to test the model, while 70% of observations were used to train the sample.

We have implemented four random forest models to examine the predictive power of FDI determinants for FDI stocks in the CEE region (FDI stocks as dependent variable), which differ in terms of the set of independent variables as follows: (i) Model 1: FDI determinants – the variables described in *Table 1*, continuous); (ii) Model 2: FDI determinants (continuous variables) and Country (categorical variable); (iii) Model 3: FDI determinants and 1-year lagged FDI stock (continuous variables); (iv) Model 4: FDI determinants and 1-year lagged FDI stock (continuous variables), plus Country (categorical variable). The inclusion of 1-year lagged FDI stock and Country as variables in the random forest model supported testing for the agglomeration effects associated to FDI (Tan and Meyer, 2011; Procher, 2011) and for host countries' particularities in terms of their relationship to foreign investors. We estimated 100 trees for each random forest and the algorithm stopped for a decrease in training error of 5%. Variables were standardized before introducing them in the random forest algorithm to remove any distortion in results due to different measurement units of variables.

To implement the random forest algorithm and identify variables' predictive power regarding FDI stocks in CEE we have used Tibco Statistica 13.0, which advances a different approach for determining variable importance than the Breiman et al. (1984) procedure for classification and regression trees. Thus, the algorithm determines variable importance by summing the resubstituting estimate and expressing these sums in relation to the largest sum of all predictors. Hence, the ranking of variables shows the importance of predictors (variables) in relative terms (against all others) and not in absolute terms.

Main results and discussion

Before presenting the main findings resulting from the application of the random forest methodology, we consider useful a succinct discussion about the differences between the seven countries included in our sample across the variables included in the analysis.

FDI determinants in CEE countries

Table 3 shows the mean values of variables for each country in the sample between 2008 and 2017, revealing striking differences beyond the expected ones resulting from different populations and territory sizes. Mean FDI stock levels between countries show a ratio of 7.60 between the maximum value (Poland) and the minimum value (Croatia). Moreover, there is a clear division of the seven countries in 2 or 3

distinct groups depending on the FDI stock level: Hungary and Poland are the leaders of the region, with mean FDI stocks of 187,173 million EUR and 168,003 million EUR, respectively, followed by the Czech Republic with a mean level of FDI stocks of 98,889 million EUR between 2008 and 2016, and the remaining four countries with the lowest mean FDI stock varying between 59,589 million EUR for Romania and 24,635 million EUR for Croatia.

Table 3. Mean values of variables by country, 2008-2017

	STOCK_FDI	INFR	TRQAL	HTMAN	LTMAN	KISER	RDEUR	TFP	GDPC	POP	URB	EMP	SEC	TER	NET	ICT
Bulgaria	37156.91	78.24	1299.8	3.74	11.94	29.68	39.14	1.00	45.90	7.31	73.15	2816.12	55.34	25.23	48.50	4.97
Croatia	24635.35	298.6	4094.8	3.50	9.27	31.47	87.03	1.01	60.20	4.26	55.66	1438.98	60.48	19.9	64.10	4.18
Czechia	98889.63	80.38	2588.3	10.55	7.1	31.93	258.82	1.01	84.90	10.49	73.38	4752.96	73.03	19.54	69.60	4.34
Hungary	187173.7	152.00	2217.7	8.75	7.52	35.12	132.25	1.00	66.40	9.93	69.69	3766.45	60.07	22.02	66.80	5.75
Poland	168003.1	33.38	1354.11	5.16	8.7	30.45	88.69	0.99	64.70	38.04	60.59	13742.58	64.68	25.02	69.20	3.15
Romania	59589.34	26.78	1829.1	5.06	9.24	20.58	34.48	1.08	54.70	20.09	53.86	6294.01	59.88	15.32	54.60	3.26
Slovakia	40932.91	80.27	1447.2	9.91	7.29	32.57	104.88	1.02	74.30	5.41	54.30	2297.99	72.03	19.2	73.00	4.31

Source: Authors' calculations

The first category of FDI determinants, "Infrastructure", shows an improvement over time in all countries, but more in kilometres of highway per 1 million inhabitants (INFR) and less for people killed and injured in accidents per million inhabitants (TRQAL). The CEE countries offered foreign investors 90.5 kilometres of highway per 1 million inhabitants on average in 2008, growing by 38% until 2017 to 124.81 kilometres. However, INFR shows high dissimilarity among countries: Croatia had a mean of 298.6 kilometres between 2008 and 2016, followed by Hungary (152 kilometres), while Romania (26.78 kilometres) and Poland (33.38 kilometres) displayed the lowest road infrastructure size. Infrastructure quality, measured by TRQAL, had a positive evolution at sample level between 2008 and 2017 – an overall drop of 15% over the period –the number of people killed and injured in accidents increased after 2014. In CEE, Croatia is the undesired leader in terms of people killed and injured in accidents (mean of 4,094 between 2008 and 2017) but is also the country with the best road infrastructure size of all CEE countries. It is followed by the Czech Republic (2,588) and Hungary (2,217). Bulgaria holds the last position with 1,299 accidents and injuries per 1 million people. Putting things together, better road quality in the form of highways for CEE countries has not led to lower number of accidents in any of the seven countries. This is a concerning evolution in CEE countries that needs to be addressed by authorities, as it may represent a hindering factor for working, investments, business development and competitiveness in the region, an inference also made by other authors (Mikušová, 2011; Pawłowski et al., 2019), Lenz et al., 2019; Jamroz et al. (2019).

