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Investigating the Factors Affecting Foreign Direct Investment in Selected Muslim Countries: A Panel Data Approach

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Abstract. This paper attempts to test the effects of foreign direct investment on selected Islamic countries by using spatial econometric analysis. For this purpose, foreign direct participation and investment data from selected countries were used as panel data between 2000-2013 years period. The foreign direct investment equation is estimated using static (fixed and random effects) and dynamic (Generalized Method of Moments) methods as panel data in both conventional and spatial econometric models. The results of the estimated model show the existence of spatial correlations between selected countries and hence the use of this type of estimation is justified. On the other hand, the variables of degree of openness of the economy and economic security have a positive and significant effect on attracting foreign direct investment in the studied countries while inflation rate, economic growth and human capital solely have no significant effect on foreign direct investment in these countries.

Keywords: Spatial econometrics, Foreign direct investment, Islamic countries, Panel data, GMM

JEL Classification: C23, N45, F21

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Introduction

Capital accumulation is arguably one of the basic requirements of the process of economic growth from domestic or foreign sources. External financing as a complement to domestic savings in addition to filling the savings-investment gap, there is also a solution to deal with the foreign-currency resource gap. In developing countries, external financial resources include grants from developed countries, financial flows from multiple sources, such as the World Bank, regional banks, indirect and direct foreign investment (Kosari, 2016). Foreign direct and indirect investment is mostly done by the private sector in the form of multinational corporations, referred to as private capital flows. The benefits of foreign direct investment include attracting capital, technology, up-to-date knowledge, enhancing management capability, increasing employment, improving balance of payments and enhancing competitiveness (Mirhashemi Naeeni & Googerdchian, 2011). It should be noted, however, that weak management and inadequate foreign direct investment policies can have negative consequences, such as the creation of a long-term monopoly market, the destruction of small-scale industries and the intensification of unemployment (Alaaddin, 2017).

This study examines the factors affecting foreign direct investment attraction through panel data from selected countries over a 14-year period. Model variables include the degree of openness of the economy, rate of return on capital, infrastructures, human capital, volume of investment in the previous period, government cost, market size, economic growth rate, natural resources, degree of development, inflation and liquidity. Additionally neighborhoods are also one of the factors that influence macroeconomic variables. Therefore, this study intends to satisfy the foreign direct investment function for selected countries using the spatial econometric method over the period 2000-2013 and to answer the question of what factors affect foreign direct investment in selected countries. Therefore, this study evaluates the effect of all factors on attracting foreign direct investment in an international context. The difference between this study and other similar studies is the control of regional conditions, as well as the test of the effect of all variables that could theoretically affect foreign direct investment.

Theoretical Framework

There are different theories about investment, each of which has somehow tried to introduce the determinants of investment and capital formation. In fact, every investment theory tries to give a definite answer to these two issues;

1. How is the optimal amount of capital stock determined, what are the factors affecting it and how much?
2. What adjustment rate does the firm make to reach the desired capital stock and what factors determine that adjustment rate?

The investment theories put forward, such as acceleration theory, neoclassical models, and the Tobin's q theory, ... are more designed for developed countries that cannot be applied to developing countries (Payetakhti Oskoye, Taheri, & Ebghaei, 2013). Numerous researches on theories and patterns of investment by researchers and economic experts are mainly concerned with advanced economies whose reliance on market economics is a prominent feature of them. However, the economies of developing and Islamic countries have characteristics that distinguish them from developed economies. Developing countries mainly have structural economic problems that make it difficult to apply classical economic theories in these countries (Blejer & Khan, 1984). The following are two major theories of investment:

Neoclassical Theory of Investment

The neoclassical theory of investing was first developed by Fischer in the 1930s and later developed by researchers such as Hirshleifer (1958 and 1970), Bailey (1959) and White (1963). A key feature of the neoclassical investment model is considering the demand for capital services as a determinant of investment decisions in the context of maximizing firm profits. According to this theory, the optimal volume of capital is obtained through the process of maximizing the present value of the firm. In this regard, the net present value of the firm's future earnings is considered to be the present value of the firm. To present the classical theory of firm investment, it is assumed that the firm produces a homogeneous function (Y) by employing two homogeneous inputs of labor (N) and capital (K). The production function of the firm is as follows:

$$Y = f(N,K) \qquad (1)$$

If p, w and q are the price of one unit of production, labor and capital respectively, and I and T are gross investment and tax respectively, the net future earnings flow of the firm (R) can be written as follows:

$$R = pY - qI - wN - T \qquad (2)$$

Considering the value of the firm and obtaining and solving the first-order conditions, the productivity of capital, which is equivalent to the actual cost of capital consumption, is obtained as follows:

$$\partial Y/\partial K=(q(\delta+i-q^{\circ}/q))/p=C/p \qquad (3)$$

Theory of Investment Acceleration Principle

The basic idea behind the acceleration principle for describing firm investment behavior goes back to the studies by Aftalion (1911), Clark (1917) and Frisch (1933). Accordingly, the acceleration principle states that the determinant of the optimal volume of capital (K*) is proportional to the level of production (Y), as follows:

$$K^*=\beta Y \qquad (4)$$

It is clear from the above equation that the principle of simple acceleration implies that net investment in the long run is only a function of the level of production changes. In other words, experiencing periods of recession or boom in an economy will cause a decrease or increase in investment.

