

An Examination of Impact of Regulation Efficiency on Foreign Direct Investment: The Role of Institutional Quality in MENA Region from (2000-2020)

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Abstract

This study aims to examine the impact of regulation efficiency indicators on FDI considering the moderating effect of institutional quality in 15 countries from MENA Region from 2000 to 2020. This study used Dynamic Generalized Least Square as econometric approach to test whether regulation efficiency have a significant impact on FDI. The study findings showed that mixed results as strength of accounting and auditing, intellectual property protection and property right a negative and significant impact on FDI, while incidence of corruption and conflict of interest have positive but insignificant impact on FDI. Finally, government ensuring policy has a positive and significant impact on FDI. Consequently, the study recommends that policymakers and governments should devote their efforts toward formulating laws and procedures that contribute to enhancing the regulation environment to attract FDI.

Keywords

FDI, Regulation Efficiency, MENA Region, Institutional Quality, Generalized Least Square

1. Introduction

Foreign direct investment is a very important factor for enhancing economic growth as it adds value for host countries through providing home country with

technology, new capital and creating employment opportunities which stimulate economic growth as well as improve efficiency and amounts of investments in the host country according to neoclassical growth theories. Furthermore, home country benefit from FDI through expanding into new markets seeking for higher profits, additional market share or benefit from skills and knowledge host country have or even seeking a strategic objective according (Dunning, 1996, 2000).

MENA Region has faced many challenges especially when it comes to enhancing economic growth and attracting more FDI due to instability in terms of political, economic and financial constraints, consequently foreign investment is very crucial for overcoming issues MENA region have been facing considering the last ten years “The Arab Spring” as many countries faced very sever political instability as Egypt, Tunisia, Libya and Yamen that witnessed revolution and changing in political regimes which affected their capabilities in attracting FDI and serving MNEs with right resources for expansion as well as many MENs had forced to exist the market which had a huge impact on overall country’s economy, monetary and fiscal policy and unemployment. Furthermore, institutional quality is also another determinant for attracting FDI especially MENA region since those countries faces very fragile institutional as North (1990) stated that economic behavior and incentives are influenced by a set of rules and limitations, which play a crucial role in determining and improving the economic growth and total productivity especially in emerging countries Al Abri & Al Bulushi (2022) and Nguyen et al. (2018).

2. Literature Review and Hypothesis Development

2.1. Theoretical Literature Review

There are numerous theories that explain FDI determinants as well as the relationship between facilitating FDI besides the role of institutional quality in strengthen those relationships. Consequently, this chapter will be focusing on illustrating theories that support this study argument, this section includes two parts firstly theories that related to investment facilitation and FDI, secondly theories that trigger the role of institutional quality in attracting FDI. The main focus of this study is on electric paradigm theory by Dunning (1997-2008) due to it is significance in explaining the determinants and incentives for attracting FDI.

Ijirshar (2022), theories of international trade could be divided into two categories, firstly descriptive theories that describe shape of trade in terms of occurrence and types of investment that could be traded. Secondly, prescriptive theory that describe problems relate to foreign investment in terms of how should be done and what government could do to enhance foreign investment through using efficient polies and procedures.

Furthermore, Samuelson (1954) employed new model called iceberg trade theory exploring how transportation cost affect decision to trade and how it impacts trade cost causing bad level of investment facilitation. In order to promote

economic growth, Solow and Swan 1956 developed neoclassical growth theory that employed the effect of technology as exogenous factor, which untimely will affect economic growth in long run, as this theory tackle external factors as key factors in promoting economic growth as any change in technology will have impact on national income. According to Solow it's crucial for financial markets to deploy its resources especially savings toward investment to achieve higher output.

Hymer (1976) stressed the need of differentiating between portfolio investment and direct investment, since these two ideas are sometimes mistakenly viewed as identical. Direct investment entails the investor having direct control over the operations of a foreign company, while portfolio investment refers to situations when the investor is not actively engaged in the management of the business. Thus, understanding this difference is crucial in comprehending investing as Hymer considered the pioneer in explaining concept of direct investment but on the other there were many flaws in this theory regarding variables incorporated in terms of cost of capital and production which discussed properly by Dunning in OLI theory (Dunning, 1977, 1997, 1998 & 2000) see (Figure 1).

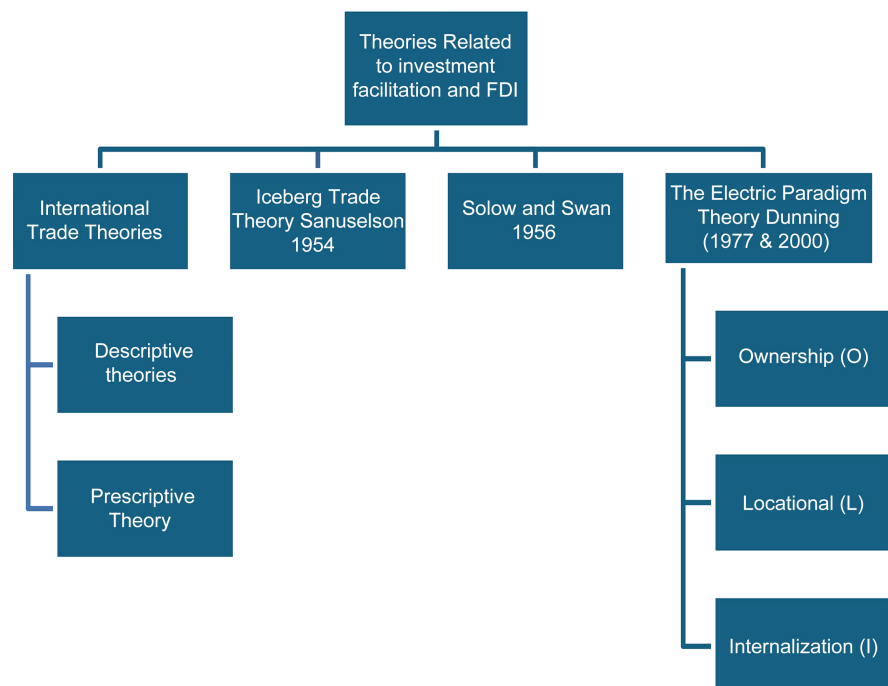


Figure 1. Summary for theories related to FDI.

