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EVALUATION OF COUNTRY RISKS ON FOREIGN DIRECT INVESTMENT IN MIDDLE EAST COUNTRIES USING DATA ENVELOPMENT ANALYSIS (DEA): A CASE STUDY

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ABSTRACT:
THIS RESEARCH PAPER AIMS TO PROVIDE AN ASSESSMENT OF COUNTRY RISKS ON FOREIGN DIRECT INVESTMENT IN MIDDLE EAST COUNTRIES USING DATA ENVELOPMENT ANALYSIS (DEA).NOWADAYS, FORIEGN DIRECT INVESTMENT (FDI) HAS STRONG AFFECT TO RISK COUNTRY. MANY COUNTRIES CHECK THE COUNTRY RISK OF THAT TO UNDERSTAND THEY CAN PERFORM INVESTMENTSIN THAT COUNTRY OR NOT. THE AIM OF THIS RESEARCH STUDY IS FINDING ACCORDING TO COUNTRY RISK, HOW MUCH THEY CAN GET FDI AND EVALUATED THEY PERFORMANCE ABOUT IT IN THE MIDDLE EAST COUNTRIES. FIVE COUNTRIES HAVE BEEN SELECTED AND THEN THEY EVALUATED BY DATA ENVELOPMENT ANALYSIS (DEA) FOR FINDING THE BEST PERFORMANCE OF COUNTRIES FROM 2005 TO 2020. THE RESULT INDICATES THAT AMONG THESE COUNTRIES, EXCLUSIVELY TURKEY AND THE UNITED ARAB EMIRATES HAD OBTAINED BEST PERFORMANCE REGARDING ABSORBING FDI ACCORDING TO THEIR COUNTRY RISK.

KEY WORDS: DATA ENVELOPMENT ANALYSIS (DEA), COUNTRY RISK, FORIEGN DIRECT INVESTMENT (FDI), MIDDLE EAST COUNTRIES

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INTRODUCTION

Middle East include the following cluster of countries: Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, Yemen (parts of the Asian continent), Egypt (part of African continent), and Cyprus (part of European continent). Turkey, like Cyprus, is a transcontinental state, but in general the countries of the Middle East form a cluster that has as a point of reference the geographical position. The World Bank provides a representative classification in the following main categories according to income such as: low, lower-middle, upper-middle, high income based on World Bank Atlas method. According to World Bank official reports, in the case of the current 2022 fiscal year, low-income countries (economies) are defined as those with a GNI per capita, calculated using the World Bank Atlas method, of $1,045 or less in 2020. Moreover, lower middle-income countries (economies) are those with a GNI per capita between $1,046 and $4,095, while upper middle-income countries (economies) are those countries characterized by a GNI per capita between $4,096 and $12,695. In addition, high-income countries (economies) are represented by those with a GNI per capita of $12,696 or more.

Meldrum[7] analyzed the relationship between country risk and foreign direct investment. It was stated that the country risk as a result of political, economic and social factors reflects the general risk map of the country. Within the scope of determining and preventing deficiencies and imbalances that will create a risk factor in the expected return of the investment, it has divided the risks into groups in six main categories (economic risk, transfer risk, exchange rate risk, location or neighborhood risk, sovereign risk, political risk) based on the harmony of local economic policies and international politics. and described prevention methods. As a result, it was classified the risk effects of foreign direct investors according to the investment type. Moreover, Birau et al.[8] examined interesting aspects of the investment perspective and argued that higher volatility obviously implies the opportunity for greater but also much rapid financial returns.

Mohanty and Sahoo[9] examined how the government policies to reduce environmental pollution will affect the economic performance of India. It aimed to create a qualified macroeconomic performance (MEP) and eco-macroeconomic performance (Eco-MEP) index for the Indian economy, using the time series data from 1980-81 to 2015-16, with the Data Envelopment Analysis (DEA) method. The structure of the DEA model while calculating these indices; It was established in the direction of maximizing economic growth, employment rates and trade terms, minimizing the inflation rate, fiscal deficit and pollution. According to the index scores; The best and worst performing years have emerged in the Indian economy and it has been concluded that these years are in parallel with the negative events in the economy. In the last part of the study; ARDL Bounds Testing method was used to test the consistency of the indices.

