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# Foreign direct investment and economic growth in Jordan: An empirical research using the bounds test for cointegration

## ABSTRACT

This paper investigates both long-run and short-run elasticities between gross domestic product and foreign direct investment (FDI) in Jordan. Annual data have been used in order to explore the relationship between foreign direct investments (FDI) with economic growth for the period 1992-2013. Data were collected for both variables (FDI and GDP) from the World Bank and World Development Indicators, and the Autoregressive Distributed Lag Model (ARDL) approach was used. The results show long-run and short-run elasticities in foreign direct investment (FDI) and GDP. The results indicate that Jordanian policy makers focus their efforts to attract more FDI to Jordanian economy. This is because more FDI is expected to lead to a decrease in economic obstacles in Jordan (e.g., increased level of investment, decreased unemployment rate).

**Keywords:** FDI, GDP, financial development, elasticities, Jordan.

**JEL:** C10, E22, O47.

Inversión extranjera directa y crecimiento económico en Jordania: una investigación empírica que utiliza la prueba de límites de cointegración

## RESUMEN

Este artículo investiga las elasticidades a largo y corto plazo entre el producto interno bruto y la IED en Jordania. El estudio utiliza datos anuales para analizar la relación entre la IED y el crecimiento económico para el periodo de 1992-2013. Los datos para las variables IED y PIB se obtuvieron de los Indicadores del Desarrollo Mundial y del Banco Mundial, y se utilizó el enfoque ARDL. Los resultados muestran elasticidades de largo y corto plazo en la IED y el PIB. En general, los responsables políticos de Jordania centran sus esfuerzos para atraer más IED a la economía jordana. Esto se debe a que se espera que más IED en la economía jordana conduzca a una disminución de

los obstáculos económicos (por ejemplo, disminución de la tasa de desempleo y mayor nivel de inversión).

**Palabras clave:** IED PIB, desarrollo financiero, elasticidades, Jordania.

## Investimento estrangeiro direto e crescimento econômico na Jordânia: uma pesquisa empírica que utiliza o teste de limites de cointegração

### RESUMO

Este artigo pesquisa sobre as elasticidades em curto e longo prazo entre o produto interno bruto (PIB) e o investimento estrangeiro direto (IED) na Jordânia. Este estudo utiliza dados anuais para analisar a relação entre a IED e o crescimento econômico para o período de 1992-2013. Os dados para as variáveis IED e PIB foram obtidos dos Indicadores do Desenvolvimento Mundial e do Banco Mundial, e foi utilizada a abordagem Autorregressiva com Defasagens Distribuídas (ARDL). Os resultados indicam elasticidades de curto e longo prazo no IED e no PIB. Em geral, os responsáveis políticos da Jordânia focam seus esforços para atrair mais IED à economia jordana. Isso se deve a que se espera que mais IED na economia jordana leve a uma diminuição dos obstáculos econômicos (por exemplo, diminuição da taxa de desemprego, maior nível de investimento).

**Palavras-chave:** IED, PIB, desenvolvimento financeiro, elasticidades, Jordânia.

## INTRODUCTION

Investment represents a basic economic activity, and it is the key to economic development in various countries worldwide, especially in developing countries. Many of those countries are lacking capital because of weak national savings, originally resulting from a low level of gross domestic product. Foreign direct investment (FDI) is considered one aspect of international economic relations, and a key element for development in developing countries. In addition, foreign direct investment of any economy in general aims to fill four major gaps. The first gap is the savings gap to finance necessary investments. The second is the technological gap to fill the host country's need for technical knowledge and management skills. While the third one is the foreign exchange gap needed to import production inputs, the fourth is to fill the gap between public revenues and public expenditures (AlShammri & ALSarhan, 2012).

The importance of FDI has increased particularly in developing countries, including Jordan, and has become to be seen as the best available source of external funding. In addition, the majority of developing countries—if not all—seek to attract FDI as a tool for financing their economic development in order to increase national income first, and then the average per capita income, in order to improve the level of living. To achieve these goals, which require the provision of financial resources, many developing countries are inevitably compelled to use international funding, including FDI (Aitken & Harrison, 1999).