2.2. Empirical Literature Review

Regulation Efficiency exert a significant influence on FDI. With growing concern for sustainability and environmental preservation, governments are increasingly adopting regulatory policies aimed at reducing emissions, protecting natural resources, and promoting environmentally friendly business practices. These regulatory measures can have a decisive impact on companies' interna-

tional expansion decisions as well as their investment strategies. On the one hand, stringent environmental regulations can generate additional costs for companies, thus discouraging their investments in countries where these rules are strictly enforced. On the other hand, well-formulated regulations can incentivize investments in sectors and regions that encourage sustainable practices. Therefore, studying the impact of environmental regulations on FDI is crucial for understanding global investment trends and economic policies (Bae et al., 2022; Van et al., 2024). The literature offers a wealth of research on the relationship between various indicators of the regulatory environment (intellectual property, corruption etc.) and FDI. This work will be presented in the next subsection.

International Financial Reporting Standards (IFRS), developed by the International Accounting Standards Board, aim to provide users with consistent, accurate and verifiable information. With increasing globalization, the need for harmonized financial regulation has grown, not least because of the challenge investors face in comparing financial statements across countries. The adoption of IFRS is crucial to facilitate investment in a globalized context and to avoid investment risks (Kumar, 2014; Khémiri & Noubbigh, 2020). Indeed, given the diversity of national standards, consistency in accounting practices is becoming essential for investors. This standardization promotes the transparency and comparability of financial data, thereby enhancing the confidence of international investors (Almaqtari et al., 2021). This subsection presents a selective review of previous studies focusing on the impact of the application of accounting standards on FDI, distinguishing between previous studies on developed and developing countries.

Chen et al., (2014) is considered to be one of the pioneers that addressed the importance of the relationship between the adoption of accounting standards and FDI. The researchers examined the impact of IFRS adoption on FDI for 30 developed countries from 2000 to 2005. They argued that the adoption of accounting standards affects the transaction costs associated with foreign investment. In addition, it will provide foreign investors with assurances about the quality of information that could change their investment decision. The argument lies in the existence of asymmetric information, as the host country has better information than foreign investors, which is inevitable for charging a premium. On the other hand, the existence of accounting standards will increase the variability and comparability of information, which will help to mitigate transactions. The result showed that the adoption of IFRS had a positive and significant impact on FDI inflows, suggesting that the application of accounting standards will reduce transaction costs and mitigate information barriers, which will encourage FDI inflows.

Charles & Oshilike (2023) examined the impact of ease of doing business on FDI in Nigeria from 1980 to 2020 using ADRL approach using access to electricity as a proxy for measurement as the result showed negative and significant relationship between ease of doing business and FDI, suggesting that poor quality

and complexity of business environment as well as lack of security and existence of corruption have direct contribution in reducing the level of FDI.

In addition, Felipe and Tavares (2004) examined the impact of corruption on FDI on selected countries from 1970 till 1994. The result showed a negative and significant relationship between corruption and FDI as the higher the level of corruption, the lower the amount of FDI inflows the host country will receive.

Abd Rahman et al., (2019) examined the impact of intellectual property rights, patent protection and copyright protection on FDI in five ASEAN countries from 2007 to 2016. The result showed that both IPR and copyright protection have positive and significant impact on FDI, on the other hand, patent protection using Ginarte Park patent has insignificant impact on FDI. The researcher argued the importance in IPR, and copyright driven by the country itself are directed towards the digital economy where IPR and copyright have more importance in most industries such as construction and highly computerized industry.

Recently, Contractor et al. (2020) assessed the impact of regulatory variables on FDI flows in 189 countries. The objective was to identify which host country regulatory factors influence FDI inflows. Their analysis reveals that countries with stronger contract enforcement and more effective international trade regulations attract more FDI. The interaction terms suggest that multinational firms are willing to compensate for a country's institutional shortcomings in favor of better performance in other areas. For example, they are inclined to invest in countries with less effective entry and exit regulations in exchange for better contract enforcement.

In general, it should be noted that the outcomes of these empirical studies are also mixed. Therefore, the third hypothesis of this study is as follows:

Hypothesis 3. *Regulation Efficiency affect FDI.*

Hypothesis 3 (a). *Strength of auditing and accounting standard has negative and Significant impact on FDI.*

Hypothesis 3 (b). *Conflict of interest regulation has a negative and Significant impact on FDI.*

Hypothesis 3 (c). *Government ensuring policy has positive and Significant impact on FDI.*

Hypothesis 3 (d). *Incidence of Corruption has negative and Significant impact on FDI.*

Hypothesis 3 (e). *Intellectual Property Protection has negative and Significant impact on FDI.*

Hypothesis 3 (f). *Property Right has negative and Significant impact on FDI.*

3. Methodology & Data

3.1. Data Collection

The data collection includes a sample dataset generated from three sources between 2000 and 2020 from 15 countries in MENA Region (Table 1). The prima-

ry independent factors are derived from the global competitiveness report, while the dependent and moderating variables are acquired from the World Bank dataset. Finally, control variables are composed of two sets acquired from the World Bank dataset and the International Monetary Fund (IMF).

Table 1. Sample of the study.

