

An Error Correction Model Analysis of the Determinants of Foreign Direct Investment: Evidence from SAUDI ARABIA

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Abstract

The aim of this study was to gain insights into the factors affecting Foreign Direct Investment (FDI) inflow in Saudi Arabia by applying the cointegration and error-correction model on annual data over the period 2000-2020. The results of the ARDL bound test of co-integration displayed the existence of the long-run equilibrium in the model. The long-run regression results report that openness, government spending and economic stability are statistically significant. The coefficient of exports and market size is positive and both of them are not significant. However, in the short-run, our evidence shows that exports, openness and economic stability are statistically significant at 1%. The findings of the study are important for Saudi economic policy makers to undertake effective policies that can promote and attract foreign direct investments to diversify sources of income and boost economic growth.

Keywords

FDI, Determinants, Kingdom's Vision 2030, ARDL Approach, Cointegration, Saudi Arabia

1. Introduction

All countries have come increasingly to regard foreign direct investment (FDI) as a source of economic development and employment. Since late 1990s, the world has witnessed a significant increase in the inflows of global capital movement. The ability of countries to attract foreign direct investments has become an essential issue today. FDI triggers technology spillovers, assists human capital formation, contributes to international trade integration, helps create a more

competitive business environment and enhances enterprise development. Many studies have shown that foreign capital inflow helps to cover the domestic saving gap and provide access to the modern technology that promotes efficiency and generates new production opportunities.

Saudi Arabia is a large host country to foreign direct investment (FDI), especially when compared to the size of its economy. Saudi Arabia became a major FDI host country in the last decade. UNCTAD statistics (2013) indicate that FDI in Saudi Arabia increased from an annual average of \$251 million from 1990-1999, to \$772 million from 2000-2004, then jumped to \$24 billion in the period 2005-2011. Based on the Kingdom's Vision 2030, the Kingdom of Saudi Arabia acknowledged the importance of FDI in facilitating the growth of the country's economy and diversifying its source of incomes. A key element of the Vision 2030 strategy is the establishment of special economic zone (SEZs) offering fiscal and other incentives in competitive locations for promising sectors, among them ICT, logistics, tourism, and industrial and financial services. As part of Vision 2030 reforms, privatization is a key element underpinning the Vision 2030 goal of increasing the private sector's contribution to GDP from 40 percent to 65 percent by 2030. Moreover, the Saudi strategic development plan, Vision 2030, sets out the country's ambition to increase FDI from 3.8 percent of GDP to the international benchmark level of 5.7 percent of GDP by 2030.

The Ministry of Investment of Saudi Arabia (MISA), formerly the Saudi Arabian General Investment Authority (SAGIA), governs and regulates foreign investment inflows in the Kingdom, issues licenses to investors, and works to foster and promote investment environment in the economy. More recently, the Kingdom has issued new incentives in different fields to attract foreign investors i.e. Saudi Arabia adopted seven "Guiding Principles for Investment Policymaking", including non-discrimination, investment protection, investment sustainability, enhanced transparency, protection of public policy concerns, ease of entry for employees, and the transfer of knowledge and technology. According to [UNCTAD World Investment Report 2022](#), FDI inflows in Saudi Arabia increasing by 20% to USD 5.39 billion in 2020, up from USD 4.56 billion one year earlier and to USD 19.28 billion in 2021.

The main objective of this study is to examine the main determinants of FDI in Saudi Arabia by applying the cointegration model on annual data over the period 2000-2020. FDI is hypothesized to be determined by a number of explanatory variables namely market size, openness, economic stability, exports and government spending.

1.1. Research Problem

The great challenge facing the gulf countries as well as Saudi Arabia is the fluctuations of oil price. Dependence on oil as a major source of income is one of the biggest challenges facing the Saudi economy. Therefore, Saudi Arabia has to undertake major reform efforts to reduce commodity dependency. To facing these

challenges, Saudi Arabia is implementing Vision 2030 as strategic framework to diversify its economy, creating jobs, and moving to more balanced investment based

1.2. Research Objective

(FDI) has been regarded as an essential tool for development to the host countries. FDI is expected to have effects on gross capital formation, employment, productivity, economic growth, and development.

In this regard, it gets a great deal of attention in empirical studies.

1.3. The Main Objectives of This Study Are:

- To identify the role of FDI on economic development.
- To investigate the main determinants of FDI in Saudi Arabia.
- To identify the incentives and policies that attract FDI.
- To help economic policy makers to undertake the effective policies that can promote foreign investments to boost economic growth.

