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FDI Time Series Forecasts: Evidence from Emerging Markets

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Abstract:

Research Question: This paper investigates the trend and flow of foreign direct investments (FDI) in emerging markets, with the focus on FDI in Serbia in comparison with akin countries from the region. **Motivation:** FDI is an important factor of growth and prosperity in developing countries. It largely influences trade, productivity, and economic development of a receiving country. Based on UNCTAD's World Investment Report of 2019, the share of global FDI in developing countries was 54 per cent, which was a record. Recently, Serbia has been recognized as one of the most popular destinations for FDI in Southeastern Europe. This motivated us to analyze the chances and possibilities of enlargement of FDI in Serbia, as well in other Balkan countries. **Idea:** The main idea of the paper is to analyze and estimate time series of FDI net inflows for Serbia. We strive to investigate whether FDI demonstrates the durable growth in the future period of time. Furthermore, we compare the state of Serbian FDI with the former Yugoslav countries, in search for disparities or similarities. **Data:** We observed the FDI net inflows that are measured in current US dollars, while the data were retrieved from the World Bank database. The earliest available time point is 1992, while the latest available year of observation is 2018. **Tools:** We estimated the FDI net flow time series using a list of suitable ARIMA models, and we have chosen the best model fit among them using AIC and BIC criteria. **Findings:** We have found that Serbia and North Macedonia show a mild growth in future investments. A significant percentage of the cumulative FDI inflows from EU companies have been invested precisely in Serbia, while in North Macedonia, fostering FDI has been promoted as one of the main instruments for employment and economic development. Other Yugoslav countries tend to stagnate in the future period, which is in literature called a negative 'Western Balkans' effect on FDI. **Contribution:** Findings of the mild growth in FDI inflows in Serbia and North Macedonia contribute to the policy of attracting the FDI inflows in the countries of Southeastern Europe.

Keywords: FDI, Emerging markets, Time Series, ARIMA, AIC, BIC, Balkan countries

JEL Classification F21, F30, F47

1. Introduction

Over the past few decades, opportunities and challenges of globalization for all economies have increased rapidly. Information and Communication Technologies (ICT) have connected the world to such an extent that, for example, an economic problem in one country can now have a harmful effect on financial sectors in faraway countries as well. Foreign direct investment (FDI) is one of globalization's key aspects (Baldwin, 2016; Lacal-Arantequi, 2019; Maiga, Hu, Mekongcho, & Coulibaly, 2018).

There are many reasons for a company to be really careful when looking for a FDI destination. Garsous, Kozluk, and Dlugosch (2020) investigated the influence of production energy prices on outward FDI and found that only firms that were faced with increased energy prices did increase their FDI activity and that this effect was relatively small. Lee, Hong, and Makino (2020) mention some other reasons for outbound FDI, such as means to counter trade barriers, to achieve a financial hedge, or to obtain tax breaks. Other reasons in-

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clude market, resource and efficiency seeking, low-cost workforce, or higher skills workforce on the other side (Jones, Serwicka, & Wren, 2020). Piperopoulos, Wu, and Wang (2018) focused on emerging market enterprises (EMEs) and their outward FDI location choices. It turns out that those EMEs that were focused on innovation used to primarily choose developed countries, because of opportunities they provide. These opportunities include access to cluster-specific environments for innovation, a possibility to foster network ties with knowledge-intensive firms, competitors, and universities, as well as access to 'early warning indicators' of global market trends and the pressure to meet high standards. By contrast, EMEs that are focused on adapting their existing technologies and products to local market needs will choose developing countries.

The aim of this research is to examine the trends of FDI in the emerging market of Serbia, as one of the attractive FDI destination countries. We additionally strive to compare the allurements of Serbia with countries from the region, more precisely, the countries from the former SFR Yugoslavia, as they are most similar to Serbia in the cultural and social sense (Dobrota, Zornić, & Marković, 2019). The research methodology used to examine FDI trends involve time series models. We expect that the findings of the research will have significant practical implications for policy makers in emerging countries, when it comes to attracting and re-locating FDI.

Section 2 of this paper offers a detailed literature review on the topic of modelling the FDI, while Section 3 presents the empirical data used in the time series analysis. Introduction to methodology follows in Section 4. Results are presented and analyzed in the fifth section. Finally, discussion, conclusion, and future research directions are given.

2. Literature Review

FDI largely influence trade, productivity, and economic development of a receiving country. Effects that FDI will have on productivity depend on human capital and countries' institutions (Li & Tanna, 2019). Developing countries usually introduce policies that should attract FDI, but that might not be enough. Among most important ones for attracting FDI is institutional quality, especially political stability, control of corruption, and rule of law (Bailey, 2018; Peres, Ameer, & Xu, 2018; Sabir, Rafique, & Abbas, 2019; Uddin, Chowdhury, Zafar, Shafique, & Liu, 2019). Based on the UNCTAD's (United Nations Conference on Trade and Development) World Investment Report (United Nations, 2019), the share of global FDI in developing countries is 54 per cent, which is a record. Unfortunately, it is not enough only to have a high level of FDI to achieve economic growth. Sadni-Jallab, Gbakou, and Sandretto (2008) have found that macroeconomic stability is essential to translate the impact of FDI on economic growth. Another interesting information presented in the UNCTAD's report regards countries' investment policy. Namely, in 2018, 55 economies introduced at least 112 measures affecting foreign investment. A high portion of these (more than one third) are restrictions reflecting national security concerns about foreign ownership of critical infrastructure, core technologies, and other sensitive business assets. Ufimtseva (2020) explores this phenomenon and points out that investment recipient countries are more likely to protect a domestic business where foreign ownership threatens domestic industry. She proposes a 'FDI acceptability threshold' for countries to clarify conditions for acceptable FDI and prevent negative effects of rejecting specific FDI on attracting the future ones.

Analyzing international data reveals that a significant part of FDI is directed through financial centers. Two main types of these centers are tax havens and investment hubs. The largest investment hubs include Ireland, Luxemburg, Mauritius, the Netherlands, and Singapore. They accommodate around one-third of global FDI (Hers, Witteman, Rougoor, & van Buiren, 2018).