Goodwin et al. (1948). propose a flexible accelerator model by proposing the principle of flexible acceleration. They acknowledge that net investment is the predominant share of the desired capital difference from the prior period capital. It can be showed as below:

$$I^n=\alpha(K_t^*- K_{t-1}) \qquad (5)$$

Where represents the adjustment coefficient.

As it is clear from the difference of investment relations in the two spectra of accelerator theories, capital accumulation in flexible accelerator model is less than simple accelerator model, which is due to the desirable capital adjustment process compared to its previous capital.

Factors Affecting Foreign Direct Investment Flow

Economists' theories of foreign direct investment and the factors affecting it are of two types:

First, classical economic theory, which considers investment as one of the factors of economic growth. However, new economic theories, in addition to recognizing the historical role of investment, also find new technical knowledge and new managerial practices effective in economic growth that part of it can come from the foreign direct investment. Some economists have also considered foreign direct investment as part of international trade. In this approach, foreign direct investment is subject to international regulations and foreign direct investment flows are subject to locational conditions.

Various economic, political, cultural and social factors influence the flow of foreign direct investment to the host country. Nowadays, different countries provide

the necessary infrastructure to attract foreign investors in which, the special attention of developed countries to the political and economic contexts of foreign direct investment flows has been cited as a major cause of the gap in investment flows to developing and developed countries. Factors affecting the flow of foreign investment based on international frameworks and experience of different countries are divided into 4 groups as follows:

Traditional Factors

These factors are based on classical theories, including geographical factors, natural resources, and abundant skilled labor. In the past, the main reason for foreign investors to enter the host country is related to conditions such as having natural resources and a large labour force. However, the flow of large investments of individuals and companies to host countries without natural resources has altered existing theories of justifying capital flows and following the successful experience of countries such as India and China, other factors have come into play in justifying the flow of foreign investment to the host country.

Economic Factors

Among the most important factors influencing foreign investment flow in new theories are economic factors. These factors guarantee the inflow of investments into the host country. The most important are:

1. The degree of economic openness.
2. Economic liberalization includes the removal of tariff barriers, privatization, foreign exchange policies and tax policies.
3. Host country market size.
4. Performance of macroeconomic variables including GDP, inflation rate, budget deficit or surplus and external debt.
5. Communication and infrastructure conditions.

Supporting and encouraging factors

These factors guarantee the long-term presence of foreign investors in the host country. The most important encouraging and supportive factors are:

1. Encouraging factors include insurance and protection of domestic and foreign capital.

2. Eliminate corruption and administrative bureaucracy.
3. Investment Facilitation Factors.
4. Welfare Facilities.

Political and Security Factors

The last category of factors influencing the flow of foreign investment, based on new theories, are political and security factors. The most important are:

1. The political system of the country.
2. The type of government attitude to foreign investment.
3. Laws and regulations.
4. Policies focused on market structure and performance, especially international competition, integration and international position policies.
5. Cultural factors.

Literature Review

There have not been many studies on the spatial effects of trade in the world, but one of the earliest studies in this area is the Hanson (1998) study in Mexico that stated, firms near the US border had better trade than other firms in Mexico. On the other hand, various studies have been conducted on the factors affecting domestic and foreign investment in and abroad. Therefore, only studies focusing on investment and the spatial econometric approach will be considered:

Christiansen et al. (2003) examine empirically and analytically the factors affecting the absorption of FDI in Brazil and incentives such as financial aid and tax cuts and the expansion of infrastructure such as roads and railways have been seen as a major factor in attracting foreign investment firms.

Banga (2009) used information from 10 developing countries to obtain information on how investment agreements and government policies affect FDI. Findings indicate that market size, labor cost, the ratio of secondary school enrollments, external debt, and electricity consumption are the factors affecting FDI inflows. The results also show that investment agreements with developed countries have a positive and significant effect and regional agreements have different effects on foreign direct investment.

In his study of government, private investment and foreign direct investment for 46 developing countries around the world during the period 1996-2009, Udomkerdmongkol and Morrissey (2008) examined the relationship between FDI and domestic investment and the elements of effective government. The results show that total investment (private and FDI) is larger in countries with good governance, and FDI replaces domestic investment and the severity of the substitution effect is related to government. Corruption and political instability have the greatest impact on investment, and political stability has been the most important aspect of government in terms of the relationship between FDI and private domestic investment.