1.4. Data and Methodology

The methodology used in this study is descriptive and analytical. The study examines the main determinants of FDI in Saudi Arabia by applying the cointegration model on annual data over the period 2000-2020. Data on GDP, export and imports, inflation and government spending were collected from Saudi Arabia Monetary Authority (SAMA). Data on FDI were collected from World Development Indicator, World Bank, and UNCTAD statistics.

Variations in FDI are expected to be explained positively by variations in GDP, Openness, and exports and negatively by variations in government spending and inflation (used as proxy for economic stability). The Augmented Dickey Fuller (ADF) unit root test and Philips-Perron test are used to test whether a given time series is stationary or not. Also, error correction model (ECM) was used to verify short run dynamics with long-run equilibrium.

2. Literature Review

FDI inflows have in general been recognized as a source of economic growth and economic development in all countries. The Neoclassical Growth Model assumes that capital accumulation in an economy is important for determining economic growth.

Kadi (2017) studied the determinants of FDI in developing countries and their comparison with Saudi Arabia. His study shows that the most important drivers of FDI in Saudi Arabia were found to be the cost factors, market factors, infrastructure and technological factors, political and legal factors, and social and cultural factors.

Bengoa and Robles (2003) argue that although FID is positively related to

economic growth, the host country requires, however, adequate human capital, economic stability and liberalized markets to benefit from long-term capital flows. [Bouchoucha and Bakari \(2019\)](#) examined the impact of domestic investment and foreign direct investment on economic growth in Tunisia during the period 1976-2017. Their study shows that domestic investment and foreign direct investment have a negative effect on economic growth in the long-run. However, in the short run, he concludes that only domestic investment causes economic growth.

[Abdehag \(2021\)](#) undertook study to analyzed determinants of attracting foreign direct investment in Saudi Arabia during the period (1995-2020). He found that the most influential variable is the tax burden, as the more it decreased by 1%, the volume of foreign direct investment inflows increased by 41.6%. In her study of the impact of foreign direct investment (FDI) on Saudi Arabia, [Jawaher \(2015\)](#) found that FDI cuts the gap between domestic mobilized savings and desired investments, improves technological knowhow, and labor skills.

[Attia \(2018\)](#) investigated the impact of foreign direct investment one of the determinants of growth in Kingdom of Saudi Arabia in the Period From (2000-2017). The study concluded that foreign direct investment has direct and positive effect on economic growth in Saudi Arabia. [Al-Sadig \(2013\)](#) empirically examined the effects of outward FDI on domestic investment in developing countries using data from 121 developing and transition economies over the period 1990-2010. The study shows that FDI outflows negatively impact the rate of domestic investment. Al-Sadig concluded that the combination of domestic investment and foreign investment for production purposes could have different effects depending on the motivations of foreign investors. [Akhtar \(2000\)](#) investigated the determinants of FDI in Pakistan through multivariate regression analysis. His findings suggest that market size, exchange rates and relative interest rates are the main important factors for FDI inflows in Pakistan.

3. Model Speciation

Prior to conducting the cointegration test, the series are subjected to unit root tests to make sure that they are stationary. Based on model of determinants of foreign direct investment in Saudi Arabia over the period (2000-2020) we will use the following regression model.

According to the ARDL approach proposed, the existence of long run relationship could be tested using Equation (1):

$$\begin{aligned} \Delta fdi_t = & a_0 + \sum_{i=0}^r a_{1i} \Delta fdi_{t-i} + \sum_{i=0}^r a_{2i} \Delta EC_{t-i} + \sum_{i=0}^r a_{3i} \Delta ex_{t-i} \\ & + \sum_{i=0}^r a_{4i} \Delta open_{t-i} + \sum_{i=0}^r a_{5i} \Delta gov_{t-i} + \sum_{i=0}^r a_{6i} \Delta MZ_{t-i} \\ & + \gamma_1 \ln fdi_{t-1} + \gamma_2 \ln EC_{t-1} + \gamma_3 \ln ex_{t-1} + \gamma_4 \ln open_{t-1} \\ & + \gamma_5 \ln gov_{t-1} + \gamma_6 \ln MZ_{t-1} + \varepsilon t. \end{aligned} \quad (1)$$