Table 4. Mean values of variables by year and full sample, 2008-2017

	STOCK_FDI	INFR	TRQAL	HTMAN	LTMAN	KISER	RDEUR	TFP	GDPC	POP	URB	EMP	SEC	TER	NET	ICT
2008	77583.34	90.50	2584.57	6.77	9.73	27.73	81.87	1.03	61.43	13.76	62.51	5073.86	65.34	17.14	42.71	4.30
2009	80844.87	93.28	2375.29	6.03	9.31	28.90	77.50	0.98	62.29	13.74	62.63	5029.53	65.03	17.96	49.43	4.14
2010	80902.05	97.55	2112.29	5.96	8.83	29.74	84.80	0.99	62.71	13.70	62.72	4860.43	64.37	18.87	54.29	4.35
2011	82487.21	100.22	2080.14	6.43	8.67	29.70	95.16	1.00	63.71	13.68	62.81	4853.73	64.20	19.61	60.14	4.25
2012	89997.17	104.90	1979.86	6.57	8.61	30.10	106.11	1.00	64.43	13.66	62.89	4870.84	64.29	20.39	65.14	4.22
2013	86749.62	109.51	1949.00	6.59	8.50	30.86	111.24	1.01	64.57	13.64	62.98	4891.36	63.81	21.40	67.14	4.22
2014	88997.94	110.62	1938.29	6.71	8.49	31.13	117.09	1.01	65.57	13.61	63.07	5004.89	62.54	22.36	70.00	4.20
2015	89397.75	116.34	2024.29	6.99	8.36	31.34	133.54	1.03	66.14	13.59	63.17	5092.84	62.26	23.23	73.43	4.29
2016	100030.90	123.13	2057.71	7.24	8.49	31.50	119.51	1.04	66.14	13.55	63.28	5186.49	62.33	23.64	76.43	4.33
2017	103553.30	124.81	2207.67	7.39	8.24	31.57	137.87	1.07	67.43	13.53	63.41	5291.89	62.27	24.30	78.14	4.51

Source: Authors' calculations

The second category of variables, "Economic sophistication", includes five variables, of which three refer to employment in high-tech and low-tech manufacturing (HTMAN and LTMAN), and knowledge-intensive services (KISER), as percentage of total employment. One variable considers the amount spent on research and development in euros per inhabitant (RDEUR), complemented by total factor productivity (TFP), a well-known and used measure of productivity (Feenstra et al., 2015; Waters and Thretheway, 1999; Comin, 2010; Van Beveren, 2012). *Table 4* shows the increasing trend in HTMAN and KISER between 2008 and 2017 for all CEE countries – mean HTMAN surged from 6.77% in 2008 to 7.39% in 2016, and KISER from 27.73% in 2008 to 31.57% in 2016 -, indicating the enrolment of countries in the region in the Industrial revolution 4.0, accompanied by a decline in mean LTMAN from 9.73% in 2008 to 8.24% in 2016. However, differences between countries exist, particularly for HTMAN, who varied between 10.55% in Czechia and 3.50% in Croatia (mean between 2008 and 2017). Besides Czechia, two other countries show higher values for HTMAN: Slovakia – 9.91% and Hungary – 8.75%; at the same time, Poland and Romania have a mean value of HTMAN around 5%, while Bulgaria mimics Croatia with a mean value of only 3.74%. Bulgaria, Croatia and Romania have higher percentages of employment in low-tech manufacturing – 9.24 to 11.94% -, while in Czechia, Slovakia, and Hungary employment in low-tech manufacturing was only around 7-7.5% (2008-2017 mean). KISER mean values between 2008 and 2017 varied between 20.58% for Romania and 35.12% for Hungary, suggesting dissimilarities between CEE countries concerning the adjustment of their economic and business structures to a knowledge-based economy.

All countries in our CEE sample increased their R&D expenditures between 2008 and 2017, from 81.87 euros to 137.87 euros per inhabitant as a mean over the period (a surge of 68%), a trend fuelled by the presence of FDI enterprises and outsourcing activities in the region supporting the activity of MNE. However, CEE countries display significant differences in terms of R&D expenditures: while the Czech Republic spent on average over the 2008-2017 period 258.82 euros per inhabitant, followed by Hungary with 132.25 euros and Slovakia with 104.88 euros, Romania and Bulgaria allocated 6-7 times less amount for R&D. Not surprising, these differences are correlated with the percentages of employment in high-tech, low-tech, and knowledge-intensive services, indicating that, at least from this perspective, CEE countries have two speeds of adjustment of their economies to the economic trends in Western EU countries, which may lead to different types of FDI built on specific sets of competitive advantages, with uneven impact on businesses and long-term economic development. To lessen this conclusion, all seven countries increase their R&D expenses over time, accompanied by small gains in Total factor productivity (TFP). Quite remarkably, TFP is the variable with the lowest variation among the seven countries (as 2008-2017 mean), but also over time. Over time, TFP increased at CEE level from 1.03 in 2008 to 1.07 in 2017, despite drops in the years following the Global financial crisis in 2007-2009.