#	Countries
1	Algeria 9 Morocco
2	Bahrain 10 Oman
3	Egypt 11 Qatar
4	Iran 12 Saudi Arabia
6	Iraq 13 Tunisia
6	Jordan 14 UAE
7	Kuwait 15 Yemen
8	Lebanon

Source: Prepared by the author based on data from the World Bank.

3.2. Variable Measurement

The variable measurement of this study is explained the following section as there are one dependent variable, three independent variables, four control variable and one moderating variable (**Figure 2**).

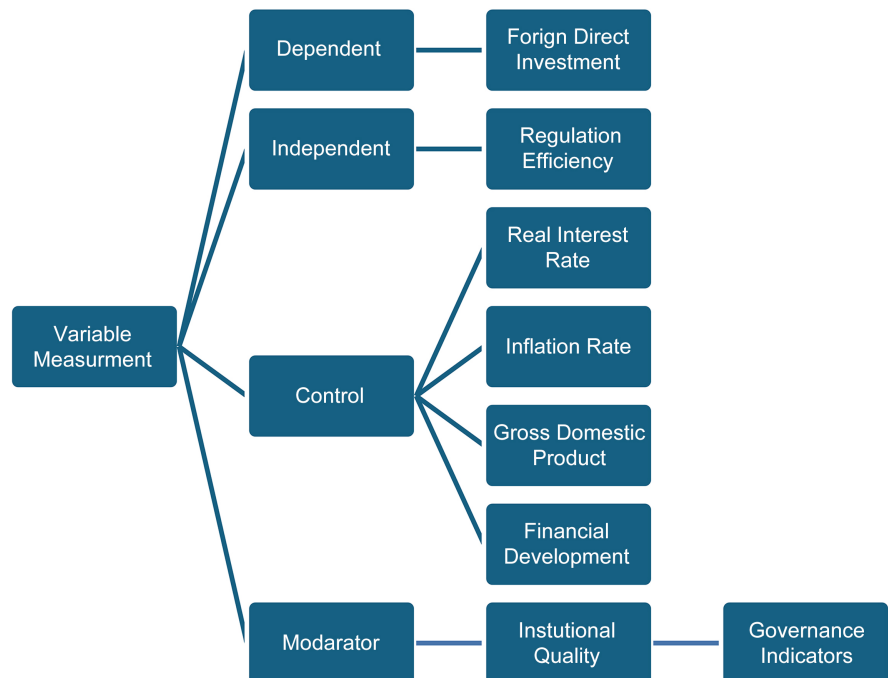


Figure 2. Source: Prepared by the author.

3.3. Dependent Variable

The main dependent variable of the study is Foreign Direct Investment (FDI), net inflows, measured as a percentage of the Gross Domestic Product (GDP). This variable is retrieved from the World Development Indicators (WDI) on the World Bank Database (**Table 2**).

3.4. Independent Variables

The main independent variable of the study is business environment that is measured by four sub indicators which are retrieved from Global Competitiveness Report 2019 (**Chen et al., 2020**) as shown in the table below (**Table 2**).

3.5. Control Variable

The study also accounts for a set of control variables such as interest rate, inflation, GDP and financial development. The existence of control variable is to increase the validity of model since they influence the outcome of the study as various previous studies mentioned the importance of those variable while investigating the relationship between investment facilitation indicators and FDI (**Fitriandi & Kakinaka, 2014; Munir & Iftikhar, 2021; Atioğlu & Sahin, 2022** and **Duenya et al., 2020**) (**Table 2**).

Table 2. Variable summary.

Variable	Label	Measure	Source
Dependent Variable			
Foreign Direct Investment	FDI	Net inflows (% of GDP)	World Bank Database
Independent Variable			
3-Regulation Efficiency			
Strength of Auditing and Accounting Standard	SAA	Response to the survey question “In your country, how strong are financial auditing and reporting standards?” [1 = extremely weak; 7 = extremely strong]	Global Competitiveness Report 2019 (Chen et al., 2020)
Conflict of Interest Regulation	CI	Score on the extent of conflict of interest regulation index, which measures the protection of shareholders against directors’ misuse of corporate assets for personal gain. The scale ranges from 0 to 10 (best)	Global Competitiveness Report 2019 (Chen et al., 2020)
Government Ensuring Policy	GEPS	Response to the survey question “In your country, to what extent does the government ensure a stable policy environment for doing business?” [1 = not at all; 7 = to a great extent]	Global Competitiveness Report 2019 (Chen et al., 2020)
Incidence of Corruption	IC	Score on the Corruption Perceptions Index, which measures perceptions of corruption in the public sector. This is a composite indicator, and the scale ranges from 0 (highly corrupt) to 100 (very clean)	Global Competitiveness Report 2019 (Chen et al., 2020)

Continued

Intellectual Property Protection	IPP	Response to the survey question “In your country, to what extent is intellectual property protected?” [1 = not at all; 7 = to a great extent]	Global Competitiveness Report 2019 (Chen et al., 2020)
Property Rights	PR	Response to the survey question “In your country, to what extent are property rights, including financial assets, protected?” [1 = not at all; 7 = to a great extent]	Global Competitiveness Report 2019 (Chen et al., 2020)
Control Variable			
Real Interest Rate	RIR	Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator.	World Bank Database
Inflation Rate	INF	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	World Bank Database
Gross Domestic Product (Constant 2015 USD)	GDP	GDP at purchaser’s prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.	World Bank Database
Financial Development	FD	Financial Development Index.	International Monetary Fund (IMF) (Svirydzenka, 2016)
Moderator Variables			
Voice and Accountability	VA	Capturing perceptions of the extent to which a country’s citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	World Bank Database Kaufmann et al. (2011)
Government Effectiveness	GE	Capturing perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies.	World Bank Database Kaufmann et al. (2011)
Political Stability	PS	Capturing perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism.	World Bank Database Kaufmann et al. (2011)
Regulation Quality	RQ	Capturing perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	World Bank Database Kaufmann et al. (2011)
Rule of Law	RL	Capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	World Bank Database Kaufmann et al. (2011)

Source: Prepared by the author based on data from the Global Competitiveness Report World Bank & IMF.