And the Error Correction Model could be tested using Equation (2):

$$\begin{aligned} \Delta \ln fdi_t = & \delta_0 + \sum_{j=1}^p \delta_{1j} \Delta \ln fdi_{t-j} + \sum_{j=0}^q \delta_{2j} \Delta \ln EC_{t-j} + \sum_{j=0}^r \delta_{3j} \Delta \ln ex_{t-j} \\ & + \sum_{j=1}^p \delta_{4j} \Delta \ln open_{t-j} + \sum_{j=1}^p \delta_{5j} \Delta \ln gov_{t-j} + \sum_{j=1}^p \delta_{6j} \Delta \ln MZ_{t-j} \\ & + \delta_7 ECM_{t-1} + \nu_t. \end{aligned} \quad (2)$$

where;

FDI = foreign direct investment.

EC = economic stability.

ex = export.

open = openness of the economy.

gov = government expenditure.

MZ = market size.

$\gamma, \gamma_1, \gamma_2$ and $\gamma_3, \gamma_4, \gamma_5, \gamma_6$ are the long run coefficients.

$\delta_0, \delta_{1j}, \dots, \delta_{6j}$. represents the short run dynamics

ECM_{t-1} = Error Correction term .

The following variables in the empirical analysis are considered.

EC (Economic stability): Stable economy of a country is very important factor for FDI. Economic stability reduces fluctuations in the economy. In most cases, an economy with low and stable inflation is considered as stable, therefore, inflation as a proxy for economic stability.

MZ (market size): It is generally accepted that market size of host countries is one of the main determinants of FDI. GDP is considered as a proxy for market size in this study. Greater market size means higher demand for goods and services and thus attracts more FDI. Market size is expected to have positive effect on FDI.

OPEN (Openness of the economy): Export and imports determine openness of a host country. The ratio of the sum of imports and exports to GDP is considered as a proxy for trade openness. The sign of a coefficient of this variable is expected to be positive.

GOV (government spending): The government spending contributes negatively towards FDI. The sign of a coefficient of this variable is expected to be negative. The neo-classical school argues that increased government spending attributable to raising taxes or borrowing may slow FDI flows.

EX (export): An increase in exports is likely to lead to an increase in FDI. The sign of a coefficient of this variable is expected to be positive.

4. Empirical Results

4.1. Unit Root Tests

The study tests the variables for the time series properties of stationary using the Augmented Dickey-Fuller (ADF) test. The result of the unit root tests is presented in **Table 1**. The table indicates that the null hypothesis of a unit root cannot be rejected for all series for the given variables at their level. However, all

variables are stationary in the first-differenced data. i.e. the series are integrated of order one I (1).

Table 2 shows the unit root test proposed by Phillips and Perron (1990). The results resemble with the ADF test and with these tests we can proceed to the ARDL co-integration tests as all the variable are I (1).

4.2. Lag Selection Structure

Table 3 presents lag order selection result on the variables considered in this study. After finding the integrating order, the two-step ARDL co-integration procedure has been employed. The AIC, SBC and likelihood ratio (LR) criteria are utilized to select the optimal lag length of vector autoregressive (VAR). The lag length selection criteria of the VAR start with the specification of maximum lag of 2. An asterisk* indicates the selected lag from each column of the criterion statistic.

Table 1. ADF test results.

Variable	Intercept				Trend and Intercept			
	Level		First Difference		Level		First Difference	
	t-stat	p-value	t-stat	p-value	t-stat	p-value	t-stat	p-value
FDI	-2.092	0.249	-5.230*	0.000	0.075	0.944	-9.264*	0.000
EC	-1.548	0.489	-9.568*	0.000	-1.435	0.541	-9.568*	0.000
EX	-1.529	0.498	-4.826*	0.004	-3.801	0.039*	-4.803*	0.006
OPEN	-1.512	0.505	-3.217*	0.035	1.262	0.999	-4.393*	0.013
GOV	-0.911	0.761	-5.363*	0.000	2.591	0.287	-4.741*	0.008
MZ	-1.573	0.472	-6.171*	0.000	0.881	0.932	-6.458*	0.000

Critical value for the ADF statistic with an intercept but not a trend = -3.020 (5%); Critical value for the ADF statistic with an intercept and Trend = -3.673 (5%).

Table 2. Philips-Perron test results.