Behboodi et al. (2012), in a study examining the convergence of energy efficiency in a selected group of OECD countries with a spatial econometric approach in 22 countries during the period 1993-1998. Findings indicate that there is convergence of energy efficiency in these countries, with 0.075% annually eliminating the gap between current and long-term sustainable levels. The results of the estimation also confirm the hypothesis of spatial dependence in the model and proximity has had a positive effect on the growth of energy efficiency in these countries.

Hatef and Karbasi (2013) examining the impact of government and foreign investment index on private investment in Asian countries showed that in the 37 countries studied, there is a complementary relationship between FDI and private investment in low-income countries and the substitution relationship in high-income countries during 1994 - 2010. Public investment and GDP growth also had a significant positive effect on private investment.

Najafi Alamdarloo et al. (2013) used panel data from the 1992-2008 period in a study entitled "Using Space Econometrics to Investigate Factors Affecting Agricultural Exports to ECO Countries" and concluded that spatial correlations exist between countries and using this method to estimate models is acceptable.

Bahrami and Pahlavani (2014), by examining the impact of globalization on investment attraction in selected MENA countries, concluded that there is a significant positive relationship between globalization and investment. In addition, market index and human capital had a positive and significant effect on investment attraction and on the other hand, the impact of population on this key variable of economy was negative.

Summarizing the research background can yield several important conclusions. Firstly, the process of attracting foreign investment in the world has not been the same and the developed countries have been more successful than the

developing countries in attracting foreign investment. It is therefore appropriate for developing countries, especially Islamic countries, to address their existing barriers, given the experience of successful countries. Secondly, in the developing countries, among the four main factors influencing investment flows, which have already been mentioned in the theoretical discussions, respectively, the supportive - incentive, political - security and economic factors are more effective in attracting foreign investment and there was a positive and significant relationship in attracting investment, and only the traditional factors were mentioned less. Finally, it can be seen from the perspective of the study method that econometric methods and models have been used in these studies.

Research Methodology

Parametric or nonparametric methods are usually used to study economic events. Parametric approaches are preferred to nonparametric models since they allow testing hypotheses and predictions. In this study, parametric spatial econometric method will be used to investigate the factors affecting the investment function of Muslim countries. The main feature of this approach introduced to the economic community by Anselin in 1981 is to consider the realities of spatial economics in quantitative analysis. In his work "Space Econometrics, Methods and Models", Anselin emphasizes the inappropriate use of conventional econometrics in regional studies and adds further explanations of the concepts of spatial dependence and spatial heterogeneity to the literature. He argues that spatial dependence occurs when an observation in position i depends on other observations. This phenomenon can be expressed as follows:

$$y_i=f(y_j) \quad i = 1,2,3,\ldots,n \qquad j = 1,2,3,\ldots,n \qquad (6)$$

Spatial heterogeneity, on the other hand, points to the problem of distortions in observational relationships in different geographical locations. In other words, it is assumed that there is a linear relationship between observations. This assumption is mathematically expressed in the following relation:

$$Y_i=X_i\,\beta_i+\varepsilon_i \qquad (7)$$

Where i is the observation and is from 1 to n. x is also the vector (1×K) of the explanatory variables and β_i is the vector of the pattern parameters. Also, Y_i is a dependent variable in time or place i and ε_i represents the error term. Consequently, it is observed that the observations do not have a constant mean and variance. Various methods can be used to eliminate such spatial communications, one of which is the Maximum Likelihood method introduced by Anselin (1988) as follows:

$$Y=\rho WX+X\beta+\varepsilon \qquad (8)$$

$$\varepsilon \cong N(0,\delta^2 I_n)$$

Where $Y_{n\times1}$ is the dependent variable vector, $X_{n\times k}$ is the explanatory variable vector and W is the spatial weight matrix, which is usually the first order proximity matrix. In the above relation, ρ is the coefficient of the spatial dependent variable WY. Also in this respect, b is the effect of the explanatory variables on the deviation of the dependent variable. In the literature, the model presented in the above relation is called the mixed spatial auto regressiv (SAR) model. In field studies, the above relationship can be expressed in different ways. If we estimate the above equation for the present research model, the equation will be considered as follows:

$$litm_{it}=\rho.W.litm_{it}+\beta.X_{it}+\epsilon_t \qquad (9)$$

Data Analysis and Model Fit

In the present study, following the Udomkerdmongkol et al. (2008) based on theoretical foundations and studies (Office of Economic Studies, 2008), the investment function is implicitly written to examine the relationship between research variables:

$$FDI=f(ES,GM,GR,OPENS,INF,FDISAR) \qquad (10)$$

And spatial econometrics is used to make it clear, so it should be discussed.

Anselin (1988) for the first time presented a comprehensive picture of the realities of spatial econometrics in his book "Spatial Econometrics, Methods and Models". He argues that the technique proposed has better capability and applicability than conventional econometrics in regional and space studies and when a researcher is confronted with regional data and evidence such as business, commercial, demographic studies, he is able to replace conventional econometric models and methods.