3.6. Moderating Variable

The study investigates how institutional quality moderates the relationship between investment facilitation and FDI in the MENA Region. As previously mentioned in Chapter two that quality of institution plays an important role in attracting FDI as enhancing its quality could contribute toward enhancing investment environment consequently attract FDI. This study uses governance indicators to measure the institutional quality retrieved from the World Development Indicators (WDI) on the World Bank Database Kaufmann et al. (2011) as shown in table below (Table 2).

3.7. Research Analytical Procedures

STATA 16 is the statistical software used in the present investigation. The study's key tests include descriptive statistics, correlation matrix, panel data regression, and dynamic panel threshold analysis.

3.8. Descriptive Statistics

A single variable in a structured format is used to describe sample data based on descriptive statistics for all variables in the study, including independent, dependent, and control variables. Each variable's central tendency is determined using its mean, median, first quartile, third quartile, and standard deviation. The skewness and kurtosis of a data distribution convey information about its shape, such as symmetry, peakedness, and flatness, when compared to a normal distribution (Basiruddin, 2011; Hair et al., 2012; Alessandro, 2013).

3.9. Correlation Matrix

To evaluate multicollinearity, two approaches are used: the correlation matrix and the variance inflation factor test (VIF). The pairwise correlation matrix displays the correlation between variables, measuring the strength and direction of the linear relationship between two variables on a scale of +1 to -1. A correlation of ± 1 indicates a perfect linear relationship between variables. Multicollinearity issues arise when the correlation coefficient surpasses 0.60 and the independent variables exhibit a higher degree of intercorrelation.

Multicollinearity may reduce the predictive ability of a regression model and the accuracy of coefficient estimates in regression (Habbash, 2010; Hair et al., 2012). Furthermore, the tolerance factor and variance inflation factor are utilized to assess robustness tests for multi-collinearity. The issue of collinearity across variables becomes apparent when the tolerance factor approaches zero and the variance inflation factor exceeds 10 (Habbash, 2010; Hair et al., 2012; Hassan and Ibrahim, 2014).

3.10. Regression Method

The most frequent method employed in this study is regression analysis, which

is often recognized as the most popular instrument accessible to econometricians (Brooks, 2019) and the most regularly used strategy for multivariate analysis. According to Brooks (2019), Ordinary Least Squares (OLS) regression is appropriate for models including both dummy and continuous variables, as is the case in this research. Nonetheless, a number of underlying assumptions must be fulfilled before applying parametric tests to evaluate the validity of ordinary least squares (OLS) regression (Habbash, 2010; Basiruddin, 2011; Hair et al., 2012).

Existing and emerging studies, such as (Hsiao, 2007) revealed various benefits of panel regression analysis. First, it gives a method for mitigating intrinsic statistical issues such as endogeneity. Second, it takes the time impact into account, which is not visible in pure cross-section data. Thus, longitudinal data offer a succession of portrayals, but an OLS regression for a single time produces only one conclusion. Furthermore, utilizing a panel data technique allows researchers to collect more than one set of observations, experience high degrees of freedom, and eliminate collinearity difficulties among explanatory factors (Baltagi, 2008).

Fourth, panel data reduce the impact of any omitted variables issues that may develop and account for unobservable individual heterogeneity and dynamics, which is not achievable in time series ($N = 1$) and cross-sectional ($T = 1$) regressions (Hsiao, 2007). Fifth, panel data may help researchers handle a wider range of challenges, improve the efficiency of estimates, and broaden the scope of interpretation. Finally, unlike pooled cross-section data, panel data cannot assume that observations are dispersed randomly across time, therefore error terms for a single individual may be related throughout many time periods. As a consequence, one of the key assumptions of OLS may be violated due to the correlation between the error components, meaning that OLS is no longer the best estimate. Econometrically, panel data are characterized as follows:

$$Y_{it} = \alpha + \beta x_{it} + u_i$$

$$\ln FDI_{it} = a_0 + a_1 \ln(RE_{it}) + a_2 \ln(INF_{it}) + a_3 \ln(GDPPC_{it}) + a_4 \ln(FD_{it}) + a_5 \ln(RIR_{it}) + a_6 \ln(IQ_{it}) + a_7 \ln(BE_{it} * IQ_{it}) + U_{it}$$

in Which

- FDI demotes as Foreign Direct Investment.
- RE demotes as Regulation Efficiency.
- INF demotes as Inflation.
- GDPPC demote as Gross Domestic Product per Capita.
- RIR demotes as Real Interest Rate.
- FD demotes as Financial Development.
- IQ demotes as Institutional Quality.

Where Y_{it} is the dependent variable, α is the intercept, β is a $k \times 1$ vector of parameters; where k represents the number of explanatory variables, and x_{it} represents a $1 \times k$ vector of observations on the explanatory variable, where $t = 1, \dots, T$ and $i = 1, \dots, N$

As a result, the prior tests must be repeated to validate the data against the

OLS assumptions. Nonparametric testing are preferred in this investigation. As a result, GLS regression may be more appropriate owing to its capacity to compensate for omitted variable bias and the existence of autocorrelation and heteroscedasticity. Using this method, this study may explore differences across cross-sectional units as well as fluctuations within individual units over time (Hassan et al., 2009; Basiruddin, 2011). Furthermore, the regression parameters do not change between cross-sectional units, increasing the dependability of the coefficient estimations. Before executing the regression analysis on panel data, the research should exert several specification tests to ensure that the regression model specification matches the data which will be discussed in next section. The research should address three major concerns: whether or not to pool the data, tests for individual and temporal effects, and heteroskedasticity of error terms.