Variable	Intercept				Trend and Intercept			
	Level		First Difference		Level		First Difference	
	t-stat	p-value	t-stat	p-value	t-stat	p-value	t-stat	p-value
FDI	-1.591	0.468	-5.238*	0.000	-1.502	0.793	-5.071*	0.000
EC	-1.596	0.465	-4.204*	0.004	0.236	0.996	-6.046*	0.000
EX	-1.334	0.592	-5.940*	0.000	-2.926	0.175	-4.978*	0.004
OPEN	-0.117	0.934	-8.569*	0.000	-0.293	0.984	-4.553*	0.009
GOV	-0.317	0.906	-5.363*	0.000	-1.910	0.612	-5.897*	0.000
MZ	-0.271	0.913	-5.564*	0.000	-2.600	0.283	-5.363*	0.002

Critical value for the PP test with an intercept but not a trend = -3.029; Critical value for the PP test with an intercept on Trend = -3.673 (5%).

Table 3. VAR lag order selection criteria.

Lag	LogL	LR	FPE	AIC	SBC	HQ
0	-980.54	NA	5.08e+37	103.8468	104.1450	103.8973
1	-864.486	146.5991	1.38e+34	95.41967	97.50738	95.77300
2	-753.53	70.07442*	2.60e+31*	87.53008*	91.40725*	88.18625*

Note. *Indicates Optimal lag length.

4.3. F-Bounds Test

The results of the ARDL bound test of co-integration are displayed in **Table 4**. The F-statistics has a higher value (4.596) than the upper bound critical value provided by Pesaran table (2001) is (3.61) at 5% significance level. Hence, we can reject the null hypothesis of no long-run relationship at 5% significance level. Thus, there is a cointegration nexus among the series in Saudi Arabia.

4.4. Estimation of Short-Run and Long-Run Relationships

4.4.1. Long-Run Relationship

Table 5 states about the long-run ARDL model results. The long-run regression results report that openness, government spending and economic stability are statistically significant on FDI while exports and market size are not significant, the coefficient of economic stability is (-0.522109) and it is statistically significant at (10%) which implies that a 1% increase in inflation will lead to (0.52)% decrease in foreign direct investment in the long run. The coefficient of openness is (13.72999) and it is statistically significant at (5%) which implies that a 1% increase in openness will lead to (13.7)% increase in foreign direct investment in the long run. The coefficient of government expenditure is (-8.5290) and it is statistically significant at (1%) which implies that a 1% increase in government expenditure will lead to (8.5)% decrease in foreign direct investment in the long run. The coefficient of export and market size is positive and both are not significant.

4.4.2. Short-Run Relationship

Table 6 reports empirical results of the short run analysis. The result shows that exports, openness and economic stability are statistically significant at 1%. The coefficient of ECM (CointEq(-1)) is negative, as expected, and statistically significant. The coefficient of error correction term is around (-0.852) which indicates that around 85 % of the disequilibrium in the foreign direct investment in the short-term is corrected annually. To be more specific, it takes less than a year to correct short-term disequilibrium and to restore long-term equilibrium. Export, and export with lags (1), open and open with lags (1), and economic stability are significant at the 99% confidence level. This shows that there is short-term causality from these variables to the foreign direct investment in Sau-

di Arabia. The adjusted R^2 indicates that about 85% of variations of foreign direct investment have been explained by variations in economic stability, export, and openness.

Table 4. ARDL bound test of co-integration.

Variables	F-Statistics	Decision
F (FDI, EC, EX, OPEN, GOV, MZ)	4.596	Co-integration exist
Critical Value Bounds (significance)	Lower Bound (I0)	Upper Bound (I0)
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

Table 5. Long run coefficients of ARDL.

Dependent Variable: FDI				
Variables	Coefficients	Standard Errors	t-stat	P-value
LOG(FDI(-1))*	-0.852061	0.332112	-2.565587	0.0372
LOG(EX(-1))	7.257144	4.037070	1.797626	0.1153
OPEN(-1)*	13.72999	4.568387	3.005435	0.0198
LOG(MZ)	4.125898	3.284426	1.256201	0.2493
LOG(GOV)*	-8.529068	2.384802	-3.576426	0.0090
EC(-1)*	-0.522109	0.249284	-2.094433	0.0745

Table 6. Short run coefficients (error correction model).