Shoko[10] presented a macro-scale risk classification for the twelve countries in the South African region to Turkish investors who want to invest. For this purpose, which will ensure

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[8] Birau, R., Trivedi, J., Spulbar, C. (2021) Estimating Volatility and Investment Risk: An Empirical Case Study for NIFTY MIDCAP 50 Index of National Stock Exchange (NSE) in India, "Ovidius" University Annals, Economic Sciences Series, Volume XXI, Issue 1 /2021, 691-696

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the effective evaluation of countries; From 2005 to 2012, foreign direct investment stocks per capita trends, gross domestic product per capita trends, total reserves in months of imports, total tax rate as percentage of commercial profits, inflation, government debt to GDP ratio, threat to invested property Three Data Envelopment Analysis (DEA) methods, namely Super BCC-I, Super BCC-O and Super SBM-V, were used for data on variables. According to the ranking results of the achieved productivity scores; Advice was given to countries on how to make the most appropriate investment, and Botswana, the country with the lowest macro risk for foreign direct investment purposes, was selected in the most convenient position to invest. On the other hand, Meher et al.[11] investigated the complex implications of ESG factors, such as Environment, Society and Governance for sustainable investment.

Badea et al.[12] examined the relationship between country risk and foreign direct investment in ten developing countries in the Central and Eastern European regions with a bilateral approach. Within the scope of this research; the seasonally adjusted quarterly Economic Sentiment Indicator, Industrial Confidence Indicator, Services Confidence Indicator, Consumer Confidence Indicator, GDP and the CDS Price for Sovereign Debt criteria are economic; Political Stability, Government Effectiveness, Rule of Law and Control of Corruption evaluated the criteria based on annual market data. In the evaluation phase; A stepwise panel regression approach and a one-lag panel VAR methods were used. According to the results; GDP and labor cost from economic actors, Government Effectiveness and Control of Corruption from market factors play an active role on foreign direct investors.

Mumtaz and Smith[13] examined developing and emerging economies from 26 countries (Asia), 24 countries (Africa) and 17 countries (Americas). The study investigated the reasons for China's Outward Foreign Direct Investment (OFDI) between 2006 and 2015 using a robust pooled data estimation (ROLS), a fixed effects model (FEM), a random effects model (REM) approximation and the Least Squares Regression approach. Although the results of the research show a distinction according to the regions; On the other hand, factors such as economic size, market opportunities, cost advantages arising from low wages, country risk and geographical location affect China's Outward Foreign Direct Investment activity. Meher et al.[14] highlighted the fact that the most important aspect for an investor is to maximize the yields on investments.

LITERATURE REVIEW

Türedi[15] investigated the effects of corruption and country risk on foreign direct investment inflows of 49 developing countries between 2002 and 2015. Inflation, population, GNP, trade deficit, physical capital, corruption control and rule of law indices were considered as variables in the study, and the relationship between variables was examined

[11] Meher, B.K., Hawaldar, I.T., Mohapatra, L., Spulbar, C., Birau, R. (2020) The Effects of Environment, Society and Governance Scores on Investment Returns and Stock Market Volatility, International Journal of Energy Economics and Policy, 10(4), 1-6, DOI: https://doi.org/10.32479/ijeep.9311

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with static and dynamic panel data analysis. It has been concluded that the decrease in corruption, the decrease in country risk, economic and political risk levels have an accelerating effect on foreign direct investment inflows; In this direction, recommendations were made to developing countries that could attract foreign direct investment inflows.

Rafat and Farahani[16] studied the political, country and financial risk relationship of foreign direct investment, which has a critical importance in economic growth strategies. According to the 12 different political risk indexes provided by the International Country Risk Guide (ICRG), such as government stability, internal and external conflict, corruption, military policies, ethnic and religious tensions, democratic accountability and the quality of bureaucracy; Iran time series data from 1985 to 2016 were analyzed using the Wu-Hausman test and the two-stage least square approach. It was seen that the political risk indices categorized according to the results of the study have an undeniable effect on foreign direct investment flows; such that instability, bureaucracy and conflict in general slowed the performance of investment flows in the long term.

Zhang et al.[17] investigated the effect of governments European Partnership Energy and Environment (EPEE) activities on foreign direct investors in order to have an ecological civilization. Within the scope of this research; the output-oriented Data Envelopment Analysis (DEA) scale return model was chosen as the method to measure the effectiveness of environmental protection expenditures of city prefectures in China between 2007 and 2016. While the ratio of expenditures to regional GNP was taken as input data, wastewater treatment rate, sulfur dioxide and nitrogen oxide removal rate, industrial smoke and domestic garbage rate were included in the analysis as output data set. In the last 10 years, it has been concluded that the quality of governments' expenditures on environmental protection has increased and thus foreign direct investment inflows have been positively affected.