The next category of variables, "Market size", contains three components: real GDP per capita, population size and the percentage of urban population, considered good proxies for drivers of FDI determined by consumption and the search for output markets. We cannot disregard the decline in mean population from 13.76 million people in 2008 to 13.53 million in 2017, driven by the massive migration in almost all seven countries, but particularly in Bulgaria and Romania. However, the figures in Eurostat do not correctly reflect the number of people that are still officially residents in these countries but live effectively in other countries (mostly in other EU countries), which, means that less workforce is available in the labour market and that GDP per capita is also distorted. Concerning real GDP per capita, the mean value of this variable

for all countries over the period surged from 61.43% of EU average in 2008 to 67.43% in 2017, showing the real economic progress made by the region in the last decades. Though, the seven CEE had different levels of real GDP per capita compared to EU average, with the Czech Republic being the closest (84.90% as a mean over the period) and Bulgaria the farthest (45.90%). On a positive note, five CEE countries (except for Croatia and Slovakia) have seen their real GDP per capita against the EU average growing – highest for Poland (25.4%) and Romania (23.6%). Thus, CEE countries have maintained over time their attraction as an output market for foreign investors, although this motivation for MNEs that choose the region to invest seems to have faded over time (Popovici, 2015a; Marinova, 2020). Last, but not last, the percentage of urban population (URB), considered as a solid indication of higher income and economic advancement (Henderson, 2000; Chen et al., 2014), increased from 62.51% in 2008 to 63.41% in 2017 (mean over the period for the sample). However, differences among the seven countries are consistent: Romania, Croatia, and Slovakia had average values of URB around 50-55% over the period, while the percentage of urban population in the Czech Republic and Bulgaria was at 70-75% as a mean of the period. Only Bulgaria, Hungary, and Croatia had a solid increase in URB between 2008 and 2017, while in Poland and Slovakia the share of urban population declined. For the Czech Republic the percentage of urban population dropped until 2011, then increase until 2017, whereas in Romania the percentage increased until 2012, then dropped until 2016 and afterwards increased again in 2017.

We have included three variables in the "Labour market" category of FDI determinants to capture the size and quality of available workforce in the CEE region: total employment (EMP), the percentage of population in upper secondary and post-secondary non-tertiary education (SEC) and the percentage of population in tertiary education (TER). Total employment is a variable well correlated with population size, hence its variation among countries – from 1.44 million people in Croatia to 13.74 million in Poland, as mean over the 2008-2017 period – is no surprise. At the same time, despite migration and negative population growth in five out of the seven countries in our sample, the average value of EMP increased from 5.07 million in 2008 to 5.3 million in 2017, mostly after 2011-2013 in all countries except for Bulgaria. For what concerns the quality of the workforce, figures show that SEC declined in all countries between 2008 and 2017, from 65.34% (2008) to 62.27% (2017), mostly in Slovakia (by 9.2%) and Poland (7.9%), while increasing only slightly in Bulgaria (by 0.3%). Differences between the seven countries were also present for SEC: Czechia and Slovakia are the only countries with more than 70% of population having upper secondary and post-secondary education, while Bulgaria and Romania show smaller percentages of 55% and 59%, respectively. Similar discrepancies between countries are observable for TER: Romania holds the lowest percentage of population with tertiary education (15.32%), followed by Slovakia, the Czech Republic, and Croatia (values in the 19% area), while Poland and Bulgaria hold percentages above 25%. Over time, though, all seven countries have recorded surges in TER, from of 17.14% in 2008 and 24.30% in 2017 as sample mean. These figures suggest rather low levels of education of the population and workforce in CEE countries, which might again act as a determinant of FDI directed towards labour-intensive activities, particularly in countries with the lowest levels of SEC and TER.

Last, but not least, the "Digitalization" category includes two variables that portray the level of digital economy: the percentage of households with access to the internet at home (NET) and the share of ICT sector in GDP (ICT). Both variables increased (as a mean) between 2008 and 2017 for all countries in the sample, but with differences from one economy to another: NET surged by 83% between 2008 and 2017

(from 42.71% to 78.14%), while ICT increased by only 5% over the same time interval. Regardless of country, both variables recorded positive trends, but with a stronger point for NET compared to ICT. Bulgaria and Romania were the "champions" in NET growth, as the percentage of households with access to Internet increased by 2.68 times in Bulgaria and 2.53 times in Romania over the period of our analysis. At the opposite end, Slovakia and Croatia recorded lesser growth of NET between 2008 and 2017 (60-70%), but both countries had higher levels of NET at the beginning of the period. Hungary and Bulgaria are the countries with the highest importance of ICT sector in GDP (around 5% as a mean over the period), followed by Czechia, Slovakia, and Croatia (weight of around 4%). Romania and Poland had mean shares of ICT sector in GDP around 3% as a mean of the period, but on a positive trend. The rather high population connectivity to Internet is an optimistic sign related to the future development of these economies by incorporating the advances brought by the digital economy, while the low importance of the ICT sector in GDP might be an indication of these countries' potential of progress when the digital economy features will be embraced.