Dependent Variable: FDI				
Variables	Coefficients	Standard Errors	t-stat	P-value
DLOG(EX)	1.682479	0.356496	4.719482	0.0022
DLOG(EX(-1))	-3.806669	0.668150	-5.697325	0.0007
D(OPEN)	8.955791	1.072351	8.351545	0.0001
D(OPEN(-1))	-7.108238	1.020435	-6.965890	0.0002
D(EC)	-0.769453	0.101560	-7.576341	0.0001
CointEq(-1)*	-0.852061	0.110230	-7.729866	0.0001

R-squared = 0.893; Adjusted R-squared = 0.852.

4.5. Diagnostics Tests

The model is also examined by applying Residual Serial Correlation LM Tests with the null hypothesis of no serial correlation no residual autocorrelations at/up to lag h, and residual heteroscedasticity tests with the null hypothesis of no heteroscedasticity in the error term.

Table 7 shows F-statistics (1.769) at probability values (0.262) which denote that residuals serially uncorrelated and normally distributed. Likewise, findings of heteroscedasticity test declared that data series are homoscedastic, because the Breusch-Pagan-Godfrey F-statistics (1.444) and probability value (0.321). The model also passes the Reset Specification and the result implies no functional misspecification in the model.

4.6. Stability Tests

Finally, the cumulative sum of recursive residuals (CUSUM) and the CUSUM square (CUSUMSQ) tests, proposed by Brown, Durbin, and Evans (1975), are employed to investigate the stability of the model. As seen in **Figure 1** and **Figure 2**, the plot of the CUSUM or CUSUMSQ line do not break the limits which imply that the coefficients are stable.

Table 7. Diagnostic tests results.

Statistics	F-statistics	P-value
Serial Correlation	1.769	0.262
Heteroskedasticity	1.444	0.321
Reset Test	0.222	0.654

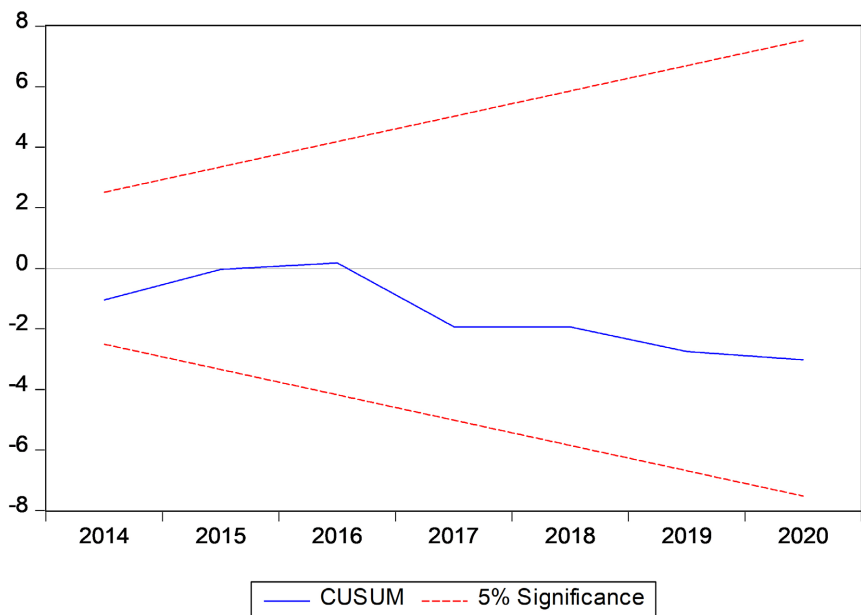


Figure 1. CUSUM test.