Doytch[18] have been dividing 117 countries from 1984 to 2011 into low, middle and high income groups according to their income distribution, using the 'World Bank Atlas' method; studied the depletion rate of bioproductive physical areas and the effect on foreign direct investment inflows. Calculations were made based on the Production, Consumption, Import and Export Ecological Footprint (EF) indicator of foreign direct investment flow in six different sectors, namely mining, production, financial and non-financial services. These calculations; It was carried out with dynamic panel data analysis, which includes the Environmental Kuznets Curve (EKC) and varies according to the development status of the countries.

Islam et al.[19] examined the relationship between financial development and foreign direct investment inflows by Principal Component Analysis (PSA) method in 79 Belt and Road Initiative (BRI) member countries between 1999 and 2017 under the important regulatory role of quality institutions. Foreign direct investment stock per capita, financial developments, per capita GDP, consumer price index, domestic investment, openness to trade, infrastructure and population parameters were chosen as variables. In addition to these,

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for the Robustness Check of the study; political risk indicators, development in financial markets and financial institutions are included in the scope of alternative human capital proxy analysis. As supported by the Robustness Check, it has been concluded that financial development and quality institutions have a significant impact on foreign direct investments.

Mohanty et al.[20] investigated the relationship of foreign direct investment by constructing a durable macroeconomic performance index of the Indian economy using the Data Envelopment Analysis method. While creating the macroeconomic performance (MEP) index for the research, using five economic indicators such as economic growth, employment rate, terms of trade, inflation rate and fiscal deficit for the period from 1980-1981 to 2018-2019; Eco-MEP index was calculated by adding environmental factors such as pollution and climate change. In the light of these indices and environmental factors, the relationship between foreign direct investment inflows was examined with the Autoregressive Distributed Log (ARDL) bounds test approach. Research results; It has been shown that foreign direct investments cannot be explained only by economic indicators, and environmental parameters are also taken into account by investors.

Sutherland et al.[21] The Belt and Road Initiative (BRI) policies and institutional fragility; They studied how it affects foreign direct investment in China. Within the scope of this study, Hausman test and generalized least squares(GLS) models approach of investment flows data between 2003-2017 were used. All foreign direct investment project data, in which China's capital exceeds 10%, was taken as the dependent variable in the analysis. The independent variables are based on political risk measures commonly included in the studies, such as corruption control, political stability, rule of law, and government responsibility. Results; It shows that China's efforts to encourage foreign direct investments have increased with the effect of BRI policies and institutional fragility.

Tang and Buckley[22] analyzed 64 empirical publications containing 52,229 property decisions regarding the measurement of the relationship between country risk and foreign ownership strategy, and aimed to reveal the connection of official and informal institutions in the country with this relationship. Production, SME and international data were controlled considering effects such as institutional factors, methodological artifacts and potential publication bias. Legal proceedings, investor protection, manufacturing industry, international experience, published work and daily impact factor are the variables covered in the research. After all; The positive effects of politicians' institutional constraints and country risk tendencies were obtained with these analyzes, but the negative effects of their association were reached.

Wang and Lee[23], based on the fact that as the risk level in foreign direct investments increases, income inequality gradually deteriorates and the country risk decreases; From 1998 to 2014, they applied panel data analysis method to investigate the relationship between these three variables in 60 countries. While income inequality measured with the Gini Coefficient

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was included in the model as a dependent variable, foreign direct investment, per capita GDP, population, trade deficit, unemployment rate and financial developments were added as explanatory variables to strengthen the model. Since the countries included in the study generally have a low country risk, this data was included in the model as an accompanying variable. As a result, it has been tried to determine a more objective framework for foreign direct investment with the variables taken into account.

RESEARCH METHODOLOGY AND EMPIRICAL RESULTS

DEA is a kind of linear parametric programming which measures the efficiency of decision-making units (DMUs) according to number of inputs and outputs[24]. The results of this method is more reliable than some other methods[25].

DEA is a simple benchmarking method, which rates entities according to their ability to maximize output or minimize input. Mehdiabadi et al.[26] argued that "emerging technologies have opened the door to a range of applications and inter-industrial collaborations". Many models of DEA models are existed which are input-oriented or output-oriented models or BCC or CCR models.