Some authors analyzed the influence of FDI on the economy, general wellbeing, income inequality, and poverty. Bruno, Campos, and Estrin (2018) combined the country and enterprise-level evidence together in a meta-regression analysis to evaluate the evidence about FDI spillovers in emerging economies. Teixeira and Loureiro (2019) examine to what extent inward FDI contribute to income inequality and poverty in the long run. They show that an increase in FDI leads to a decrease in both income inequality and poverty rates. There is an ample body of research investigating the influence of FDI on the environment (Hanif, Faraz Raza, Gago-de-Santos, & Abbas, 2019; Liu, Wang, Zhang, Zhan, & Li, 2018; Salahuddin, Alam, Ozturk, & Sohag, 2018; Shahbaz, Nasir, & Roubaud, 2018). Wang and Luo (2020) used panel data from 30 provinces in China from 2006 to 2016, using FDI quantity and FDI quality as threshold variables. They found a complex nonlinear relationship between technological innovation capability and environmental pollution when taking FDI quantity and quality as dual thresholds. Namely, with the low level of FDI the capacity for scientific and technological innovation worsens environmental pollution levels; when FDI crosses a higher threshold, the capacity for scientific and technological innovation improves environmental quality, but with a further

increase of the level of FDI, the positive effect decreases to some extent. Other authors showed on the example of China that FDI has insignificant influence on environmental quality in the long run, but in the short term, pollution variables cause significant variances on the amount of FDI inflows (Ayamba, Haibo, Abdul-Rahaman, Serwaa, & Osei-Agyemang, 2020). Baek (2016) examines the FDI-income-energy-environment nexus and uses panel data of 5 ASEAN (Association of Southeast Asian Nations) countries. He shows that FDI deteriorates the environment, so not everything about FDI is positive.

There is a number of papers dealing with the prediction of FDI using a time series analysis (Shi, Zhang, Su, & Chen, 2012; Vega-Nieva et al., 2019). Jere and his co-authors explored Simple exponential smoothing (SES), Holt-Winters exponential smoothing (HWES), and Autoregressive Integrated Moving Average (ARIMA) and used the best fit model to forecast Zambia’s annual net FDI (Jere, Kasense, & Chilyabanyama, 2017), while the similar has been done by Fadhil and Almsafir (2015) for Malaysia’s FDI inflows.

In Central and Eastern Europe, the choice of FDI location is highly affected by market-seeking (GDP, labor cost, and open economy index), while not so much by the country risk for example (Gunther & Kristalova, 2016; Jirasavetakul & Rahman, 2018). When it comes to the Balkan countries, it is peculiar to note that the relationship between FDI and poverty reduction has a positive effect in the Western Balkan region, whereas this is not the case in the Central European region (Ganic, 2019; Shimbov, Alguacil, & Suárez, 2019). After World War II, the Balkans expansion was the result of the profound industrialization, and the fact that the industry dominated the trade and services (Estrin & Uvalic, 2016). At that time FDI were attracted to the Balkan countries by the development of the industry. Later on, the Balkans started to develop the service sector, causing the change in the distribution of FDI, where, for example, the Croatian economic growth depends on tourism (Kurtovic, Maxhuni, Halili, & Talovic, 2020). In later days, the leaders in attracting FDI among the Western Balkan countries are Serbia and Croatia, making up 60% of the total amount of FDI inflows (Kurtovic et al., 2020). In Serbia, when it comes to manufacturing, FDI were attracted by the production of food, rubber and plastic products, motor vehicles, and metals, and when it comes to services, by wholesaling and retailing, the financial sector, and telecommunications. Croatia had a much higher average of FDI inflows share in the service sector, attracted by the wholesaling and retailing, real estate, and tourism.

3. Methodology

As highlighted in the literature review, given the importance of international investments for markets and economies, in this research we observe the status and trends of the main variable FDI. FDI refers to direct investment equity flows (sum of equity capital, reinvestment of earnings, and other capital) in the reporting economy (IMF, 2020; World Bank, 2020). It represents an investment made by a stakeholder resident in one economy into business activities that is resident in another economy (Brooks & Hill, 2004; Brouthers, Werner, & Wilkinson, 1996; Neuhaus, 2006; Patterson, Montanjees, Motala, & Cardillo, 2004; Rivoli & Salorio, 1996).

We observed the FDI net inflows that are measured in current US dollars (IMF, 2020), while the data were retrieved from the World Bank database (World Bank, 2020). Our main focus was to examine and inspect the trends of FDI in the Balkan emerging economies, with the focus on Serbia and the countries from the former SFR Yugoslavia, as they are most similar in the cultural and social sense, to make the appropriate comparisons. In order to do so, we spotlighted Serbia, Croatia, Montenegro, Bosnia and Herzegovina, North Macedonia, and Slovenia. Table 1 shows the descriptive statistics for the abovementioned economies.

Table 1: Observed countries’ FDI descriptive statistics (values in billions of dollars)

Country	Mean	SD	Minimum	Maximum	Count	Period
Serbia	1,678.72	1,596.86	0.001	4,929.90	27	1992-2018
Croatia	1,574.82	1,369.79	13.00	5,187.84	27	1992-2018
Montenegro	565.88	374.15	49.43	1,549.31	17	2002-2018
Bosnia and Herzegovina	489.78	401.05	66.74	1,841.97	21	1998-2018
North Macedonia	287.69	216.08	9.49	733.47	25	1994-2018
Slovenia	648.94	626.58	-346.27	1,884.93	27	1992-2018

Source: World Bank, Foreign direct investments

The data presented in Table 1 are collected for all the publicly available time points. While for most of the countries in the World Bank database, data are given from 1970, the earliest available time point for the observed economies is 1992. The latest available year of observation is 2018. Yet, not all the economies from the list in Table 1 have the same number of time data points. For some countries, the records of FDI started

to be kept later in comparison with the larger countries. For example, the data for Montenegro are available from 2002. It is interesting to note that this is the year when Montenegro adopts euro as its currency (European Central Bank, 2019), and that the EU mediated accord was signed to set up the new state to be called Serbia and Montenegro (BBC News, 2019). North Macedonia has its data available from 1994, and it is interesting to note that in 1993 it gained the UN membership (Wood, 1997). The lack of data for a longer period of time is the main limitation of this study.

Since the time period is not the same for all the countries, the minimal values vary in what seems to be an unexpected way. For example, Serbia has the smallest FDI value in 1996 (what can be noted from Figure 1), and Slovenia has an even negative value in 2009 (Figure 3c). However, this matter will not affect the time series modeling results since each time series is observed separately.