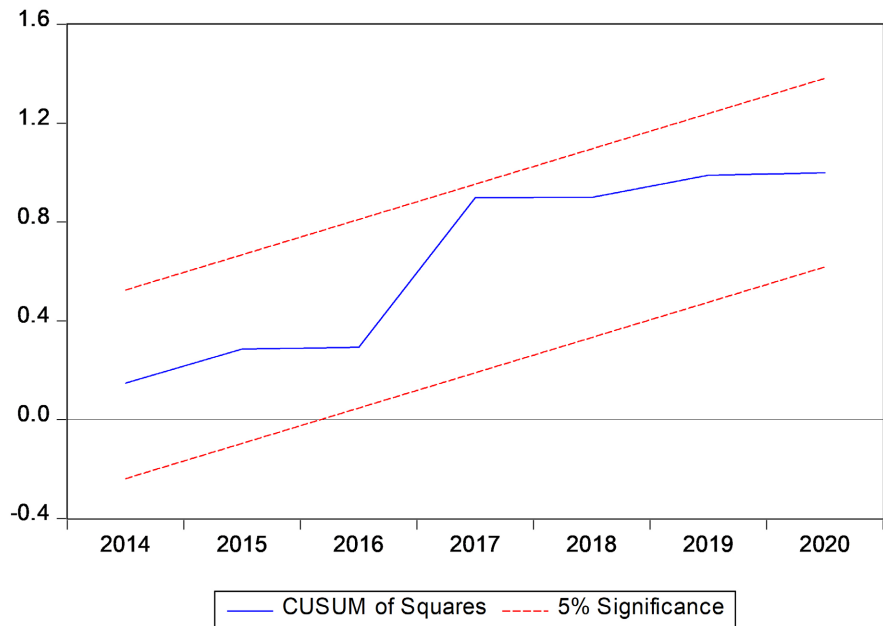


Figure 2. CUSUM of squares test.

5. Conclusion and Policy Implications

The main objective of this study is to investigate the main determinants of FDI in Saudi Arabia by applying the cointegration and error-correction model on annual data over the period 2000-2020. The study tests the variables for the time series of stationary using the Augmented Dickey-Fuller (ADF) unit test and PPunit test. The results evidently show all variables stationary at first difference.

The results of the ARDL bound test of co-integration displayed the existence of the long-run equilibrium in the mode. Tests for autocorrelation indicate the absence of serial correlation or autocorrelation. The model also passes the Reset Specification and the result implies no functional misspecification in the model. The long-run regression results report that openness, government spending and economic stability are statistically significant. Thus, these variables should be used as policy instruments to stimulate FDI inflows to Saudi Arabia. Short run analysis shows that exports, openness and economic stability are statistically significant at 1%. The coefficient of error correction term is around (-0.852) which indicates that around 85% of the disequilibrium in the foreign direct investment in the short-term is corrected annually.

Dependence on oil as a major source of income is one of the greatest challenges facing the Saudi economy. Therefore, Saudi Arabia has to undertake major reform efforts to reduce commodity dependency. The government has to invest heavily in national infrastructure to attract foreign investment. Moreover, Saudi Arabia must provide better environment for attracting the foreign investment such as establishing a transparent, broad and effective enabling policy environment for investment and building human and institutional capacities.

Our empirical evidence shows that some variables did not yield significant in

the long run. Some factors which may affect FDI are not included in this study because of the lack of data. Further study is needed to better understand and examine the factors that attract FDI to the host country.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

- Abdehag, T. (2021). Determinants of Attracting Foreign Direct Investment in Saudi Arabia during the Period (1995-2020). *Journal of Management and Development for Research and Studies*, 10, 37-56.
- Akhtar, H. M. (2000). The Determinants of Foreign Direct Investment in Pakistan: An Econometric Analysis. *The Lahore Journal of Economics*, 5, 21-22.
<https://doi.org/10.35536/lje.2000.v5.i1.a1>
- Al-Sadig, A. J. M. (2013). *Outward Foreign Direct Investment and Domestic Investment: The Case of Developing Countries* (Vol. 2013). IMF Working Paper.
<https://doi.org/10.2139/ssrn.2233754>
- Attia, F. (2018). *Standardized Study of the Impact of Foreign Direct Investment One of the Determinants of Growth in Kingdom of Saudi Arabia in the Period from (2000-2017)*. American Academy for Science and Technology.
- Bengoa, M., & Sanchez Robles, B. (2003). Foreign Direct Investment, Economic Freedom and Growth: New Evidence from Latin America. *European Journal of Political Economy*, 19, 529-545. [https://doi.org/10.1016/S0176-2680\(03\)00011-9](https://doi.org/10.1016/S0176-2680(03)00011-9)
- Bouchoucha, N., & Bakari, S. (2019). *The Impact of Domestic and Foreign Direct Investment on Economic Growth: Evidence from Tunisia*, Faculty of Economic and Management of Sousse (Tunisia).
- Jawaher, A. (2015). *The Impact of Foreign Direct Investment on Saudi Arabia*. Msc. Thesis, California State Polytechnic University.
- Kadi, M. M. (2017). The Determinants of FDI in Developing Countries and Their Comparison with Saudi Arabia. *Journal of Contemporary Scientific Research*, 1, 7.
- UNCTAD's World Investment Report, 2022.