The BCC model is used as:

$$
\begin{aligned}
&Min \quad \theta \\
&s.t. \quad \theta X_p - \sum_{j=1}^{n} \lambda_j X_j \geq \mathbf{0}, \\
&\qquad \sum_{j=1}^{n} \lambda_j Y_j \geq Y_p, \\
&\qquad \sum_{j=1}^{n} \lambda_j = 1, \\
&\qquad \lambda_j \geq 0, \qquad j = 1, \ldots, n.
\end{aligned}
$$

and the dual of this model is the following:

$$
\begin{aligned}
&Max \quad U^t Y_p + u_0 \\
&s.t \quad V^t X_p = 1, \\
&\qquad U^t Y_j - V^t X_j + u_0 \leq \mathbf{0}, \qquad j = 1, \ldots, n, \\
&\qquad U \geq \mathbf{0}, \quad V \geq \mathbf{0}.
\end{aligned}
$$

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The CCR model is the following:

$$Min \quad \theta$$

$$s.t. \quad \theta X_p - \sum_{j=1}^{n} \lambda_j X_j \geq \mathbf{0},$$

$$\sum_{j=1}^{n} \lambda_j Y_j \geq Y_p,$$

$$\lambda_j \geq 0, \qquad j = 1, \ldots, n.$$

In the following paragraphs we will analyze relevant aspects regarding data gathering. Five countries in the Middle East have been chosen for this research. These selected countries are the following: Bahrain, Iran, Qatar, Turkey and the United Arab Emirates (UAE).

Then the information of country risk according to OECD scale is extracted from 2005 to 2020. The rate of country risk is classified by rank from one (the lowest risk) to seven (the highest risk). Then the data of FDI from these countries are filled up.

The empirical results of our research study are presented in the following paragraphs. First according to BCC model the data have been computed according to DEA software.

The description of data is provided in the following table:

Table 1. Data description of methods

Name	Average	Sum	Variance	Standard deviation	Max	Min
Country risk 2005	0.356	1.78	0.0155	0.1247	0.5	0.2
Country risk 2006	0.39	1.95	0.0184	0.1356	0.5	0.2
Country risk 2007	0.382	1.91	0.0217	0.1473	0.5	0.16
Country risk 2008	0.382	1.91	0.0217	0.1473	0.5	0.16
Country risk 2009	0.344	1.72	0.0199	0.1409	0.5	0.14
Country risk 2010	0.31	1.55	0.0139	0.1178	0.5	0.14
Country risk 2011	0.298	1.49	0.0131	0.1144	0.5	0.16
Country risk 2012	0.294	1.47	0.0143	0.1194	0.5	0.14
Country risk 2013	0.294	1.47	0.0143	0.1194	0.5	0.14
Country risk 2014	0.254	1.27	0.0042	0.0647	0.33	0.14
Country risk 2015	0.288	1.44	0.014	0.1182	0.5	0.14
Country risk 2016	0.288	1.44	0.014	0.1182	0.5	0.14
Country risk 2017	0.292	1.46	0.0129	0.1134	0.5	0.16

Country risk 2018	0.292	1.46	0.0129	0.1134	0.5	0.16
Country risk 2019	0.292	1.46	0.0129	0.1134	0.5	0.16
Country risk 2020	0.272	1.36	0.0151	0.123	0.5	0.16
Amount of FDI 2005	5473.7588	27368.7938	17063287.9689	4130.7733	10899.9319	1048.6702
Amount of FDI 2006	8344.6845	41723.4226	49875281.5881	7062.2434	20185	2317.5385
Amount of FDI 2007	8772.7094	43863.5472	65903819.7794	8118.1168	22047	912.234
Amount of FDI 2008	6662.1769	33310.8843	44586373.9858	6677.3029	19851	1979.988
Amount of FDI 2009	4216.9254	21084.6272	12210964.344	3494.419	8585	257.1809
Amount of FDI 2010	5271.3846	26356.9228	11226834.7619	3350.6469	9085	155.8511
Amount of FDI 2011	5721.7471	28608.7353	33447559.2938	5783.3865	16143	98.4043
Amount of FDI 2012	5982.8955	29914.4776	25149363.7979	5014.9141	13745	395.8791
Amount of FDI 2013	5832.8396	29164.1979	26070755.6403	5105.953	13461	-840.385
Amount of FDI 2014	5741.0066	28705.033	26759962.4394	5173.0032	12969	1040.385
Amount of FDI 2015	6142.5349	30712.6745	49981263.3736	7069.7428	18976	64.8936
Amount of FDI 2016	5529.005	27645.0251	27556101.9452	5249.3906	13651	243.3511
Amount of FDI 2017	5750.0552	28750.2758	18064336.025	4250.216	10965	985.989
Amount of FDI 2018	5013.2555	25066.2776	32040709.9424	5660.4514	12840	-2186.2637
Amount of FDI 2019	5472.2704	27361.3518	53703563.6007	7328.2715	17874.6594	-2812.6374
Amount of FDI 2020	5535.8378	27679.1888	62599462.3253	7911.9822	19884.4687	-2433.9288