In order to estimate and forecast the trends of FDI, we exploited various time series models. We run Palisade RISK plug-in software for Microsoft Office Excel, that is used as a risk analysis tool, based on a Monte Carlo simulation (Hastings, 1970). Palisade automatically estimates the best fit time series model, based on model selection criteria, the Akaike information criterion (AIC) (Akaike, 1974) and Bayesian information criterion (BIC) (Schwarz, 1978), used to resolve which of the numerous models is seemingly the best model fit for a given dataset. The criteria estimate the quality of each model, relative to other observed models.

The software estimates the best model from the list of the following: AR(p), MA(q), ARMA(p,q), ARCH, GARCH, BMMR, BMMRJD, GBM, GBMJD (Bollerslev, 1986; Engle, 1982; Ross, 2014; Whittle, 1951). If the observed time series is non-stationary, or the seasonality is detected, it can be estimated with the specific order of integration or some deseasonalizing mechanism. So, for example, integrated ARMA(p,q) of the d-th integration order represents ARIMA(p,d,q) model (Box & Jenkins, 1970).

4. Results

Each time series is estimated with the list of models as specified in section 3. They were compared and ranked according to AIC and BIC, that represents the amount of information the model loses; the quality of the model is higher if it loses less information (Akaike, 1974; Schwarz, 1978). The best five models for each time series, as presented in Tables 2, 3, and 4, are AR(1), AR(2), MA(1), MA(2), and ARMA(1,1). In most of the cases, rank orders are the same for both AIC and BIC information criteria. The models where these values are not equally ordered are sorted by AIC criterion, nevertheless, the differences are minor. Yearly time points of the data were collected, thus there was no need for deseasonalizing the data. The model fit for each time series did not perform any data transformation, nor detrended the time series, unless specified otherwise. Table 2 shows the results of the model fit for the specified FDI time series for Serbia.

Table 2: Time series model fit results and ranks for Serbi

Model rank	#1	#2	#3	#4	#5
Serbia	MA1	MA2	AR1	AR2	ARMA
Data Transform Function	Square Root	Square Root	Square Root	Square Root	Square Root
Detrend	First Order	First Order	First Order	First Order	First Order
AIC	562.52	565.86	570.03	572.14	572.75
BIC	562.52	568.99	572.71	575.27	575.87
Mu (Billions)	20,337,549	20,337,549	20,337,549	20,337,549	155,893,161
Sigma (Billions)	120,091,820	112,628,474	12,270,653	122,143,742	119,809,133
α_1 (AR) / β_1 (MA)	-0.412	-0.776	-0.441	-0.483	0.111 (α_1)
α_2 (AR) / β_2 (MA)		-0.489		-0.957	-0.556 (β_1)

Non-stationarity was detected for Serbia and thus the data were detrended using the first order level of integration to achieve stationarity. The data were also transformed using the square root transformation function. The best fit model for Serbia was shown to be integrated MA(1) model that can also be presented as ARIMA(0,1,1) model. According to AIC and BIC (see table 2), it was followed by ARIMA(0,1,2), ARIMA(1,1,0), ARIMA(2,1,0), and ARIMA(1,1,1) respectively. Figure 1 presents the time series model ARIMA(0,1,1) for Serbia. The time series was detrended using first-order difference to achieve stationarity.

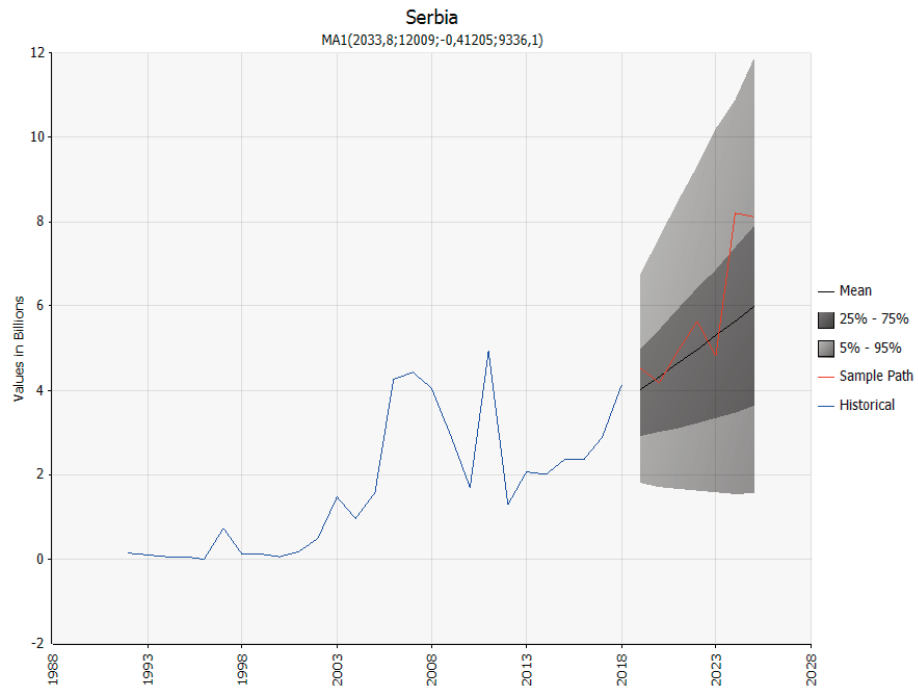


Figure 1: Serbia FDI time series model forecast

Table 3 shows the results of the model fit for the specified FDI time series for North Macedonia. Similarly to Serbia, this time series is non-stationary, but there was no need to transform the dataset. The data were detrended using the first order level of integration.

Table 3: Time series model fit results and ranks for North Macedonia

Model rank	#1	#2	#3	#4	#5
North Macedonia	MA1	MA2	ARMA	AR2	AR1
Detrend	First Order	First Order	First Order	First Order	First Order
AIC	980.07	985.17	989.53	989.80	992.20
BIC	980.07	987.77	992.14	992.40	994.53
Mu (Billions)	260,305,177	260,305,177	231,353,595	260,305,177	260,305,177
Sigma (Billions)	182,842,920	163,944,684	177,271,721	179,664,662	2,013,179
α_1 (AR) / β_1 (MA)	-0.834	-0.640	0.109 (α_1)	-0.382	-0.263
α_2 (AR) / β_2 (MA)		-0.424	-0.760 (β_1)	-0.451	

The best fit model for North Macedonia was shown to be integrated MA(1) model, thus ARIMA(0,1,1) model. According to AIC and BIC (see table 3), it was followed by ARIMA(0,1,2), ARIMA(1,1,1), ARIMA(2,1,0), and ARIMA(1,1,0) respectively. The best fitting model ARIMA(0,1,1) is similar to the simple exponential smoothing model, but with some additional flexibility: the estimated MA(1) coefficient is negative (β_1), a constant μ term can be included, the trajectory of the long-term forecasts is typically a sloping line (whose slope is equal to μ) rather than a horizontal line, etc. Figure 2 presents the time series model for North Macedonia.