In this study, spatial econometrics will be used to estimate the model. Spatial econometrics is the application of econometric technique to the use of sample data with spatial component and, in fact, spatial econometrics is a subset of econometric studies that examines the interrelationship of spatial (spatial dependence or spatial autocorrelation) and spatial structure (spatial heterogeneity) in regression models with cross-sectional or composite time series data.

When sample data has a spatial component, the use of general econometric methods is not very effective. Because in this case, two problems of "spatial dependence" and "spatial heterogeneity" will occur. Spatial dependence is a phenom-

enon that occurs in sample data with a spatial element, so that when observations of a location such as i are present, this observation is dependent on other observations of location j. But spatial heterogeneity is a term that refers to the deviation between the observations at the geographical location of the space and in other words, by moving between the observations, the distribution of the sample data does not represent a constant mean and variance.

General econometrics ignores spatial dependence and heterogeneity because considering them, the Gauss-Markov theorem will be violated and, consequently, the spatial econometric approach should be used.

The theoretical model of the research is as follows:

$$LFDI_{it}=\alpha_{\circ}+\alpha 1.LES_{it}+\alpha_{2}.LGM_{it}+\alpha_{3}\,GR_{it}+\alpha_{4}.LOPENS_{it}+\alpha_{5}.INF_{it}+\alpha_{6}.LFDISAR_{it}+\varepsilon_{it} \quad (11)$$

Because panel data will be used in this study, the spatial lag variable is used to include spatial econometric into the research model, which is an n×n square matrix and n is the number of countries selected and the spatial lag variable is obtained as $LFDISAR_{it}=W.FDI_{it}$.

Where w is the spatial weight matrix, which is usually the first order proximity matrix and to determine it we can use the proximity and correlation method. In this way, by determining which countries are neighboring matrices, a proximity matrix is formed where one is considered to be a neighbor and zero is considered to be a non-neighbor. Next, the matrix must be standardized, which is known as the standardized first order proximity matrix. By standardizing the matrix and multiplying it by the dependent variable, a new variable is obtained that represents the spatial model of the model and is known as the spatial lag variable.

In this function, the regression coefficients are an estimate of elasticities.

Where in this function:

$LFDI_{it}$: The logarithm of the amount of foreign direct investment in the country i at the time of t.

LES_{it}: The logarithm of the economic security of the country i at the time t which will use domestic investment as a Proxy (Torabi & Mohammadzade Asl, 2010)

LGM_{it}: The logarithm of the size of the state of the country i at the time t was derived from the ratio of government expenditure to GDP (Fotros & Emami, 2011).

GR_{it}: The rate of GDP growth of country i at time t.

$LOPENS_{it}$: The logarithm of the index of the degree of economic freedom of the country i at the time t obtained from the ratio of foreign trade to GDP.

INF_{it} : The inflation rate of country i at time t.

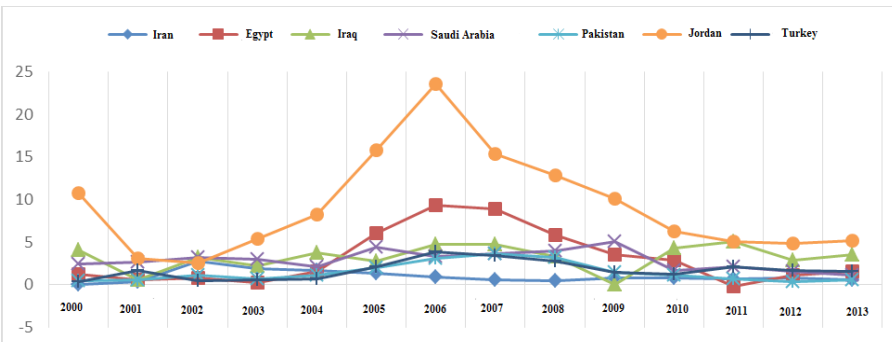
$LFDISAR_{it}$: The logarithm of the spatial lag of foreign direct investment.

Statistical softwares Eviews 9 and Stata 14 have been used to estimate the mentioned models.

Research Findings

In this study, among the Islamic countries, 20 countries with investment data were selected. These countries are Iran, Malaysia, Nigeria, Bahrain, Pakistan, Saudi Arabia, Emirates, Jordan, Indonesia, Turkey, Qatar, Azerbaijan, Uzbekistan, Kuwait, Bangladesh, Kazakhstan, Oman, Egypt, Lebanon and Iraq. However, some of these countries were excluded because of insufficient data and information. For this purpose, the countries of Iran, Iraq, Saudi Arabia, Pakistan, Jordan, Egypt and Turkey were selected for the study. The period used in this study is 2000-2013 on an annual basis.

Figure 1.
Polygon chart of foreign direct investment of selected countries



Data on variables used in the model are extracted from the World Bank website based on the maximum available information. For a better analysis, tables and charts of the foreign direct investment variables for the selected countries and their comparison with the total for the years 2000-2013 are provided:

Figure 2.