Source: Researchers' own computation

Then the model based on BCC model has been run. When the efficiency of DMUs is equal to one (100 npercent) it means that these DMUs are eficient otherwise they are inefficient.

Table 2. The result of DEA method

Name	Efficiency	Percentage of efficiency
DMU 1	0.277	28
DMU 2	0.8174	82
DMU 3	0.7887	79
DMU 4	1	100
DMU 5	1	100

Source: Researchers' own computation

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Also this model shows which of these DMUs are references for other DMUs.

Table 3. Number of DMs references

Name	DMU 1	DMU 2	DMU 3	DMU 4	DMU 5
DMU 1				√	
DMU 2				√	
DMU 3				√	
DMU 4				√	
DMU 5					√
Number of references	0	0	0	4	1

Source: Researchers' own computation

Table above shows DMU 4 has been references fourth time and DMU five referenced one time.

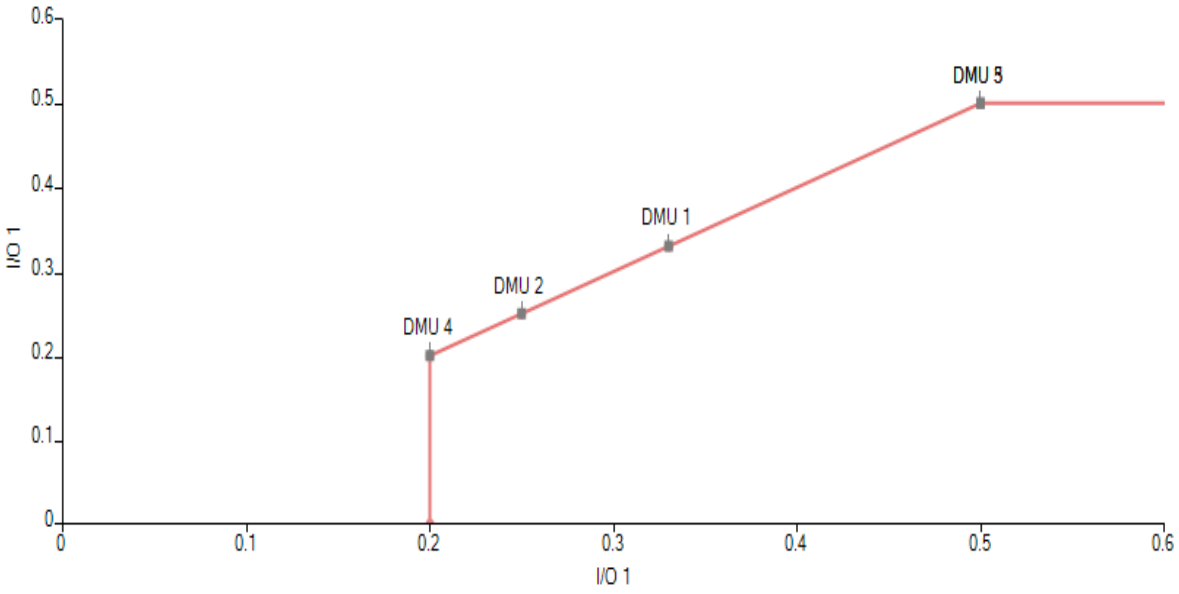

Figure 1. The performance of DMUs
Source: Researchers' own computation

CONCLUSION

This research study intends to provide an evaluation of country risks on foreign direct investment in Middle East countries using Data Envelopment Analysis (DEA) based on a case study. Data Envelopment Analysis (DEA) is a mathematical programming method. For instance, Data Envelopment Analysis (DEA) can be used to measure changes in both technical efficiency and relative efficiency if a significant panel of data is available. The result pointed out that among these middle east countries, during these times Turkey and UAE countries had best performance for absorbing FDI thanks to low countries risk. Bahrain country could not absorb FDI according to country risk. Turkey references forth time which is shown it had the best performance among them.

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