Random forest results

We have included in the random forest algorithm all the fifteen determinants of FDI considered, as well as FDI stocks with 1-year lag (FDI(-1)) and Country (categorical variable), as independent variables. The dependent variable was the FDI stock level for each country and year in the sample and period under scrutiny. Table 5 presents the risk estimates and standard errors for each random forest model and for the train and test samples used by the model. The risk estimates show the predictive power of the set of independent variables for the dependent variable – the lower they are, the better the prediction. The results in *Table 5* indicate Model 2 as the one with the lowest risk estimate and lowest standard error for the test sample (0.197 and 0.045, respectively), followed by Model 4.

Table 5. Risk estimates and standard errors for random forest models

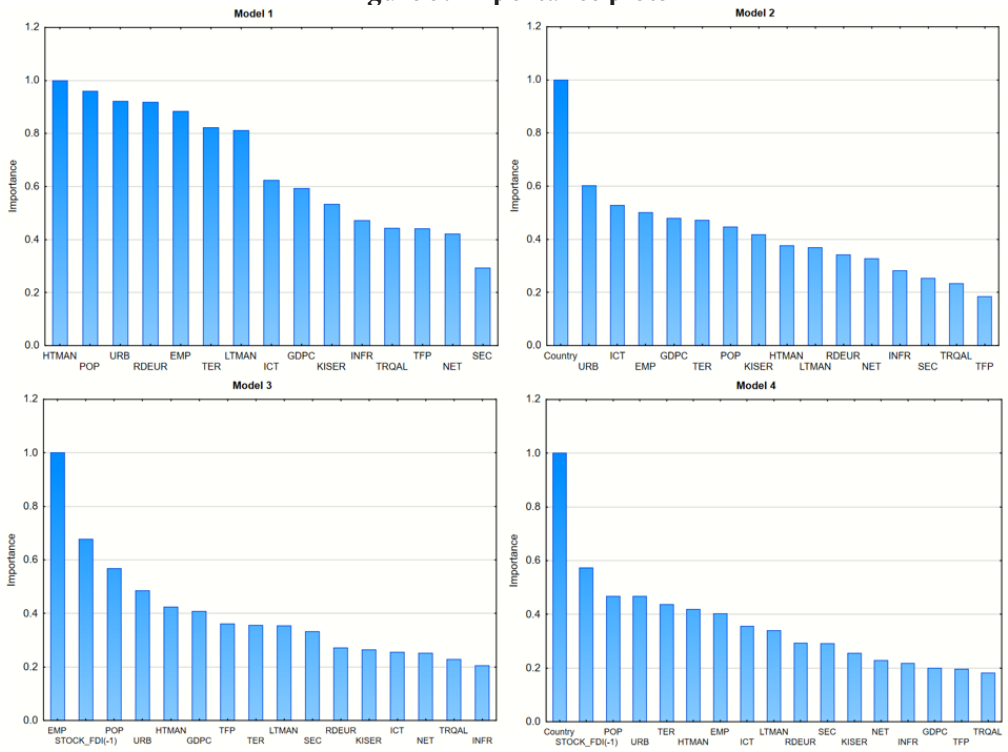
	Model 1 FDI determinants		Model 2 FDI determinants and Country		Model 3 FDI determinants and FDI(-1)		Model 4 FDI determinants, Country and FDI(-1)	
	Risk estimate	SE	Risk estimate	SE	Risk estimate	SE	Risk estimate	SE
Train sample	0.382	0.071	0.195	0.043	0.281	0.063	0.154	0.036
Test sample	0.436	0.097	0.197	0.045	0.363	0.103	0.303	0.110

Note: SE – standard error.

Source: Authors' representation and Statistica output

The most important output of the random forest algorithm resides in the ranking of independent variables in respect to their predictive power against the dependent variable. *Figure 5* shows the rankings for all models – the Importance plots. Country is the variable with the highest importance (1.00) in the model with the highest predictive power for FDI stocks in CEE, which suggests that countries in the region display significant differences in terms of FDI competitiveness and attractiveness for FDI. URB, ICT and EMP come on the second place, with importance values of 0.601, 0.528 and 0.500, respectively. This indicates that market size, the digitalization of the economy and labour market play an important role for FDI level in CEE countries, but country particularities should be considered. Other variables with good predictive power are GDPC (0.479), TER (0.471), POP (0.446) and KISER (0.418), also from Market size and Labour market categories. The least important predictors of FDI stocks for CEE countries are TFP (0.184) – not surprising, given the relative homogeneity of this variable for the countries in the sample – and TRQAL (0.233).