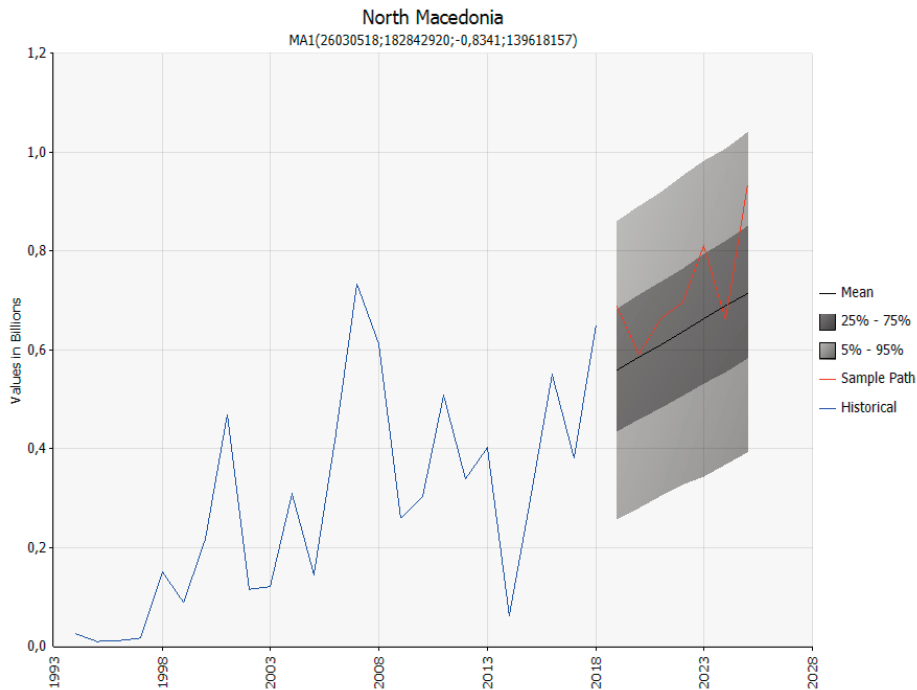


Figure 2: North Macedonia FDI time series model forecast

Table 4 shows the results of the model fit for the specified FDI time series for other former SFR Yugoslav countries.

Table 4: Time series model fit results and ranks

Model rank	#1	#2	#3	#4	#5
Bosnia and Herzegovina	MA1	MA2	ARMA	AR1	AR2
AIC	879.36	884.68	889.80	892.14	893.72
BIC	879.36	886.36	891.47	893.86	895.39
Mu (Billions)	489,781,899	489,781,899	425,435,633	489,781,899	489,781,899
Sigma (Billions)	291,904,935	270,433,714	285,699,434	343,802,080	335,428,109
α_1 (AR) / β_1 (MA)	0.767	0.793	0.212 (α_1)	0.515	0.628
α_2 (AR) / β_2 (MA)		-0.294	0.735 (β_1)		-0.219
Montenegro	MA1	AR1	ARMA	MA2	AR2
AIC	712.55	719.31	719.92	721.73	721.88
BIC	712.55	719.96	719.92	721.73	721.88
Mu (Billions)	565,879,435	565,879,435	611,458,021	565,879,435	565,879,435
Sigma (Billions)	307,972,594	300,660,738	268,808,099	278,977,539	300,589,182
α_1 (AR) / β_1 (MA)	0.431	0.595	0.664 (α_1)	0.246	0.582
α_2 (AR) / β_2 (MA)			-0.207 (β_1)	0.288	0.218
Slovenia	MA1	MA2	ARMA	AR1	AR2
AIC	1,161.20	1,164.42	1,170.93	1,171.45	1,173.52
BIC	1,161.20	1,167.79	1,174.30	1,174.29	1,176.88
Mu (Billions)	648,935,559	648,935,559	633,502,961	648,935,559	648,935,559
Sigma (Billions)	51,420,749	504,351,991	522,797,224	570,498,011	566,495,314
α_1 (AR) / β_1 (MA)	0.699	0.793	-0.574 (α_1)	0.414	0.462
α_2 (AR) / β_2 (MA)		-0.338	0.694 (β_1)		-0.118
Croatia	MA1	AR1	ARMA	AR2	MA2
AIC	1,204.38	1,208.46	1,208.51	1,209.52	1,209.99
BIC	1,204.38	1,211.30	1,211.88	1,212.88	1,213.36
Mu (Billions)	157,481,674	157,481,674	180,278,910	157,481,674	157,481,674
Sigma (Billions)	118,938,574	111,829,416	105,249,210	110,152,307	112,268,010
α_1 (AR) / β_1 (MA)	0.455	0.577	0.664 (α_1)	0.478	0.318
α_2 (AR) / β_2 (MA)			-0.219 (β_1)	0.173	0.477

The non-stationarity was not detected with these time series and thus there was no need for detrending the data. The best fit model for all the listed FDI time series was MA(1) model (see Table 4). The model was not integrated, thus it can be presented as ARIMA(0,0,1) for all of the above-mentioned economies. These models show both, the unpredictable random motion features of the Wiener process and also the mean reversion features, which suggests that the values tend to move to the historical average over time. The order of the models fit differ among time series of different countries (see Table 4). Figure 3 presents time series best fit models for (a) Bosnia and Herzegovina, (b) Montenegro, (c) Slovenia, and (d) Croatia.