Circular chart showing the amount of FDI in the selected countries

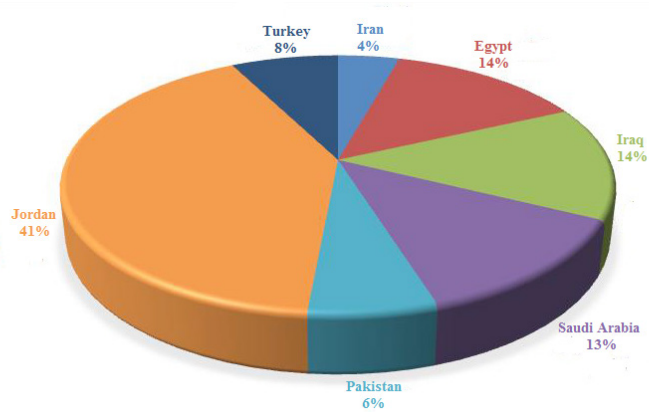


Table 1

Ratio of Foreign Direct Investment to GDP In Selected Countries

Country	2002	2005	2008	2010	2011	2012	2013	Mean
Iran	2.73	1.31	0.49	0.78	0.72	0.79	0.59	0.96
Iraq	3.17	2.73	3.28	4.26	5.07	2.82	3.49	3.20
Turkey	0.46	2.07	2.71	1.24	2.08	1.68	1.51	1.69
Egypt	0.73	5.99	5.83	2.91	0.20	1.06	1.54	3.09
Saudi Arabia	3.17	2.73	3.93	1.63	2.14	1.53	1.08	2.87
Pakistan	1.13	2.01	3.19	1.13	0.62	0.38	0.57	1.42
Jordan	2.48	15.76	12.86	6.24	5.10	4.83	5.20	9.20

Source: World Bank data

As shown in the charts and tables, the largest amount of foreign direct investment is related to Jordan and the least to Iran. Foreign investment has fluctuated during the study period, with the average rising since 2003 and then declining in all countries.

Unit Root tests Results

Before estimating the pattern, the variables used in the pattern must be checked for stationarity. For this purpose, Levin Lin Chu test, Im, Pesaran and Shin test, Fisher-ADF test and Phillips-Peron test are used. Maddala and Wu (1999) showed

that the IPS and Fisher's tests did not contain the limiting assumption of the LLC test that 's are not the same. Both IPS and Fisher tests combine information obtained from separate unit root tests. However, the advantage of the Fisher test over the IPS test is that there is no need for a balanced panel. The Fisher test can also use different lag lengths in separate ADF regressions and apply to each other unit root test. Maddala and Wu found that the Fisher test was a superior option for testing the null hypothesis of stationarity as well as for the cointegration test in panel data. In Fisher test, the null hypothesis is that there is a unit root and the alternative hypothesis is that at least one panel variable is reliable. These hypotheses can be shown as below:

H°:Existence of unit root.
H1 :There is no unit root.

With regard to the stationarity tests, Fisher test is more valid than other tests, and in this study, it is used according to test results. The results of the variables stationarity indicated that according to the Fisher test, all variables had unit root and were not static at the level.

Table 2

Results of Stationary Tests for Model Variables at Level and First Difference.

	Levin-Lin-Chu (LLC) Test		Im-Pesaran-Shin (IPS) test		ADF test		Phillips–Perron (PP)	
	LEVEL	First difference	LEVEL	First difference	LEVEL	First difference	LEVEL	First difference
GR	0.017	-	0.061	-	0.074	-	0.001	-
LAB	0.024	0.003	0.67	0.12	0.55	0.083	0.98	0.000
LES	0.031	0.000	0.19	0.003	0.12	0.004	0.001	0.000
LDT	0.024	0.005	0.64	0.13	0.51	0.098	0.96	0.000
LFDI	0.01	0.000	0.32	0.021	0.12	0.005	0.083	0.000
LFDISAR	0.029	0.000	0.47	0.007	0.49	0.008	0.08	0.000
LGM	0.10	0.000	0.54	0.000	0.56	0.000	0.056	0.000
LHDI	0.000	0.000	0.37	0.012	0.073	0.0138	0.076	0.000
LL	0.000	0.000	0.32	0.33	0.24	0.23	0.25	0.022
LOPENS	0.068	0.001	0.84	0.098	0.85	0.103	0.99	0.000
INF	0.000	0.000	0.28	0.07	0.19	0.055	0.023	0.000

Since model variables do not report the same results for the stationarity of variables according to stationary tests, cointegration between dependent variable and independent variables should be considered in order to avoid false regression in the estimates. For this purpose, the Kao Cointegration Test is used to investigate the long-run equilibrium relationship between the model variables.