Figure 5. Importance plots



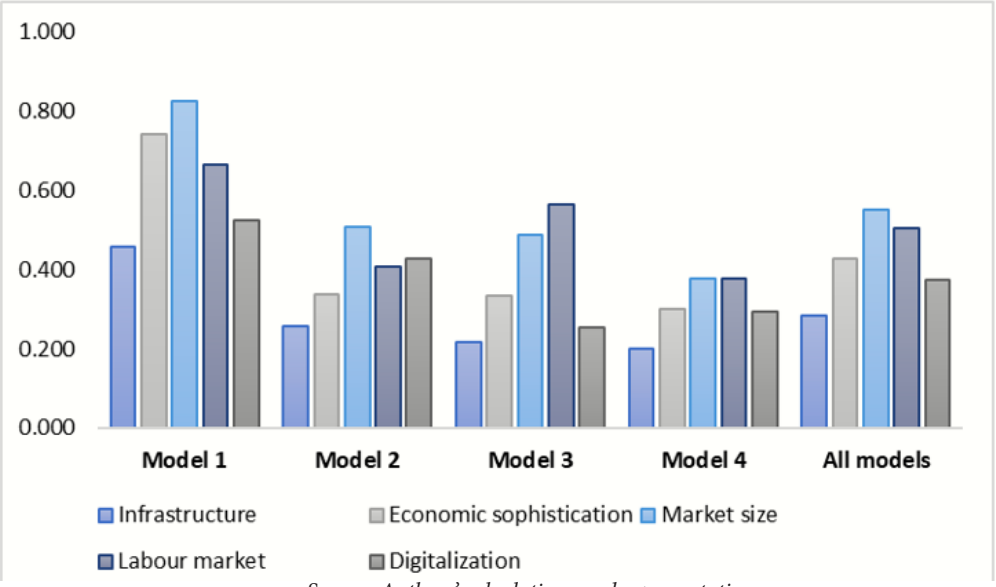
Source: Statistica output

When considering the importance values for all variables across the four models Country has an average importance of 1.000 based on the results of the two models that include it, indicating that country specificities are of paramount importance for FDI levels in the CEE region. When Country is not included, the highest predictive power (1.000) belongs to HTMAN in Model 1 and EMP in Model 3, which also includes the FDI stock in the previous year. In Model 4 the highest predictive power belongs to POP and URB, but after 1-year lagged FDI stock. At the opposite end, the variables with the smallest predictive power for FDI stocks are SEC in Model 1, INFR in Model 3 and TRQAL in Model 4, suggesting that infrastructure quality (at least when road infrastructure is considered) may play a less important role in driving FDI in the CEE region. Across all models, EMP is the variable with the highest predictive power after Country and FDI(-1) jointly with URB and POP, thus strongly implying that CEE countries are alluring for foreign investors due to their workforce and market size. The variables with the lowest importance for FDI stocks in the CEE region are TRQAL, SEC and INFR.

For a better perspective on the relative importance of FDI determinants for CEE countries, *Figure 6* exhibits the average importance of each category of variables in the four models, as well as for all models combined. Market size is the most important driver of FDI in three models out of four and in all models, followed by Labour market (in Models 3, 4 and all models), Economic sophistication (Model 1) and Digitalization (Model 2). This result confirms the solid empirical evidence in favour of the market-seeking behaviour of MNEs in CEE countries (Bevan and Estrin, 2004; Carstensen

and Toubal, 2004; Bitzenis, 2016; Stack et al., 2017). Furthermore, the characteristics of labour markets in the region – relatively well educated and numerous workers, accompanied by low salaries – also represented a lure for foreign investors (Bellak et al., 2008; Popovici and Calin, 2015; Popovici, 2015b; Horobet and Popovici, 2017; Horobet et al., 2020).