Consequently, due to existence of these assumptions, the system generalized method of Moment (SYSTEM GMM) is preferred compared to OLS regression and (GLS) to control for endogeneity problems using instrumental variables (Al-Fayoumi et al., 2010; Ammann, Oesch, & Schmid, 2011; Wintoki, Linck, & Netter, 2012; Khemiri & Noubbigh, 2018; Attia, 2020).

As previously stated, the majority of existing research on business environment and FDI difficulties suffer from dynamic endogeneity, unobservable heterogeneity, and simultaneity concerns. As a result, the present analysis follows Wintoki et al. (2012) and use the dynamic panel GMM estimator suggested by Arellano and Bover (1995) and Blundell and Bond (2000) to account for these issues. Indeed, most empirical research in CG and EM techniques suffers from endogeneity issues, which may distort estimates of how (X) independent factors influence (Y) dependent variables. The endogeneity problem may be caused by unobservable heterogeneity (which may arise if there are unobservable factors that may influence both dependent and explanatory variables), simultaneity (which may arise if the independent variables are a function of the dependent variable or expected values of the dependent variables) and from dynamic endogeneity (which may arise if the relations among firm's observable characteristics are likely to be dynamic) (Ammann, Oesch, & Schmid, 2011).

5. Results and Discussion

5.1. Principle Component Analysis (PCA)

To construct a composite indicator, this study applied principle component analysis (PCA) to extract the common principal component. To check the applicability of the data to factor analysis, two specific tests were carried out: Bartlett's sphericity test and the Kaiser-Meyer-Olkin (KMO) test. The results of these tests are presented in Appendix. The P-values for Bartlett's sphericity test is all less than 0.05 (0.00) as shown in (Table 3) & (Table 4), and the KMO values are 0.50, indicating that the data are suitable for principal component analysis (PCA) as shown (Table 5) & (Table 6).

Table 3. Tests of applicability.

	Bartlett test of sphericity			KMO
	Chi-square	Degrees of freedom	p-value	
Regulation Efficiency	1155.767	15	0.000	0.813

Table 4. Tests of applicability.

	Bartlett test of sphericity			KMO
	Chi-square	Degrees of freedom	p-value	
Institutional Quality	1513.409	10	0.000	0.841

Table 5. PCA (Total variance explained).

Component	Eigenvalue	Difference	% of Variance	Cumulative variance %
1	3.628	2.540	0.605	0.605
2	1.089	0.461	0.181	0.786
Regulation Efficiency	3	0.629	0.369	0.891
4	0.259	0.025	0.043	0.934
5	0.233	0.070	0.039	0.973
6	0.163		0.027	1.000

Table 6. PCA (Total variance explained).

Component	Eigenvalue	Difference	% of Variance	Cumulative variance %
1	3.675	2.758	0.735	0.735
2	0.917	0.695	0.183	0.918
Institutional Quality	3	0.222	0.044	0.963
4	0.116	0.046	0.023	0.986
5	0.070		0.014	1.000

5.2. Descriptive Statistics

To begin with, **Table 7** summarizes the descriptive statistics of all the variables used in this study. It presents averages, standard deviations, and number of observations for the entire sample. The average value of FDI is estimated at 2.739, a standard deviation of 3.565, and a range from -4.542 to 23.537. In addition, the average value of RE is estimated at 0.562, a standard deviation of 0.29, and a range from 0 to 1. As for moderating variable (IQ) shows an estimated average

of 0.585, a standard deviation of 0.29, and a range from 0 to 1. For macroeconomic variables, we observe that GDP has a mean of 25.299, a standard deviation of 0.959, and a range from 23.461 to 27.244. In addition, the average value of INF is estimated at 0.056, a standard deviation of 0.087, and a range from -0.101 to 0.849. Furthermore, the mean of RIR estimated at 0.041, a standard deviation of 0.117, and a range from -0.201 to 0.609. Finally, the average value of FD estimated at 0.336, a standard deviation of 0.128, and a range from 0.089 to 0.578.

Table 7. Descriptive statistics.

Variable	Obs.	Mean	Std. Dev.	Min	Max
FDI	314	2.739	3.565	-4.542	23.537
RE	315	0.562	0.29	0	1
IQ	300	0.585	0.29	0	1
VA	300	-0.975	0.433	-2.05	0.304
VE	300	-0.131	0.686	-2.349	1.505
PS	300	-0.559	1.041	-3.18	1.224
RQ	300	-0.199	0.719	-2.17	1.107
RL	300	-0.188	0.725	-1.838	0.996
GDP	315	25.299	0.959	23.461	27.244
INF	291	0.056	0.087	-0.101	0.849
RIR	200	0.041	0.117	-0.201	0.609
FD	294	0.336	0.128	0.089	0.578

5.3. Multicollinearity Diagnostics

Multi-collinearity, a term in statistical analysis, signifies the presence of a correlation among two or more explanatory variables within a model. When this correlation is minimal (approaching zero), it can typically be disregarded. However, if the correlation is substantial, it can significantly impact the parameter estimates. Specifically, high correlations between explanatory variables can lead to several issues, including increased variability in estimated parameters, wider confidence intervals for critical parameters, instability in the coefficients derived through Ordinary Least Squares (OLS) estimation, and non-significant results in Student t-tests.

As stated by Gujarati (2004), the existence of a multi-collinearity problem implies that, on one hand, the coefficients of independent variables become indeterminate, and on the other hand, it results in excessively large standard errors. Conversely, the absence of a multi-collinearity problem suggests that the coeffi-

cients of independent variables are well-determined, which can lead to more robust findings.