Cointegration Test Results

In this study, in order to avoid false regression and to be aware of the long-run equilibrium relationship between the model variables, Kao cointegration residuals and pedruni residuals tests based on Engle-Granger are used. The null hypothesis of these tests is that there is no cointegration. The results are shown in tables (3) and (4):

Table 3
Kao Residuals Cointegration Test Results.

Null hypothesis: No cointegration		
ADF	Statistic	Prob.
	-2.32	0.010

Table 4
Pedruni Residuals Cointegration Test Results.

Null hypothesis: No cointegration: (within-dimension)				
			Weighted	
	Statistic	*Prob.*	*Statistic*	*Prob.*
Panel v-Statistic	-1.83	0.96	-2.54	0.99
Panel rho-Statistic	2.83	0.99	3.29	0.99
Panel PP-Statistic	-1.5	0.066	-2.26	0.01
Panel ADF-Statistic	2.2	0.98	-1.42	0.077
Null hypothesis: No cointegration: (between-dimension)				
	Statistic	Prob.		
Group rho-Statistic	4.13	1		
Group PP-Statistic	-4.77	0.000		
Group ADF-Statistic	0.76	0.77		

According to the results of Table (3), based on the probability value of the test statistic, the lack of cointegration between the model variables, rejected and the opposite hypothesis of the existence of cointegration is confirmed. Therefore, the existence of a long-run equilibrium relationship and the absence of false regression between the variables of the model is proved by Kao cointegration test.

According to the results of table 4, 3 statistics out of 7 test statistics reject the lack of cointegration between the model variables. Therefore, the existence of a long-run equilibrium relationship and the absence of false regression between the variables of the model based on the Pedruni cointegration test is also proved.

Multicollinearity Test Results

To detect the colinearity between the variables, the Variance Inflation Factor (VIF) test has been used. The results of this test are shown in Tables 5 that do not report the problem of colinearity between the explanatory variables. According to empirical studies by Chatterjee and Price (1991) and also by Montgomery, Peck, and Vining (2012), if the value of the Variance Inflation Factor for the independent variable is greater than 10, it indicates that the variable is correlated with other independent variables. In other words, that variable has a linear combination with other variables.

Table 5

VIF Test Results for Explanatory Variables.

Variables		R^2	VIF	Result
Title	Symbol			
Foreign Direct Investment	LFDI	0.63	2.71	No Correlation
Economic Security	LES	0.48	1.92	No Colinearity
Government Expenditures	LGM	0.87	7.69	No Colinearity
Economic Growth Rate	GR	0.81	5.26	No Colinearity
Openness Degree of the Economy	OPENS	0.65	2.85	No Colinearity
The Inflation Rate	INF	0.35	1.53	No Colinearity
Spatial Lag	LFDISAR	0.61	2.56	No Colinearity

Source: Research Findings

Based on the results of Table 5, it can be stated that there is no colinearity problem between the explanatory variables in the models.

Model Estimation Results

After performing unit root tests, it is necessary to perform the relevant diagnostic tests to determine the type of estimation model. In order to ensure the significance of the sample member of Islamic countries, the group significance test is used. The F-Limer statistic test is used for this purpose. If the calculated statistic F is greater than the table F, H° hypothesis based on Equality of y-intercept will be rejected

and the different y-intercepts should be taken into account. Therefore, the panel method can be used for estimation. Now, the Hausman test is used to answer whether the difference in cross-sectional y-intercepts is constant or whether random functions can express this difference between units more clearly. In the Hussman test, H° hypothesis is tested for consistency of random effect estimates versus H1 hypothesis for incompatibility of random effect estimates. If H° hypothesis is rejected, the estimation with the fixed effects method should be used. Otherwise the estimation is done by random effects method. The following tables provide the results of the F-Limer and Hausman diagnostic tests to select the type of model concerned:

Table 6

Model Selection Results for Model Estimation.

Test Type	Traditional Regression		Spatial Regression	
	Statistic	*Prob.*	*Statistic*	*Prob.*
F-Limer	8.54	0.000	9.25	0.000
Hausman	37.16	0.000	38.67	0.000

Source: Research Findings

In F test, the hypothesis can be defined as below:

H_0: Individual effects are identical.

H_1: Individual effects are not identical.

Based on the F test, with a 95% probability, the null hypothesis that the individual effects are identical for the countries under study cannot be accepted. Therefore, the results of the ordinary least squares method are skewed and a method must be adopted to take into account the individual effects of the heterogeneity of the variables. It can then be said that fixed and random effects methods that have high explanatory power and take into account individual effects provide more reliable results and are more efficient and appropriate than other methods. But in order to choose the right model from the two fixed and random effects models, it is necessary to perform the Hausman test. The results of the Hausman test confirm the fixed effects model in both models, the results of which are presented in the following tables:

Table 7

Results from the Estimation of the Fixed Effect Model without Considering the Spatial Variable.