Figure 6. Importance of FDI determinants categories for all models

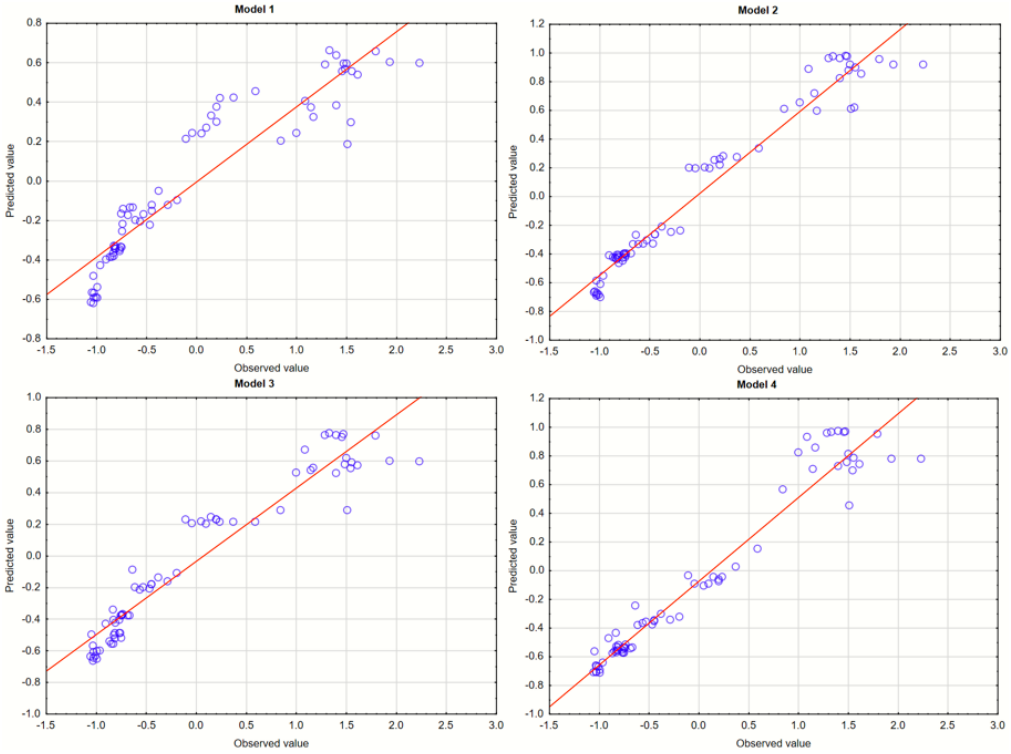


Source: Authors' calculations and representation

Quite interestingly, when Country is included as variable in Model 2 it seems to heighten the role played by Digitalization as FDI determinant, but when existing FDI stock level is included, Digitalization drops on the fourth place, after Economic sophistication. This may suggest that digitalization in CEE countries is not yet seen by foreign investors as a powerful attractiveness factor, although more recent studies and position papers point towards the region as "digital challengers" (Izkowska et al., 2020) and the innovation-driven economy as having the strength to increase their investment attractiveness (Schuh, 2020).

Figure 7 shows the predictive power of the random forest models, in the form of the relationship between observed and predicted values of the dependent variable. As indicated by the risk estimates and standard error values above, no significant underestimation or overestimation of FDI stock is revealed by any of models, which confirms the robustness of our results. At the same time, Model 2 shows the best calibration of predicted values to observed values generated by the random forest model.

Figure 7. Predicted versus observed values of dependent variables, all models



Source: Statistica output

Conclusions

The aim of this paper was to identify the impact of competitiveness on FDI inflows in seven CEE countries after the Global financial crisis, as many of the studies in the literature indicate the change in investors' motivations when deciding on the location of their investment. Compared to other studies in the literature, we have taken a more innovative approach in dealing with the large range of FDI determinants and we have used the machine-learning based random forest methodology. We have identified the most important variables that have the power to predict the dependent variable (FDI stocks) from a set of 15 indicators that reflect determinants of FDI which are partly present in the calculation of the European Regional Competitiveness Index 2019. The indicators were divided into five categories based on which competitiveness is assessed: Infrastructure, Economic sophistication, Market size, Labour market, and Digitalization.

Following the four random forest models we have used, our results indicate that the highest predictive power in attracting FDI is given by each country's particularities, followed by the market size, the digitalization of the economy and labour market. Other variables with good predictive power are GDP per capita, population in tertiary education, the dimension of the population and employment in knowledge-intensive services. The least important predictors of FDI stocks for the countries in our sample are the total factor productivity (given the low variability of this variable among the countries considered, as presented in *Table 2*) and the infrastructure quality, potentially due to the proxy considered. When countries particularities are not included, the

highest predictive power belongs to employment in high-tech manufacturing, total employment or population and the ratio of urban population, when the previous level of FDI is also considered. Among the variables having a less important role in driving FDI in the CEE region there are population with secondary education, infrastructure size and infrastructure quality. Based on these results, we confirm previous literature findings pointing towards the market-seeking behaviour of MNEs in CEE countries.

If we look at the five categories of competitiveness we have considered, we show that Market size is the most important driver of FDI, followed by Labour market, Economic sophistication, and Digitalization. In addition, the competitiveness picture in the CEE region is very diversified, which could further influence the distribution of FDI on sectors of economic activity. Most of the FDI inflows in CEE countries are concentrated in the services sector, with a share of over 68% for most of them. One third of all stocks of FDI are in the manufacturing sector, while the other sectors have almost neglecting share of stocks, except for Romania, which has a significantly higher share of FDI stocks in Manufacturing and more important FDI in low value-added sectors. The distribution of FDI in manufacturing sectors classified based on the intensity in technology or in services sectors based on the intensity of knowledge shows that the best performers are Poland, Czechia, and Hungary. Such a picture could show that a certain specialization of FDI already took place, favouring these three countries for technology and knowledge-intensive activities to the detriment of Romania and Bulgaria.

In this framework, countries in the region should first design a strategy for attracting FDI, in which the essential sectors for the development of the host location to be highlighted, following the assessment of the competitive advantages of the economy. A consequent step is to layout policy measures meant to raise the quality and standards of the factors attracting FDI at a level above the average EU. Based on our study, more efforts should be oriented towards increasing the quality of the labour force, raising employment in knowledge-intensive services and in high-tech manufacturing, and improving digitalization. In this way, FDI could be guided in the targeted direction and have an increased impact on economic growth and development.