Multi-collinearity, a term in statistical analysis, signifies the presence of a correlation among two or more explanatory variables within a model. When this correlation is minimal (approaching zero), it can typically be disregarded. However, if the correlation is substantial, it can significantly impact the parameter estimates. The detection of multi-collinearity problems can be accomplished using tools such as the Pearson correlation coefficient matrix and the Variance Inflation Factor (VIF). As noted by Gujarati (2004), a collinearity issue arises when the coefficient value exceeds 0.8. Therefore, a higher degree of collinearity between independent variables indicates a more persistent multi-collinearity problem, and vice versa. **Table 8** presents the results of the Pearson correlation matrix. The Pearson correlation test indicates the absence of a multi-collinearity problem among the variables, as all estimated coefficients have values below 0.80.

Table 8. Pairwise correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) FDI	1.000													
(4) RE	0.064	0.594*	0.607*	1.000										
(5) IQ	0.267*	0.600*	0.559*	0.504*	1.000									
(6) VA	0.249*	-0.090	0.216*	-0.103	0.335*	1.000								
(7) VE	0.246*	0.593*	0.491*	0.510*	0.910*	0.236*	1.000							
(8) PS	0.106	0.607*	0.511*	0.480*	0.920*	0.212*	0.858*	1.000						
(9) RQ	0.294*	0.630*	0.637*	0.555*	0.900*	0.261*	0.860*	0.776*	1.000					
(10) RL	0.235*	0.690*	0.511*	0.499*	0.947*	0.242*	0.903*	0.887*	0.894*	1.000				
(11) GDP	-0.357*	0.246*	-0.135*	0.173*	-0.150*	-0.501*	-0.007	0.013	-0.221*	-0.092	1.000			
(12) INF	0.040	-0.326*	-0.287*	-0.268*	-0.420*	-0.202*	-0.426*	-0.368*	-0.478*	-0.391*	0.159*	1.000		
(13) RIR	-0.089	0.016	0.094	0.028	-0.080	0.023	-0.024	-0.079	0.009	-0.052	-0.055	-0.308*	1.000	
(14) FD	0.231*	0.600*	0.550*	0.740*	0.663*	-0.026	0.654*	0.618*	0.623*	0.743*	0.138*	-0.127*	-0.051	1.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5.4. Variance Inflation Factor

The Variance Inflation Factor (VIF) serves as a measure of the reciprocal of the inter-correlation among predictor variables. In this context, VIF is calculated using the formula $VIF = \frac{1}{(1-r^2)}$, where r^2 represents the multiple correlation coefficient.

tions between the predictor variable and the other predictors. When VIF values exceed 10, it indicates a significant issue with multi-collinearity, as explained in [Chatterjee and Hadi \(2013\)](#). In this case, all VIF scores are below 10, which implies the absence of collinearity among the explanatory variables (as shown in [Table 9](#)).

Table 9. VIF correlation.

Variable	Model 1	Model 2	Model 3
RE			2.99
GDP	1.57	1.37	1.32
INF	1.77	1.54	1.55
RIR	1.13	1.13	1.13
FD	1.67	1.75	2.68
Mean VIF	1.61	1.58	1.93

As mentioned earlier in Chapter Three, given that the current study utilizes Ordinary Least Squares (OLS) regression to test its hypotheses, it is crucial to verify whether the data adheres to the assumptions of OLS regression. This verification is essential for constructing the most appropriate model in which all estimated coefficients exhibit the “correct” signs, as noted by [Gujarati \(2004: p. 516\)](#). The results of these various diagnostic tests are summarized in [Table 10](#).

According to the homoscedasticity hypothesis, the variance of the error term ($\text{var}(\epsilon_{it})$) must remain constant; otherwise, there exists a correlation (association) between the explanatory variables and the unobservable error term (ϵ_{it}), as indicated by [Gujarati \(2004\)](#). If the homoscedasticity assumption is violated, it can introduce bias into the model results. To address this situation, it is crucial to identify the presence or absence of the heteroskedasticity issue (or the independence between the explanatory variables and the error term) through Wald’s heteroskedasticity test. A p-value exceeding 5% suggests the absence of heteroskedasticity, while a p-value below 5% signifies the presence of heteroskedasticity.

As per Wald’s test, it is evident that the model suffers from a heteroskedasticity problem since the p-values are less than 5%. Autocorrelation is a concern primarily relevant to time series data, indicating the presence of correlations among error terms across observations. The application of the Wooldridge test helps in detecting autocorrelation issues. A p-value below 5% indicates the presence of autocorrelation, whereas a p-value exceeding 5% suggests the absence of autocorrelation, following [Wooldridge \(2002\)](#) and [Drukker \(2003\)](#). Furthermore, based on Wooldridge’s test, it is evident that the estimated models suffer from an autocorrelation problem, as indicated by the p-values falling below 5% (as shown in [Table 10](#)).

Table 10. Diagnostic tests.

Tests	(1)		(2)		(3)	
	T-statistic	p-value	T-statistic	p-value	T-statistic	p-value
Hausman test	5.43	0.365	13.16	0.022	6.12	0.294
Heteroskedasticity test						
Modified Wald test	2707.21	0.000	4248.96	0.000	4542.71	0.000
Auto-correlation test						
Wooldridge test	12.823	0.006	15.390	0.003	12.917	0.006

Note: This table summarizes the different diagnostic test (normality test, Heteroskedasticity test, Autocorrelation test and endogeneity test). For each test, t-statistics and p-value are presented. The level of significance is 5%.