Variable	Coefficient	Standard Error	t-statistic	Prob.
LES	0.256	0.059	4.27	0.000
LGM	-0.198	0.227	-0.87	0.38
GR	0.034	0.018	1.84	0.07
LOPENS	2.26	0.52	4.28	0.000
INF	0.001	0.009	0.17	0.86
C	-3.17	1.05	-3	0.004
	F = 8.54		Porb F = 0.000	

Table 8

Results from the Estimation of the Fixed Effect Model with Considering the Spatial Variable.

Variable	Coefficient	Standard Error	t-statistic	Prob.
LES	0.184	0.060	3.06	0.003
LGM	-0.261	0.214	-1.22	0.226
GR	0.030	0.017	7.73	0.087
LOPENS	1.75	0.518	3.39	0.001
INF	-0.002	0.009	-0.30	0.764
LFDISAR	0.449	0.130	3.45	0.001
C	-2.73	1.004	-2.72	0.008
		F = 9.25		Porb F = 0.000

As can be seen in the tables above, some of the research variables were not statistically significant at the 95% level and sign of some of them is not as expected. Therefore, to be sure, diagnostic tests should be used to test problems with panel models. It should be noted that the research model is estimated in two traditional and spatial econometric modes to compare the results.

Examining Autocorrelation of Models

One of the tests used to detect serial autocorrelation in panel data is the Wooldridge test. Hypothesis H° of this test indicates that there is no auto correlation in panel data and H1 hypothesis indicates existance of auto correlation. If the P-value would be above 5%, the lack of autocorrelation is confirmed, and if it would be below 5%, autocorrelation is confirmed and we must resolve it. The results of this test are presented in the following table:

Table 9

Serial Autocorrelation Diagnosis Test Results.

	Statistic	Prob.
Test results for the conventional model	2.64	0.1548
Test results for the Spatial model	2.56	0.1676

Source: Research Findings

Based on the Waldridge test results, with a probability of 99%, the null hypothesis that there is no autocorrelation in the panel data can be accepted in both models.

The Heterogeneity of Variance Test

To test the heterogeneity of variance between error terms, two models are constrained and unconstrained will be estimated. In the constrained model, the assumption of homogeneity of variance or the assumption of the same distribution and independence of the error terms is taken into account, while in the unconstrained model it is assumed that the variance of the error terms between cross-sectional unit is not homogen. In the next step, using the generalized least squares method, both models are estimated and then the likelihood ratio test statistic is analyzed. If the probability value of the LR statistic is less than 5%, the null hypothesis that the variance is not heterogeneous is rejected (Mohammadzadeh et al., 2011).

LR statistics and their probability values have been shown in table 10.

Table 10

Analysis of variance hetrogeneity test results.

	Statistic	Prob.
Test results for the conventional model	30.15	0.000
Test results for the Spatial model	30.42	0.000

Source: Research Findings

Based on the results of the likelihood ratio test, the null hypothesis that there is no heterogeneity of variance in the panel data with a 99% probability cannot be accepted, and alternative hypothesis of the variance heterogeneity in the panel data is confirmed. In this case, panel data estimation using fixed and random effects model in variance heterogeneity is performed in Stata software using Generalized Least Squares (GLS) method.

Model Estimation Results

To obtain the spatial lag variable, one must first obtain the proximity matrix and then convert it to standardized first-order proximity matrix and finally, the spatial lag variable must be obtained. The proximity matrix for the selected Islamic countries by linear proximity method is presented as below:

$$7 \times 7 = \begin{bmatrix} 0 & 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 & 0 & 0 \end{bmatrix}$$

Now the matrix above, after standardization, is multiplied by the dependent variable and the spatial variable is obtained. The results of estimating the research model after removing the variance heterogeneity based on GLS and GMM methods are presented in the following table.

Table 11

Results of Investment Function Estimation for Selected Islamic Countries.

	Normal Regression			Spatial Regression			Dynamic Spatial Regression		
	Coefficient	*Standard Error*	*Prob.*	*Coefficient*	*Standard Error*	*Prob.*	*Coefficient*	*Standard Error*	*Prob.*
LES	0.23	0.046	0.00	0.16	0.049	0.001	0.104	0.053	0.052
LGM	0.082	0.17	0.64	0.055	0.158	0.72	-0.115	0.72	0.87
GR	0.025	0.018	0.16	0.019	0.016	0.24	0.012	0.021	0.55
LOPENS	0.97	0.162	0.00	0.699	0.177	0.000	1.47	0.57	0.011
INF	-0.008	0.008	0.35	-0.013	0.008	0.107	0.003	0.0077	0.67
LFDISAR	-	-	-	0.311	0.096	0.001	0.161	0.096	0.093
LFDI(-1)	-	-	-	-	-	-	0.29	0.092	0.002
C	-2.51	0.77	0.001	-1.83	0.78	0.019	-0.77	1.57	0.622

As shown in the table above, the effect of government expenditures, which is approximately the size of the government, has no significant effect on foreign direct investment. Therefore, attracting foreign direct investment has not related to with the size of government expenditures and its size.