References

- Adarov, A., & Stehrer, R. (2020). *Capital dynamics, global value chains, competitiveness and barriers to FDI and capital accumulation in the EU* (No. 446). Wiiw Research Report.
- Anastassopoulos, G. (2007). Countries' International Competitiveness and FDI: an empirical analysis of selected EU Member-Countries and Regions. *Journal of Economics and Business*, 10 (1), 35-52.
- Antonakakis, N. &Tondl, G. (2010). *Do determinants of FDI to developing countries differ among OECD investors? Insights from Bayesian Model Averaging*. FIW Working Paper N° 76.
- Anyanwu, C. J. (2012). Why Does Foreign Direct Investment Go Where It Goes? New Evidence from African Countries. *Annals of Economics and Finance*. 13 (2), 425-462.
- Arel-Bundock, V. (2017). The Political Determinants of Foreign Direct Investment: A Firm-Level Analysis, *International Interactions*, 43 (3), 424-452.
- Becker, N., & Cieślik, A. (2020). Determinants of German Direct Investment in CEE Countries. *Journal of Risk and Financial Management*, 13 (11), 268.
- Bellak, C., Leibrecht, M., & Riedl, A. (2008). Labour costs and FDI flows into Central and Eastern European Countries: A survey of the literature and empirical evidence. *Structural Change and Economic Dynamics*, 19 (1), 17-37.

- Bevan, A. A., & Estrin, S. (2004). The determinants of foreign direct investment into European transition economies. *Journal of comparative economics*, 32 (4), 775-787.
- Bitzenis, A. (2016). *The Balkans: foreign direct investment and EU accession*. Routledge.
- Breiman, L. (2001). Random forests. *Machine learning*, 45 (1), 5-32.
- Breiman, L., Friedman, J.H., Olshen, R.A. & Stone, C.J. (1984). *Classification and Regression Trees*. Chapman & Hall, New York.
- Brian Gray, J., & Fan, G. (2008). Classification tree analysis using TARGET. *Computational Statistics & Data Analysis*, 52(3), 1362-1372. http://doi.org/10.1016/j.csda.2007.03.014
- Carstensen, K., & Toubal, F. (2004). Foreign direct investment in Central and Eastern European countries: a dynamic panel analysis. *Journal of comparative economics*, 32 (1), 3-22.
- Chen, M., Zhang, H., Liu, W., & Zhang, W. (2014). The global pattern of urbanization and economic growth: evidence from the last three decades. *PloS one*, 9 (8), e103799.
- Comin, D. (2010). Total factor productivity. *Economic growth* (pp. 260-263). Palgrave Macmillan, London.
- Cui, L., Fan, D., Li, Y., & Choi, Y. (2020). Regional competitiveness for attracting and retaining foreign direct investment: a configurational analysis of Chinese provinces. *Regional Studies*, 54 (5), 692-703.
- Das, M. (2020). Determinants of inward foreign direct investment: comparison across different country groups. *Proceedings of Rijeka Faculty of Economic: Journal of Economics and Business*, 38 (1), 237-269.
- Dauti, B. (2015). Determinants of foreign direct investment in South East European countries and new member states of European Union countries. *Economic and Business Review*, 17 (1), 93-115.
- Dellis, K., Sondermann, D. & Vansteenkiste, I. (2017). *Determinants of FDI inflows in advanced economies: Does the quality of economic structures matter?* European Central Bank, Working Paper 2066.
- FRED (2021). Federal Reserve Economic Data. St. Louis, MO: Federal Reserve Bank of St.
- Feenstra, R. C., Inklaar, R., & Timmer, M. P. (2015). The next generation of the Penn World Table. *American economic review*, 105 (10), 3150-82.
- Garg, A., & Tai, K. (2013). Comparison of statistical and machine learning methods in modelling of data with multicollinearity. *International Journal of Modelling, Identification and Control*, 18 (4), 295-312.
- Gorbunova, Y., Infante, D., & Smirnova, J. (2012). New evidence on FDI determinants: An appraisal over the transition period. *Prague Economic Papers*, 2, 129-149.
- Halaszovich, T. F., & Kinra, A. (2020). The impact of distance, national transportation systems and logistics performance on FDI and international trade patterns: Results from Asian global value chains. *Transport Policy*, 98, 35-47.
- Hayat, A. (2019). Foreign direct investments, institutional quality and economic growth, *The Journal of International Trade & Economic Development*, 28 (5), 561-579.
- Hayes, T., Usami, S., Jacobucci, R., & McArdle, J. J. (2015). Using Classification and Regression Trees (CART) and random forests to analyze attrition: Results from two simulations. *Psychology and aging*, 30 (4), 911–929. https://doi.org/10.1037/pag0000046