At present, foreign direct investment is one of the most important economic issues, which developing countries are particularly eager to attract. FDI is a movement of foreign capital to invest directly abroad, which is considered as one of the main drivers of economic growth in the country. Foreign direct investment contributes to solving the problem of unemployment through the creation of new jobs and familiarity with modern management, regulation, communication, and marketing methods, leading

to higher national skills and greater experience. In addition, states are generally aware of the importance of FDI, so they always seek to attract it by creating an appropriate climate that stimulates foreign investment and provides facilities and incentives to foreign investors (Karaalp, 2014).

The relationship between FDI and economic growth in Jordan has been subject to deep debates, since most of the studies have used a variety of methodologies in order to explore the factors that may determine foreign direct investment inflows to the country, including Abu Ghunmia *et al.* (2013), Al-rawashdeh *et al.* (2014), and Kardoush (2004). For example, the study of Kardoush (2004) affirmed that location is a determinant for FDI. They used a time series data to analyze major locational factors that impact the level of FDI inflows to Jordan for the period 2001-2009. They found a linear relationship between FDI and domestic market size, the openness of the economy to foreign trade, and the infrastructure of the host country.

Abu Ghunmia *et al.* (2013) investigated the long-term relationship among macroeconomic variables and FDI. The results of this study show that trade openness have significant impact on foreign direct investment. Al-rawashdeh *et al.* (2014) studied the inflow and outflow of foreign direct investment in Jordan for the period 2002-2011. In their study, an ARDL approach has been applied to determine foreign capital flow to Jordan. The results of this study indicated a positive relationship between gross national product, international net reserves, electricity production index, rate of openness, and FDI.

The current study aims to analyze the impact of foreign direct investment on the Jordanian economic growth in the period 1992-2013. The main question for this paper is: Does FDI affect the level of economic growth in Jordan? The paper has the following structure: Section 2 covers literature review that may help to understand the link between foreign direct investment (FDI) and economic growth. The next section provides data sources and describes the methodology. Finally, Section 4 presents the conclusions, limitations, and policy implications.

## LITERATURE REVIEW

Many researchers described positive relationships between FDI and economic growth. For example, Li and Liu (2005) discovered a relationship between economic growth and foreign direct investment using panel data of many countries during the period 1970-1999. The results of this study show that foreign direct investment and human capital are interconnected and can positively impact the economic growth of developing countries.

Dunning (1988) discussed that when investments are done in a host country by a foreign investor, new ideas and unique technologies are transferred from the source country to the host country, which leads to increasing the competition in the market, and to a decrease in prices for consumers. For their part, Kok and Ersoy (2009) discussed that FDI has many direct impacts on the economy. In addition this variable has a very significant impact on income in the host countries.

Hansson and Henrekson (1994) have discussed that government consumption and spending is retarding the growth in economy; on other hand, spending on education positively affects economic growth. In a strange opposite way, Alfaro *et al.* (2004) found a weak direct relationship between economic growth and education.

Sufian and Moise (2010) discussed the relationship between FDI, economic development, and openness by using data of 36 countries. The results show that some of these variables have a positive impact on the flow of foreign investment, such as GDP and the degree of openness, while some others have negative effects, such as the corruption index, inflation rate, and government spending. Alexander (1990) found a negative effect of inflation rate and government spending on economic growth by using a panel of 13 Organization for Economic Cooperation and Development (OECD) countries for the period of 1959-1984.

A study by Jude and Leveuge (2013) covered many developing countries over the period 1984-2009, including some countries from the Commonwealth States (CIS), which are: Azerbaijan,

Armenia, Kazakhstan, Ukraine, and Belarus. Their study discussed the impact of foreign direct investment on economic growth conditional on the institutional quality of host countries. The results of this study show that FDI alone (as a single variable) had no significant effect on growth; on other hand, institutional quality had a moderating impact on FDI, which in turn influenced economic growth.