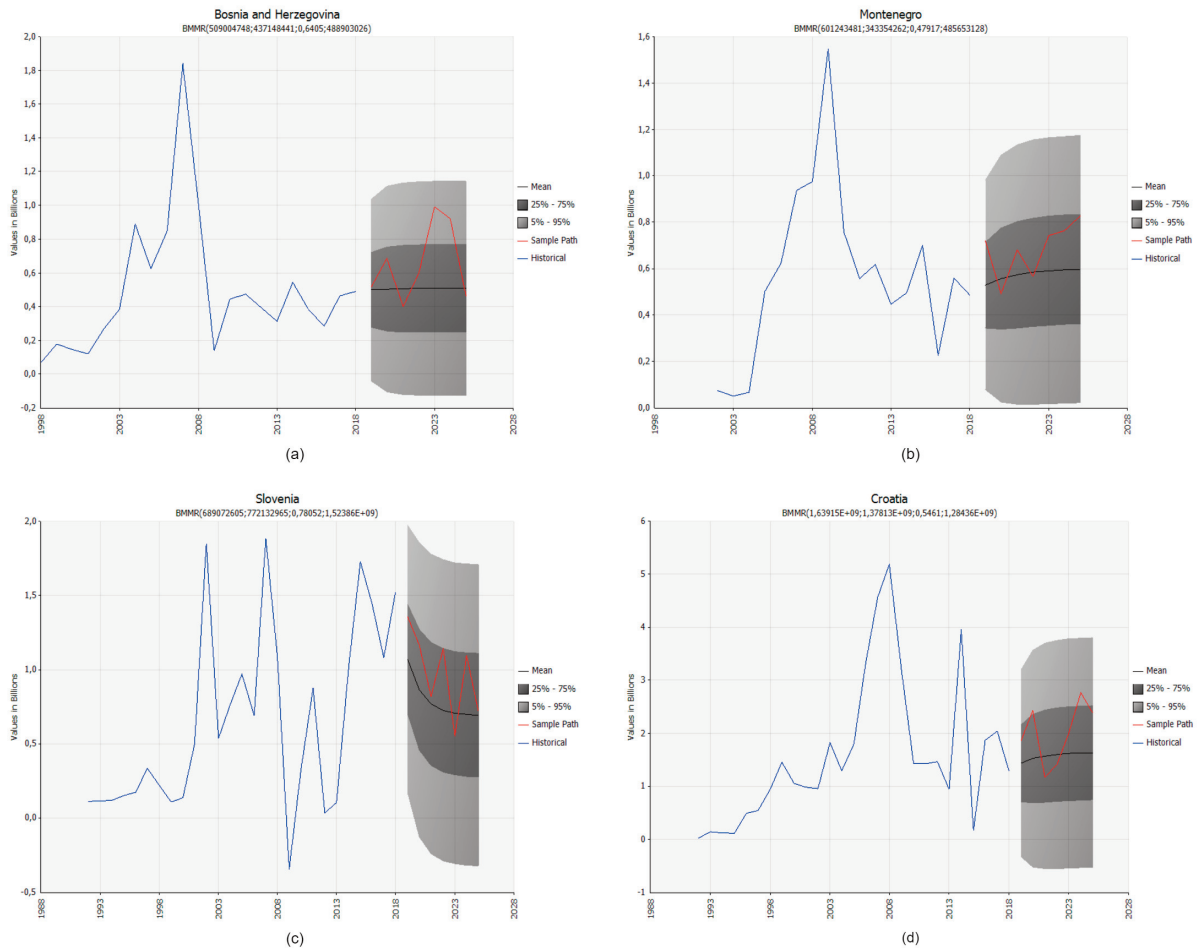


Figure 3: (a) Bosnia and Herzegovina, (b) Montenegro, (c) Slovenia, and (d) Croatia FDI time series model forecast

Figures 1, 2, and 3 show the forecast period up to 2025, with the mean value of the forecast, 50% confidence interval and 90% confidence interval. The red lines in figures for all the time series represent the sample paths of the forecast.

5. Discussion

Based on the presented results, we drew some general conclusions regarding the observed countries. Serbia and North Macedonia are the countries that have shown the mild growth in FDI for the observed future period. This is in accordance with the literature because, for example, the analysis of FDI by municipalities and cities in Serbia indicated a growing movement in the period (Stojanovic, Ilic, & Mihajlovic, 2017).

Serbia has been recognized as one of very popular destinations for FDI in Southeastern Europe. EU companies have invested almost three-quarters of the cumulative FDI inflows to Serbia over the past 8 years, amounting to over EUR 11 billion in total (Dudic, Dudic, Smolen, & Mirkovic, 2018). The European countries that have invested most in the Republic of Serbia are Austria, Norway, Netherlands, Russia, Switzerland; and among non-European there are United Arab Emirates, China, and the USA (Dudic et al., 2018). The growth of FDI in Serbia coincided in 2006, which happened throughout the entire region, primarily as a re-

sult of the privatization of the mobile network operator Mobtel, which was bought by Telenor from Norway for 1,513 million euros (Radenkovic, 2016). According to Radenkovic (2016), this was an exceptional year since the share of FDI in Serbian GDP went up to 14.10%. However, it should be stressed that greenfield investments such as Ball Packaging, Vip Mobile, and Microsoft's Development Center were practically the only bigger greenfield investments made in Serbia over the period from 2000-2011 (Radenkovic, 2016).

In North Macedonia, fostering FDI has been promoted by the government as one of the main instruments for generating employment and providing further economic development (Nikoloski, 2017). Furthermore, it was found in North Macedonia that foreign ownership helped restructure and enhance the productivity of domestic firms, that FDI had a positive influence in reinforcing the creation of new firms, and that FDI was likely to influence the job seeker to get employed rather than start their own business (Apostolov, 2017).

According to the results, Bosnia and Herzegovina, Montenegro, Slovenia, and Croatia tend to stagnate in the future period. From Figure 3c, it can be noted that for Slovenia FDI even seem to decrease, but in a longer run they flatten around the constant level. A number of years ago, the question arose by Estrin and Uvalic (2014) whether the Balkans are different in view of FDI; they have come to the conclusion that they are found to be so because even when the size of their economies, distance from the source economies, institutional quality, and prospects of EU membership are taken into account, the Western Balkans countries receive less FDI than other transition countries (Estrin & Uvalic, 2014), calling it a negative 'Western Balkans' effect on FDI. This can to some extent be noted as the reason that the FDI gravitates around the mean value.

To further discuss the findings, we have compared the results of the examined Southeastern European economies with FDI net inflows of Germany, one of the strongest economies in Europe.