To test the impact of competitiveness report (Regulation Efficiency) on FDI, the random effect panel is performed. This approach control for time-invariant heterogeneity across countries and are robust to omitted variable bias (Hausman & Taylor, 1981) (Table 10). The results of Hausman (1978) tests indicate that the random effect model is preferable to the fixed effects model. We estimate using standard errors that are robust to heteroskedasticity and serial correlation. The estimated model can be written as follows:

$$\ln \text{FDI}_{it} = a_0 + a_1 \ln(\text{RE}_{it}) + a_2 \ln(\text{INF}_{it}) + a_3 \ln(\text{GDP}_{it}) + a_4 \ln(\text{FD}_{it}) \\ + a_5 \ln(\text{IR}_{it}) + a_6 \ln(\text{IQ}_{it}) + a_7 \ln(\text{INVF}_{it} * \text{IQ}_{it}) + U_{1it}$$

5.5. Regulation Efficiency and FDI

Table 11 show the main findings of GLS Regression as well as value of Hausman test and P-Value Test as the estimated results are reliable and unbiased. With regards to regulation efficiency (RE) expects to have a positive and significant on FDI, but the outcome reveals that the relationship between regulation efficiency and FDI is negative and significant as in model (1) 1% increase in RE could reduce FDI by 3.5, furthermore the relationship between secondary indicators and FDI as presented in previous chapters with six hypotheses. Strength of accounting and auditing standards (SAA) has negative and significant impact on FDI as in model (2) 1% increase in SAA expected to lower the FDI by 2.39 accepting the hypothesis (3A), secondly incidence corruption (IC) and conflict of interest have positive but insignificant impact on FDI in model (3) and model (5) rejecting hypothesis 3 (b) and 3 (c), government ensuring policy (GEPS) in model (4) is expected to have positive and significant impact on FDI as 1% increase in (GEPS) expected to increase FDI by 6.454 accepting hypothesis 3 (d), finally for intellectual property protection and property right in model (6) and model (7) have a negative and significant impact on FDI as 1% increase in both intellectual property protection and property right could decrease FDI by 4.139 and 4.757 respectively accepting hypothesis 3 (e) and 3 (f).

Table 11. FDI and composites of RE.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FDI	FDI	FDI	FDI	FDI	FDI	FDI
RE	-3.510** (1.787)						
SAA		-2.329** (0.934)					
CI			0.794 (1.874)				
GEPS				6.454*** (2.270)			
IC					2.333 (2.109)		
IPP						-4.139** (1.847)	
PR							-4.757** (1.962)
GDP	-3.547** (1.404)	-1.308 (1.221)	-1.156 (1.327)	-1.876*** (0.235)	-1.317 (1.180)	-1.936* (1.170)	-2.234* (1.214)
INF	2.458 (3.738)	7.134** (2.990)	7.506** (3.204)	14.978*** (3.607)	8.376*** (3.053)	5.947* (3.233)	5.983* (3.133)
RIR	1.531 (2.085)	2.000 (1.725)	0.642 (1.873)	-1.555 (2.702)	0.171 (1.908)	2.390 (1.804)	2.502 (1.796)
FD	20.624*** (4.277)	16.240*** (2.771)	14.720*** (3.167)	-3.031 (2.417)	14.117*** (3.090)	16.713*** (2.814)	17.096*** (2.803)
Constant	88.559** (35.589)	33.554 (30.850)	28.386 (33.741)	45.177*** (6.180)	31.615 (29.863)	50.190* (29.709)	57.598* (30.898)
Observations	175	175	175	175	175	175	175
Number of countries	15	15	15	15	15	15	15
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country effect	Yes	Yes	Yes	No	Yes	Yes	Yes

The result of SAA is consistent with [Sanjar et al. \(2022\)](#) that stated a negative and significant relationship between IFRS adoption and FDI as the researchers argued that adopting IFRS is not mandatory element for FDI due to existence of other determinates that could more impact on FDI. Secondly another reason for negative relationship is adopting IFRS have a significant risk on tax revenue which associated with higher cost for foreign investor [Ndori Queku et al. \(2023\)](#). Moreover [Tanko \(2012\)](#) weak institutions and inefficient compliance especially in developing countries as well as other economic and political factors could cause failure in adopting IFRS. In the context of African countries [Duenya et al., \(2020\)](#) stated that Nigeria and Gambia experienced negative changes in FDI when they adopted IFRS as adopting IFRS alone is not sufficient unless there are other factors that motivate FDI inflows. Furthermore [Khémiri & Noubbigh \(2020\)](#) stated that IFRS negatively moderate the relationship between debt and investment. The authors attribute this negative effect to the payment of corporate income tax. Consequently, adopting IFRS is associated with additional cost related to training employees which considered another reason for posing IFRS adoption.

The results of IC is consistent with [Saad Alshehry \(2020\)](#) stated a that corruption perception index has positive impact on FDI as high level of corruption could attract more FDI but on the other hand [ElShazly \(2020\)](#) stated insignificance for the relationship between corruption and FDI while [Moustafa \(2020\)](#) found that corruption positively affect FDI in Egypt as the researcher argued that foreign investors might take advantage from corruption regimes to acquire resources, thus it is irrelevant that corruption is persistent as corruption does not prevent FDI inflows.

The result of CI is considered consistent with [Giofré \(2013\)](#), [Hassan \(2015\)](#) and [Mukiwihando \(2020\)](#), in terms of direction as all of them stated a positive relationship between formulating polices for protecting investors from conflict of interest and FDI as the reason for insignificance in the result is due to existence of other determinants. [Dixon and Haslam \(2016\)](#) stated a positive and insignificant relationship between investor protection and FDI which is consistent with this study findings as the [说](#) authors argued that investor protection alone is not effective in attracting FDI as the cooperation of other economic factors is important to capture the benefits of FDI. Furthermore, [Hassan \(2015\)](#) found that mediating role of earnings quality on FDI with strength of investor protection as countries associated with strong investor protection associated higher FDI for firms with high earnings quality.