Omran and Bolbol (2003) carried out a research paper on some Arab countries about FDI, gross domestic product (GDP), and financial development. The result of the paper shows that FDI has an effect on the growth of some Arab countries. Moreover, the results also reveal that policies that promote FDI will encourage the decision of foreign investors to invest in these countries, which will finally lead to an increase in the rate of economic growth and financial development.

Alsmadi and Oudat (2019) analyzed the relationship between FDI and financial development in Bahrain during the period 1978-2015 by taking into consideration political conflicts that happened in the Middle East area, called the Arab Spring. An Autoregressive Distributed Lags Approach (ARDL) has been used to analyze the data. The results of this study show a positive relationship between financial development and FDI in the short and long run.

The relationship between financial development and FDI related positively to each other in the long run. This study applied time series data from 1956 to 2004. Similarly, the outcomes of this paper confirmed that economic growth causes FDI growth in the long run (Ang, 2008).

Wint and Williams (2002) studied the efforts of developing countries to develop their economies in order to attract foreign investments through the adoption of a set of measures and promotional activities. The researchers constructed a statistical model consisting of several explanatory factors that affect the flow of foreign investments, interest rate, per capita income, balance of payments of the host country, and level of culture. The study concluded that the per capita income rate, interest rate, and the level of culture are the main factors responsible for

attracting foreign investment. In addition, the study recommended that developed countries should help developing countries to increase foreign investment. Alfaro *et al.* (2004) argue that countries that have a high-efficiency financial market could contribute to economic growth through FDI.

Zhang (2001) explored the relationship between economic growth and FDI by applying ECM and Granger causality tests of 11 economies in Latin America and East Asia countries. The results of this study found evidence of uni- and bidirectional causal relationships, but this relation depends on the economic state of the country. Choe (2003) found that causality between FDI and economic growth is bidirectional, with more compelling evidence of growth causing FDI, than of FDI causing growth.

Mencinger (2003) found an important evidence of the causality from FDI to economic growth and this causality is unidirectional. This study has been applied for the period of 1994-2001 and used data from eight countries.

## DATA SOURCES AND METHODOLOGY

### Data Sources

Annual data have been used to analyze the relationship between foreign direct investment and economic growth for the period 1992-2013. The variables data (FDI and GDP) were collected from the World Bank and World Development Indicators.

### Model Specification

#### Stationary Tests

Challis and Kitney (1991) defined stationarity as a quality of a process in which the statistical parameters (mean and standard deviation) of the process do not change with time. This study used time series data, and from an econometric point of view there was a critical problem associated with non-stationary variables, hence it is important to

determine whether data are stationary or non-stationary. Moreover, when data are non-stationary, the variables would reflect spurious regression results (Gujarati *et al.*, 2009). A stationary test, also known as unit root test, was performed in order to check for stationarity between variables. The literature review used a variety of tests; this study adopted two most popular stationary tests, which are the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test.

Therefore, if time series data are non-stationary, variance, covariance, and mean are not constant over the time period. Also, there are three properties of stationary time series data (Gujarati *et al.*, 2009).

**Mean:**  $E(Y_t) = \mu$

**Variance:**  $Y_t = E(Y_t - \mu)^2 = \sigma^2$

**Covariance:**  $Y_k = E[(Y_t - \mu)(Y_{t+k} - \mu)]$

Where  $(Y_k)$  is autocovariance at lag  $(k)$ . Which denotes covariance between the values of  $(Y_t)$  and  $(Y_{t+k})$ . However, the equation of the ADF test is based on normal regression and can be formulated as follows:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^m \alpha_i \Delta Y_{t-i} + \varepsilon_t$$

Where  $\Delta$  is the first difference;  $(\Delta Y_t)$  are the vectors of variables (CFV, IFV, INF, GDP, M2, IR, MRR and UNR) at time  $(t)$ ;  $(\beta_1)$  represents the intercept;  $(\beta_2 t)$  the time trend;  $(\delta)$  is used to measure stationarity level represented by the autocorrelation coefficient  $(P-1)$ ;  $(m)$  is the lag length;  $(\alpha_i)$  is the coefficient of  $\Delta Y_{t-i}$ ; and  $(\varepsilon_t)$  estimates the error terms.