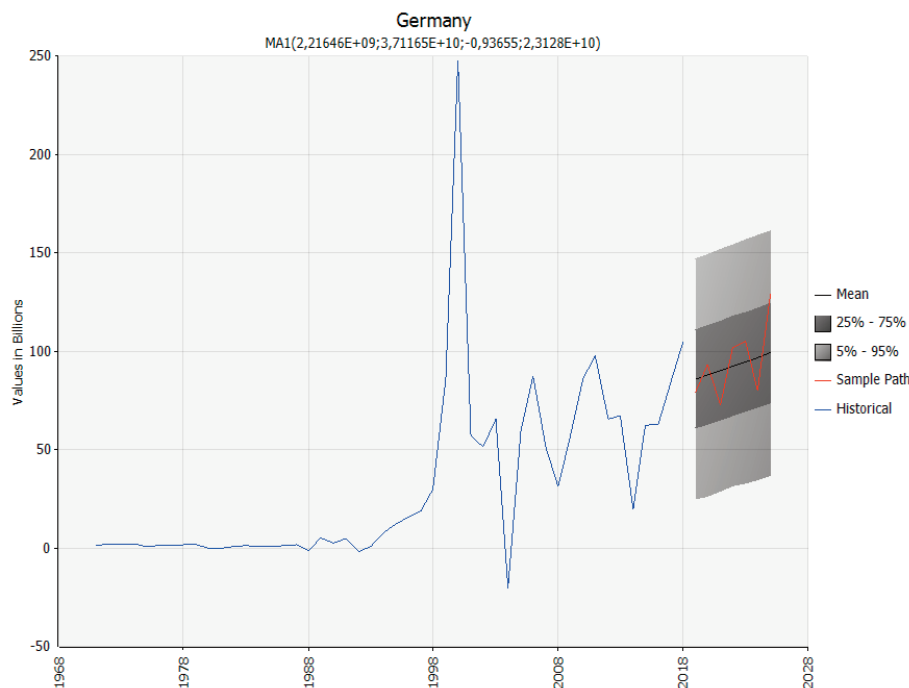


Figure 4: Germany FDI time series model forecast

The forecast of FDI time series for Germany is given in Figure 4. FDI time series in Germany are best fitted with ARIMA(0,1,1), showing the trend of growth for the future period. More than 2,000 foreign companies have been reported to have opened up businesses in Germany in 2018. This seems to be a new record, and is much due to the fact that some British companies are investing in Germany in response to the threat of Brexit (GTAI, 2019b). Around 60% of all FDI in Germany originate from within the EU and 9% from European non-EU countries, while investments from outside the EU continue to grow (19% North America, 11% Asia). For example, Germany is the world's largest recipient of new Chinese FDI projects (GTAI, 2019a). Regarding the investment sectors, in 2017, the major among them were manufacturing (27.7%), wholesale and retail (10.7%), financial and insurance activities (9.6%), ICT (6.6%), etc. (UNCTAD, 2019).

In Serbia there were 160, while Germany boasted with 691 greenfield investments (UNCTAD, 2019). However, German FDI net inflows show the similar trend of flow such as Serbian and North Macedonian. The main

strengths of Serbia, regarding attracting FDI, are: positive, liberal business environment (e.g., lowest corporate tax rate in Europe of 10%); public sector reforms (e.g., various agreements reached with the IMF and the EU); young, low-cost workforce, that is well trained and multilingual (nearly half of the population are fluent in English); comfortable level of foreign currency reserves (UNCTAD, 2019). The main strengths of Germany are: strategic location in the centre of Europe; political stability; large population; developed infrastructure; strong manufacturing basis (almost a third of the GDP); strong exports (high range products and diversified clients); advanced technology and expertise; highly qualified work force (UNCTAD, 2019). Although quite different strengths of Serbia and Germany in attracting the FDI, they undoubtedly lead towards the same direction.

Conclusion

Attracting the FDI inflows in the countries of Southeast Europe has theretofore been recognized as an important issue (Kersan-Skabic, 2013). The suggestions and implications of how to achieve so are numerous (Apostolov, 2017; Estrin & Uvalic, 2014; Nikoloski, 2017). However, this largely depends on politics, economic stability, law, etc. The mild growth in FDI inflows in Serbia and North Macedonia is undoubtedly a decisive and significant result. Recently, many headlines could be seen, such as “Serbia tops global greenfield investment index” (Ralev, 2019) or “Serbia’s manufacturing industry drives record foreign investment” (Financial Times, <https://www.ft.com/content/c87ee832-cd94-11e9-b018-ca4456540ea6>) (Shehadi & Irwin-Hunt, 2019). Anyhow, it is highly encouraging that trends of future Serbian FDI seem to exhibit the similar behaviour as FDI of a stronger economy such as Germany.

Future directions of the study might cover analysis of factors influencing FDI inflows, both in a positive and a negative directions.

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REFERENCES

- [1] Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control*, 19(6), 716–723. DOI:10.1109/TAC.1974.1100705
- [2] Apostolov, M. (2017). The impact of FDI on the performance and entrepreneurship of domestic firms. *Journal of International Entrepreneurship*, 15(4), 390–415. DOI:10.1007/s10843-017-0205-4
- [3] Ayamba, E. C., Haibo, C., Abdul-Rahaman, A.-R., Serwaa, O. E., & Osei-Agyemang, A. (2020). The impact of foreign direct investment on sustainable development in China. *Environmental Science and Pollution Research*. DOI:10.1007/s11356-020-08837-7
- [4] Baek, J. (2016). A new look at the FDI–income–energy–environment nexus: Dynamic panel data analysis of ASEAN. *Energy Policy*, 91, 22–27. DOI:10.1016/J.ENPOL.2015.12.045
- [5] Bailey, N. (2018). Exploring the relationship between institutional factors and FDI attractiveness: A meta-analytic review. *International Business Review*, 27(1), 139–148. DOI:10.1016/j.ibusrev.2017.05.012
- [6] Baldwin, R. E. (2016). *The Great Convergence: Information Technology and the New Globalization*. Belknap Press.
- [7] BBC News. (2019). Montenegro profile - Timeline. Retrieved August 10, 2019, from <https://www.bbc.com/news/world-europe-17670524>
- [8] Bollerslev, T. (1986). Generalized autoregressive conditional heteroskedasticity. *Journal of Econometrics*, 31(3), 307–327. DOI:10.1016/0304-4076(86)90063-1
- [9] Box, G., & Jenkins, G. (1970). *Time Series Analysis: Forecasting and Control*. San Francisco: Holden-Day.
- [10] Brooks, D., & Hill, H. (2004). *Managing FDI in a Globalizing Economy*. Palgrave Macmillan UK.
- [11] Brouters, L. E., Werner, S., & Wilkinson, T. J. (1996). The Aggregate Impact of Firms' FDI Strategies on the Trade Balances of Host Countries. *Journal of International Business Studies*, 27(2), 359–373. DOI:10.1057/palgrave.jibs.8490139
- [12] Bruno, R. L., Campos, N. F., & Estrin, S. (2018). Taking stock of firm-level and country-level benefits from foreign direct investment. *Multinational Business Review*, 26(2), 126–144. DOI:10.1108/MBR-02-2018-0011
- [13] Dobrota, M., Zornić, N., & Marković, A. (2019). Modeling FDI Time Series: Evidence from Emerging Markets. In *Proceedings of the 46th International Symposium on Operational Research Sym-Op-Is 2019* (pp. 725–730). Kladovo, Serbia, 15 - 18 September. ISBN: 978-86-7680-363-7.