The coefficient of degree of openness of the economy is positive at the 5% level and statistically significant. According to table 11, it means foreign direct investment increases by 7% for one percent increase in the degree of openness of the economy. In fact, free trade, free flow of capital, and low tariff and non-tariff barriers will increase the incentive for foreign investors and thus increase foreign direct investment.

As the results show, the effect of inflation rate in different model states is not significant. In fact, inflation changes are considered as one of the risk factors in the host countries and the insignificant inflation is more clearly understood.

Regarding the spatial variable, the coefficient of this variable is positive and significant. That is, the closeness of the countries has had a direct effect on foreign direct investment in the selected countries. Consequently, it should be estimated using the spatial econometric method. This means that foreign direct investment in selected countries has been affected by foreign investment from neighboring countries, and not including this in the research model can have biased consequences.

The dynamic model was used to find out the dependence of foreign direct investment on the previous period. In the dynamic model, based on the Sargan test, since the probability is 0.143 and is greater than 5%, then the null hypothesis of non-correlation between instrumental variables and residuals is rejected and the reliability of the estimated coefficients can be confirmed. The coefficient of variation with the lag is positive and significant in the dynamic model.

Economic security also has a significant and positive effect on FDI absorption growth. In fact, if domestic capital savings and investment flows into the domestic market, it can assure foreign investors of economic security in the host country and encourage them to invest.

Finally, as shown in the table, the economic growth rate in all three models had no significant effect on FDI.

Conclusion and Recommendations

Since foreign direct investment plays an important role in bridging the savings–investment gap, technology transfer, technical knowledge and new managerial techniques and overall economic development and growth, there is intense competition among countries around the world to attract it. Therefore, each country, with regards to its economic, social, cultural and political situation, tries to identify ways of attracting foreign direct investment and to eliminate its obstacles and difficulties.

The determinants of FDI are numerous. It can be said that its absorption depends on all economic factors, and overall, it depends on the whole system, economic, political, social and cultural structures. But in each country, a number of these factors play a major role in its absorption and are considered to be the main determinants.

In this study, which examines the factors affecting foreign direct investment in selected countries for the years 2000-2000, using a variety of econometric models, the results show that out of 8 very important variables, only 4 variables with positive coefficients were statistically significant and influenced the foreign investment attraction of the selected countries, which has been confirmed in some similar previous studies in Islamic countries.

The first significant variable in attracting foreign investment is economic security, which is also considered a key variable in classical growth models, has been used as a proxy variable. Therefore, it is suggested that in the short term, Islamic governments, by providing appropriate security, political, social, and ultimately economic and legal frameworks, immediately ensure the return of the main and interest of capital and help to create a safe environment. In the short run, these measures will also allow domestic investors to firstly prefer the domestic market to the foreign markets in the long run and second, the use of domestic capital itself could again be a new signal for foreign investors to show the existence of economic security and confidence in the future of the host country and due to these concerted measures, the process of foreign capital inflows will be accelerated and increased.

The second significant variable in the present study is the degree of openness of the economy that represents the ratio of foreign trade to GDP. Therefore, considering the positive relationship of this variable with the rate of attraction of foreign investment, it is suggested that in the first and in the short run Islamic countries avoid the use of closed economic policies that impede access to global financial markets and modern technology. Because most of today's developed and prosperous countries have realized this fact, they have reformed their economic structure and trade policies to facilitate business communication. In the short term, it is necessary to coordinate reforms in fiscal, monetary and trade policies to facilitate foreign trade. With the increase in trade with developed countries and especially the transfer of technology and localization, it can be hoped that in the medium and long term the technology level will be improved and hence the productivity of enterprises will increase and provide incentives to enter foreign markets due to improving the competitiveness of firms. Therefore, a more open and global economy will promise the inflow and diversification of new investments that will occur if they interact more with the outside world.

The third variable affecting foreign investment is the value of a prior period of this variable. The increase in investment every year has also had a significant impact on the amount of investment from a previous period, which indicates the security and assurance of the country's economic future. Therefore, in the short run, any factor that reduces investment risk and increases the certainty of return on capital can also facilitate and stimulate domestic and foreign investment in the long run.

Finally, the last variable that has a positive relationship with the amount of foreign investment is the spatial variable that shows that the amount of foreign investment in the selected countries has been positively influenced by the foreign investment of neighboring countries. It is natural that capital will move to an area that has the necessary set of economic, political and even geographical conditions. So in the short run, increased regional interactions and good economic, cultural and political relations with neighboring Muslim countries can also facilitate foreign capital inflows and in the long run lead to a smooth movement of productive factors such as labor, capital and technology between these countries.

In sum, the four variables identified in this study as the main factors affecting FDI absorption are somehow related to government policy making, so the key actor in the field will be the government and its regulatory policies in the short and long term. Therefore, Islamic governments have an important role in ensuring the proper economic and political environment and investment attraction of the country. So the economic growth and development will depend on their behavior and thinking.

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