The results for IPR and PR is consistent with [Mansfield et al. \(1981\)](#) that argued that IPR could have a negative impact on FDI as it increases the cost of imitation which could reach cost of R&D or innovation besides there is no guarantee for imitation [Braga and Fink \(1998\)](#), [Ferrantino \(1993\)](#) that suggested that strong protection for intellectual property could have negative impact on FDI as foreign investor may reconsider their entry mode in the host country as choosing licensing or franchizing for instance instead of fully acquiring a subsidiary.

The result of government ensuring policy (GEPS) is considered consistent with [Hossain et al. \(2018\)](#) and [Sadhvani \(2015\)](#) as they found that easing the

process doing business has a positive and significant impact on FDI, while [Xu et al. \(2023\)](#) found a positive and significant relationship only in developing countries as they have very poor business environment which contribute in lowering FDI inflows therefore ensuring good policies for doing business will help foreign investors lowering their cost avoid other issues as corruption and bribery which attract more FDI inflows suggesting that improving the business environment, especially ease of doing business, directly contributes to reducing corruption and costs, thereby attracting more FDI [Nketiah-Amponsah and Sarpong \(2020\)](#). Furthermore, MENA region faces challenges toward implementing and enforcing laws or any sort agreement that contribute in making benefits unclear ([Saidi & Prasad, 2018](#)).

5.6 Effect between IQ and Regulation Efficiency

The below table ([Table 12](#)) show the main findings of GLS Regression as well as value of Hausman test and P-Value Test as the estimated results are reliable and unbiased. With regards to moderating effect between Institutional Quality (IQ) and Regulation Efficiency (RE), the results showed that the interaction between IQ and RE (RE*IQ) have a negative and significant impact on FDI, indicating IQ unfavorably moderate the relationship between RE and FDI in Model (1) accepting H4.

With regard to governance indicators, the result showed the interaction between Regulatory Quality (RQ) and RE (RE*RQ) as well as Rule of Law (RL), RE (RE*RL) and Government Effectiveness (GE) and RE (RE*GE) have a negative and significant impact on FDI, suggesting that RL, RQ and GE unfavorably moderate the relationship between RE and FDI in Model (3), Model (5) and Model (6) respectively. Furthermore, the interaction between voice and accountability (VA) and RE (RE*VA) and Political Stability (PL) (RE*PL) have a negative but significant impact on FDI indicating that both VA and PL does not moderate the relationship between RE and FDI. Besides the interaction between IQ indicators and RE, a further analysis the impact of IQ on FDI is positive but insignificant in Model (1), as for IQ indicators it Voice and Accountability (VA), Government Effectiveness (GE) and Regulatory Quality (RQ) have positive but insignificant impact on FDI in Model (2), Model (3) and Model (5), while on the other hand the impact of Rule of Law is negative and insignificant on FDI in Model (6), while finally impact of political stability and FDI is negative and significant in Model (4).

The result of Institutional quality with FDI is consistent with [Nondo et al. \(2016\)](#) as the researchers stated that overall indicators of IQ have insignificant impact on FDI in Sub-Saharan Africa as African countries score is very low in IQ indicators but on the other hand, they argued that IQ could impact FDI in indirect way when it incorporated with other factors such as infrastructure. The result also is consistent with [Bouchoucha and Benammou \(2018\)](#) who found insignificance between IQ and FDI in African countries while using static approach. [Sabir et al. \(2019\)](#) argued that not all indicators of IQ is significant as the effect of IQ is more prevalent in developed countries rather than developing countries.

Table 12. FDI and regulation efficiency: moderating effect of institutional quality.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	FDI	FDI	FDI	FDI	FDI	FDI
RE	9.119*** (2.945)	-1.176 (4.050)	2.744* (1.599)	4.607*** (1.481)	3.052** (1.391)	4.056*** (1.435)
IQ	0.134 (2.078)					
RE*IQ	-9.336** (3.874)					
VA		1.083 (1.580)				
RE*VA		-2.437 (3.641)				
VE			0.145 (1.273)			
RE*VE			-5.168*** (1.604)			
PS				-1.465** (0.595)		
RE*PS				-0.605 (0.971)		
RQ					0.814 (0.904)	
RE*RQ					-5.037*** (1.870)	
RL						-0.735 (0.855)
RE*RL						-4.213*** (1.470)
GDP	-2.242*** (0.340)	-1.614*** (0.337)	-1.955*** (0.294)	-1.743*** (0.296)	-2.435*** (0.369)	-2.253*** (0.313)
INF	4.027 (4.066)	6.613* (3.690)	2.347 (4.007)	1.271 (3.368)	4.556 (3.536)	2.388 (3.734)

Continued

RIR	-1.305 (1.701)	-0.545 (1.658)	0.055 (2.598)	-1.508 (1.673)	-0.566 (1.605)	-0.676 (1.598)
FD	3.910 (2.619)	2.408 (2.355)	5.616** (2.731)	5.323** (2.361)	2.493 (2.696)	6.190** (2.676)
Constant	56.552*** (8.465)	42.638*** (8.793)	48.066*** (7.731)	42.099*** (7.718)	61.952*** (9.174)	55.740*** (7.979)
Observations	168	168	168	168	168	168
Number of countries	15	15	15	15	15	15

6. Conclusion

This current study addresses the gap in existing literature to examine the impact of regulation efficiency on FDI in MENA Region considering the moderating effect of IQ on this relationship. To examine this relationship, this provides an overview on determinants of regulation efficiency and how it can contribute toward increasing FDI. Previous studies did not examine this relationship in MENA Region, as the main investigation was directed mainly to European and Asian countries. Consistently the findings of this study revealed that Strength of Auditing and Accounting, Government ensuring policy, Intellectual Property and Property Right H3 (f) have a negative and significant impact on FDI. Surprisingly, the Conflict-of-interest regulation and Incidence of Corruption have a positive but insignificant impact on FDI suggesting that government and policy makers in MENA Region should improve regulation efficiency polices.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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