- [14] Dudic, B., Dudic, Z., Smolen, J., & Mirkovic, V. (2018). Support for foreign direct investment inflows in Serbia. *Economic Annals-XXI*, 169(1–2), 4–11. DOI:10.21003/ea.V169-01
- [15] Engle, R. F. (1982). Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation. *Econometrica*, 50(4), 987. DOI:10.2307/1912773
- [16] Estrin, S., & Uvalic, M. (2014). FDI into transition economies. *Economics of Transition*, 22(2), 281–312. DOI:10.1111/ecot.12040
- [17] Estrin, S., & Uvalic, M. (2016). Foreign Direct Investment in the Western Balkans: What Role Has it Played During Transition? *Comparative Economic Studies*, 58(3), 455–483. <https://doi.org/10.1057/ces.2016.10>
- [18] European Central Bank. (2019). The euro outside Europe. Retrieved August 15, 2019, from https://www.ecb.europa.eu/explainers/show-me/html/euro_outside_europe.en.html
- [19] Fadhil, M. A., & Almsafir, M. K. (2015). The Role of FDI Inflows in Economic Growth in Malaysia (Time Series: 1975-2010). *Procedia Economics and Finance*, 23, 1558–1566. DOI:10.1016/S2212-5671(15)00498-0
- [20] Ganic, M. (2019). Does Foreign Direct Investment (FDI) Contribute to Poverty Reduction? Empirical Evidence from Central European and Western Balkan Countries. *Scientific Annals of Economics and Business*, 66(1), 15–26. DOI:10.2478/saeb-2019-0003
- [21] Garsous, G., Kozluk, T., & Dlugosch, D. (2020). Do Energy Prices Drive Outward FDI? Evidence from a Sample of Listed Firms. *The Energy Journal*, 41(3). DOI:10.5547/01956574.41.3.ggar
- [22] GTAI. (2019a). European Stocks at the Top. Retrieved May 1, 2020, from <https://www.gtai.de/gtai-en/invest/business-location-germany/fdi/fdi-data-77048#>
- [23] GTAI. (2019b). FDI in Germany. Retrieved May 1, 2020, from <https://www.gtai.de/gtai-en/invest/business-location-germany/fdi>
- [24] Gunther, J., & Kristalova, M. (2016). No Risk, No Fun? Foreign Direct Investment in Central and Eastern Europe. *Intereconomics*, 51(2), 95–99. DOI:10.1007/s10272-016-0583-1
- [25] Hanif, I., Faraz Raza, S. M., Gago-de-Santos, P., & Abbas, Q. (2019). Fossil fuels, foreign direct investment, and economic growth have triggered CO2 emissions in emerging Asian economies: Some empirical evidence. *Energy*, 171, 493–501. DOI:10.1016/j.energy.2019.01.011
- [26] Hastings, W. K. (1970). Monte Carlo sampling methods using Markov chains and their applications. *Biometrika*, 57(1), 97–109. <https://doi.org/10.1093/biomet/57.1.97>
- [27] Hers, J., Witteman, J., Rougoor, W., & van Buiren, K. (2018). *The Role of Investment Hubs in FDI, Economic Development and Trade*. Brussels.
- [28] IMF. (2020). Balance of Payments. Retrieved April 28, 2020, from <https://data.imf.org/?sk=7A51304B-6426-40C0-83DD-CA473CA1FD52>
- [29] Jere, S., Kasense, B., & Chilyabanyama, O. (2017). Forecasting Foreign Direct Investment to Zambia: A Time Series Analysis. *Open Journal of Statistics*, 07(01), 122–131. DOI:10.4236/ojs.2017.71010
- [30] Jirasavetakul, L.-B. F., & Rahman, J. (2018). Foreign Direct Investment in New Member State of the EU and Western Balkans: Taking Stock and Assessing Prospects (IMF Working Papers No. WP/18/187). Washington, DC.
- [31] Jones, J., Serwicka, I., & Wren, C. (2020). Motives for foreign direct investment location in Europe and EU enlargement. *Environment and Planning A: Economy and Space*, 0308518X2091650. DOI:10.1177/0308518X20916503
- [32] Kersan-Skabic, I. (2013). Institutional Development as a Determinant of FDI Attractiveness in Southeast Europe. *Drustvena Istrazivanja*, 22(2), 215–235. DOI:10.5559/di.22.2.01
- [33] Kurtovic, S., Maxhuni, N., Halili, B., & Talovic, S. (2020). The determinants of FDI location choice in the Western Balkan countries. *Post-Communist Economies*, 1–22. DOI:10.1080/14631377.2020.1722584
- [34] Lacal-Arántegui, R. (2019). Globalization in the wind energy industry: contribution and economic impact of European companies. *Renewable Energy*, 134, 612–628. <https://doi.org/10.1016/j.renene.2018.10.087>
- [35] Lee, I. H. (Ian), Hong, E., & Makino, S. (2020). The effect of non-conventional outbound foreign direct investment (FDI) on the domestic employment of multinational enterprises (MNEs). *International Business Review*, 29(3), 101671. DOI:10.1016/j.ibusrev.2020.101671
- [36] Li, C., & Tanna, S. (2019). The impact of foreign direct investment on productivity: New evidence for developing countries. *Economic Modelling*, 80, 453–466. DOI:10.1016/j.econmod.2018.11.028
- [37] Liu, Q., Wang, S., Zhang, W., Zhan, D., & Li, J. (2018). Does foreign direct investment affect environmental pollution in China's cities? A spatial econometric perspective. *Science of The Total Environment*, 613–614, 521–529. DOI:10.1016/j.scitotenv.2017.09.110
- [38] Maiga, O. A., Hu, X., Mekongcho, T. M., & Coulibaly, S. K. (2018). Effects of Economic Globalization, Foreign Capital Influx on Export in ECOWAS. *Global Economy Journal*, 18(4), 20180055. <https://doi.org/10.1515/gej-2018-0055>
- [39] Neuhaus, M. (2006). *The Impact of FDI on Economic Growth*. Physica-Verlag HD. DOI:10.1007/3-7908-1735-X