- Henderson, J. V. (2000). *How urban concentration affects economic growth* (Vol. 2326). World Bank Publications.
- Horobeț, A., & Popovici, O. (2017). Foreign direct investments their evolution and importance in Romania. *Study carried out in partnership by the Bucharest Academy of Economic Studies and the Council of Foreign Investors*.
- Izkowska, J., Kawecka, K., Malinowska, M, Marciniak, T., Młodziejewska, M., Novak, J., Pastusiak, B. & Valachovicova, I. (2020). Digital Challengers in the next normal in Central and Eastern Europe. *Digital McKinsey*. Retrieved from https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-challengers-in-the-next-normal-in-central-and-eastern-europe.
- Jamroz, K., Budzyński, M., Romanowska, A., Żukowska, J., Oskarbski, J., & Kustra, W. (2019). Experiences and challenges in fatality reduction on polish roads. *Sustainability*, 11 (4), 959.
- Jimborean, R., & Kelber, A. (2017). Foreign direct investment drivers and growth in Central and Eastern Europe in the aftermath of the 2007 global financial crisis. *Comparative Economic Studies*, 59 (1), 23-54.
- Kurtović, S., Maxhuni, N., Halili, B., & Talović, S. (2020). The determinants of FDI location choice in the Western Balkan countries. *Post-Communist Economies*, 32 (8), 1089-1110.
- Lenz, N. V., Skender, H. P., & Mirković, P. A. (2019). The Impact of Transport Infrastructure on Economic Growth: Evidence from CEE, EFRI Exclusive Working Papers 2018-10, Faculty of Economics and Business, University of Rijeka, Croatia, available at http://www.efri.uniri.hr/upload/EFRI%20EXCLUSIVE%20papers/Exclusive%20EFRI%20Vlahinic%20Pavic%20Mirkovic_2018_10.pdf
- Lucke, N. & Eichler, S. (2015). Foreign direct investment: the role of institutional and cultural determinants *Applied Economics*, 48 (11), 935-956.
- Marinova, S. T. (2018). Motives and strategies for foreign direct investment in Central and Eastern Europe. In *Foreign Direct Investment in Central and Eastern Europe* (pp. 93-116). Routledge.
- Meyer, K.E. & Sinani, E. (2009) When and where does foreign direct investment generate positive spillovers? A meta-analysis. *Journal of International Business Studies*, 40 (7), 1075-1094.
- Mikušová, M. (2011). Value of networking in transport policy related to the road safety. In *International Conference on Transport Systems Telematics* (pp. 70-77). Springer, Berlin, Heidelberg.
- Pawłowski, W., Goniewicz, K., Schwebel, D. C., Shen, J., & Goniewicz, M. (2019). Road traffic injuries in Poland: Magnitude and risk factors. *European journal of trauma and emergency surgery*, 1-6.
- Pečarić, M., Kusanović, T., & Jakovac, P. (2021). The Determinants of FDI Sectoral Structure in the Central and East European EU Countries. *Economies*, 9 (2), 66.
- Popovici, O. C. (2015a). Assessing FDI determinants in CEE countries during and after transition. *The Annals of the University of Oradea*, 24 (1), 113-122.
- Popovici, O. C. (2015b). Assessing the impact of the labour market determinants in attracting FDI. *Journal of Academic Research in Economics* (JARE), 7 (1), 59-72.
- Popovici, O. C., & Calin, A. C. (2015). The Effects of Enhancing Competitiveness on FDI Inflows in CEE Countries. *European Journal of Interdisciplinary Studies*, 7 (1).
- Popovici, O., Horobet, A., Paraschiv, D., Hurduzeu, G., Lupu, R. & Zeldea, C.

(2020). Foreign direct investment in Romania, *Study carried out in partnership by the Bucharest Academy of Economic Studies and the Council of Foreign Investors*.
- Prime, P. B., Subrahmanyam, V., & Lin, C. M. (2012). Competitiveness in India and China: the FDI puzzle. *Asia Pacific Business Review*, 18 (3), 303-333.
- Procher, V. (2011). Agglomeration effects and the location of FDI: evidence from French first-time movers. *The Annals of Regional Science*, 46 (2), 295-312.
- Pusterla, F., & Resmini, L. (2007). Where do foreign firms locate in transition countries? An empirical investigation. *The Annals of Regional Science*, 41 (4), 835-856.
- Saini, N. & Singhania, M. (2018). Determinants of FDI in developed and developing countries: a quantitative analysis using GMM, *Journal of Economic Studies*, 45 (2), 348-382
- Sakali, C. (2015). FDI determinants in central and Eastern Europe and the impact of the global economic crisis. *International Journal of Economic Practices and Theories*, 5 (1), 16-29.
- Schuh, A. (2020). Investment Attractiveness of Central and Eastern Europe for Western Multinational Firms in the Post-COVID-19 Era. In *COVID-19 and International Business* (pp. 339-348). Routledge.
- Schwab, K., 2019. The global competitiveness report 2019, http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf
- Stack, M. M., Ravishankar, G., & Pentecost, E. (2017). Foreign direct investment in the eastern European countries: Determinants and performance. *Structural Change and Economic Dynamics*, 41, 86-97.
- Stankov, B., Damnjanović, J., & Roganović, M. (2018). Pillars of competitiveness as FDI determinants in host countries: A review of the panel data empirical studies. *Škola biznisa*, (2), 98-116.
- Statistical Office of the European Communities (2021). EUROSTAT Database. Luxembourg: Eurostat.
- Tan, D., & Meyer, K. E. (2011). Country-of-origin and industry FDI agglomeration of foreign investors in an emerging economy. *Journal of International Business Studies*, 42 (4), 504-520.
- United Nations Conference on Trade and Development (2021). UNCTAD Database
- Van Beveren, I. (2012). Total factor productivity estimation: A practical review. *Journal of economic surveys*, 26 (1), 98-128.
- Villaverde, J., & Maza, A. (2015). The determinants of inward foreign direct investment: Evidence from the European regions. *International business review*, 24 (2), 209-223.
- Waters, W. G., & Tretheway, M. W. (1999). Comparing total factor productivity and price performance: concepts and application to Canadian railways. *Journal of Transport Economics and Policy*, 209-220.
- World Bank (2021). World Development Indicators Database.