- [40] Nikoloski, D. (2017). The impact of Foreign Direct Investments on employment: the case of the Macedonian manufacturing sector. *Eastern Journal of European Studies*, 8(2), 147–165.
- [41] Patterson, N., Montanjees, M., Motala, J., & Cardillo, C. (2004). Foreign Direct Investment. Trends, Data, Availability, Concepts, and Recording Practices. International Monetary Fund.
- [42] Peres, M., Ameer, W., & Xu, H. (2018). The impact of institutional quality on foreign direct investment inflows: evidence for developed and developing countries. *Economic Research-Ekonomska Istraživanja*, 31(1), 626–644. DOI: 10.1080/1331677X.2018.1438906
- [43] Piperopoulos, P., Wu, J., & Wang, C. (2018). Outward FDI, location choices and innovation performance of emerging market enterprises. *Research Policy*, 47(1), 232–240. DOI:10.1016/j.respol.2017.11.001
- [44] Radenkovic, I. (2016). *Foreign Direct Investments in Serbia*. Beograd: Rosa Luxemburg Stiftung Southeast Europe.
- [45] Ralev, R. (2019). Serbia tops global greenfield investment index, Montenegro ranks 2nd - FT. SeeNews. Retrieved from <https://seenews.com/news/serbia-tops-global-greenfield-investment-index-montenegro-ranks-2nd-ft-665242>
- [46] Rivoli, P., & Salorio, E. (1996). Foreign Direct Investment and Investment under Uncertainty. *Journal of International Business Studies*, 27(2), 335–357. DOI:10.1057/palgrave.jibs.8490138
- [47] Ross, S. M. (2014). Variations on Brownian Motion. In *Introduction to Probability Models* (11th ed., pp. 612–614). Amsterdam: Elsevier.
- [48] Sabir, S., Rafique, A., & Abbas, K. (2019). Institutions and FDI: evidence from developed and developing countries. *Financial Innovation*, 5(1), 8. DOI:10.1186/s40854-019-0123-7
- [49] Sadni-Jallab, M., Gbakou, M., & Sandretto, R. P. (2008). Foreign Direct Investment, Macroeconomic Instability and Economic Growth in MENA Countries. *SSRN Electronic Journal*. DOI: 10.2139/ssrn.1170764
- [50] Salahuddin, M., Alam, K., Ozturk, I., & Sohag, K. (2018). The effects of electricity consumption, economic growth, financial development and foreign direct investment on CO2 emissions in Kuwait. *Renewable and Sustainable Energy Reviews*, 81, 2002–2010. DOI:10.1016/j.rser.2017.06.009
- [51] Schwarz, G. (1978). Estimating the Dimension of a Model. *The Annals of Statistics*, 6(2), 461–464. DOI:10.1214/aos/1176344136
- [52] Shahbaz, M., Nasir, M. A., & Roubaud, D. (2018). Environmental degradation in France: The effects of FDI, financial development, and energy innovations. *Energy Economics*, 74, 843–857. DOI:10.1016/j.eneco.2018.07.020
- [53] Shehadi, S., & Irwin-Hunt, A. (2019, September 3). Serbia's manufacturing industry drives record foreign investment. *Financial Times*. Retrieved from <https://www-ft-com.tudelft.idm.oclc.org/content/c87ee832-cd94-11e9-b018-ca4456540ea6>
- [54] Shi, H., Zhang, X., Su, X., & Chen, Z. (2012). Trend Prediction of FDI Based on the Intervention Model and ARIMA-GARCH-M Model. *AASRI Procedia*, 3, 387–393. DOI:10.1016/j.aasri.2012.11.061
- [55] Shimbov, B., Alguacil, M., & Suárez, C. (2019). Export Structure Upgrading and Economic Growth in the Western Balkan Countries. *Emerging Markets Finance and Trade*, 55(10), 2185–2210. DOI:10.1080/1540496X.2018.1563538
- [56] Stojanovic, D., Ilic, B., & Mihajlovic, D. (2017). Sustainable Development in Serbia in Correlations With Foreign Direct Investment. In *Proceedings of the 21st International Scientific Conference on Economic and Social Development* (pp. 101–108).
- [57] Teixeira, A. A. C., & Loureiro, A. S. (2019). FDI, income inequality and poverty: a time series analysis of Portugal, 1973–2016. *Portuguese Economic Journal*, 1–47. DOI:10.1007/s10258-018-00152-x
- [58] Uddin, M., Chowdhury, A., Zafar, S., Shafique, S., & Liu, J. (2019). Institutional determinants of inward FDI: Evidence from Pakistan. *International Business Review*, 28(2), 344–358. DOI:10.1016/j.ibusrev.2018.10.006
- [59] Ufimtseva, A. (2020). The Rise of Foreign Direct Investment Regulation in Investment recipient Countries. *Global Policy*, 11(2), 222–232. DOI:10.1111/1758-5899.12788
- [60] UNCTAD. (2019). *World Investment Report 2019, Special Economic Zones*. New York. Retrieved from https://unctad.org/en/PublicationsLibrary/wir2019_en.pdf
- [61] United Nations. (2019). *World Investment Report 2019*. Geneva.
- [62] Vega-Nieva, D. J., Nava-Miranda, M. G., Calleros-Flores, E., López-Serrano, P. M., Briseño-Reyes, J., López-Sánchez, C., ... Ruiz-González, A. D. (2019). Temporal patterns of active fire density and its relationship with a satellite fuel greenness index by vegetation type and region in Mexico during 2003–2014. *Fire Ecology*, 15(1), 28. DOI:10.1186/s42408-019-0042-z
- [63] Wang, X., & Luo, Y. (2020). Has technological innovation capability addressed environmental pollution from the dual perspective of FDI quantity and quality? Evidence from China. *Journal of Cleaner Production*, 258. DOI:10.1016/j.jclepro.2020.120941
- [64] Whittle, P. (1951). *Hypothesis testing in times series analysis*. Uppsala: Almqvist & Wiksells Boktryckeri AB.

[65] Wood, M. c. (1997). Participation of Former Yugoslav States in the United Nations and in Multilateral Treaties. Max Planck Yearbook of United Nations Law, 1, 231–257. Retrieved from https://www.mpil.de/files/pdf1/mpunyb_wood_1.pdf

[66] World Bank. (2020). Foreign direct investment, net inflows. Retrieved April 28, 2020, from <https://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD>

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