Moreover, the PP test, contrary to the ADF test, takes care of the serial correlation in the error terms without adding lagged differences. Thus, it uses non-parametric statistical methods (Gujarati *et al.*, 2009).

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \omega_t$$

## CO-INTEGRATION TESTS

Co-integration means that although individual time series are non-stationary, a linear combination of two

or more time series can be stationary. In this case, it can be said that the two variables are co-integrated. In economic terms, two variables can be co-integrated in case they have equilibrium or long-term relationship between them. Three methodological steps are used to deduct co-integration, which are the Engle and Granger test, the Johansen-Juselius (JJ) tests, and the Bounds F-statistics Approach.

### BOUNDS F-STATISTICS APPROACH

According to Pesaran *et al.* (2001), the Bounds Test Approach can be used to examine the long-run co-integrating relationship among variables based on the F-test. However, the tabulated F-test critical values are classified into two groups: lower critical bound (LCB) and upper critical bound (UCB).

The decision making under co-integration between the variables rejects the null hypotheses ( $H_0=0$ ) of no co-integration if the F-value exceeds the UCB value, which means that all the variables represented in the models share long-run relationships among themselves. While it accepts the null hypotheses ( $H_0=0$ ) of no co-integration if the F-value is smaller than the LCB value, which means that all the variables represented in the models do not share long-run relationships among themselves. However, if the calculated F-value falls between the LCB and UCB values, decisions will be foggy in order to either accept or reject the long-run coefficient hypotheses (Pesaran *et al.*, 2001).

### MODEL SPECIFICATION

#### Autoregressive Distributed Lag Model (ARDL)

Pesaran *et al.* (2001) developed the ARDL model to solve the problem by testing the existence of a level relationship between variables; the F- and t-statistics standard used to test the significance level of variables in a univariate equilibrium correction

mechanism. If the null hypothesis exists, the distributions of these statistics are non-standard, no matter whether the regressors are I(0) or I(1). Therefore, the ARDL model has several advantages; for example, it is not necessary to examine the non-stationary property and the order of stationarity, which means that the ARDL model could be applied whether the results of stationarity are I(0), I(1), or both. Thus the model can determine the co-integration relation in small sample sizes; it also allows for the variables to have different optimal lags.

To investigate the relationships among the variables for both long-run and short-run equilibrium, the ARDL approach is represented in the following equation.

### ARDL Equations

$$\Delta FDI_t = \mu_1 + \sum_{j=1}^k \beta_{1j} \Delta FDI_{t-j} + \sum_{j=1}^k \beta_{12j} \text{Economic Growth}_{t-j} + \varepsilon_{1t}$$

### RESULTS AND CONCLUSION

The Unit Root Test is necessary to determining the implicit properties of the procedure that produces these time series.

Table 1.

Augmented Dickey-Fuller (ADF)

Variables	Level of Constant	1st Difference	Level of Trend	1st Difference
INFDI	4.188***	11.320***	4.448***	-10.877***
LnGDP	0.118	4.711***	3.466	4.814***

\*\*\* Variables are significant at level 1

According to Table 1, the results reveal that GDP and FDI are integrated of order one.

Table 2.

Philip Perron Test Results

Variables	Level of Constant	1st Difference	Level of Trend	1st Difference
LnGDP	0.411	6.656***	4.855*	4.454***
INFDI	6.897*	9.118***	8.556***	-17.566***

\*\*\* Variables are significant at level 1%, \* Variables are significant at level 10%

The results from Table 2 reveal that GDP and FDI were integrated of order zero. This result is encouraging us to rely on the ARDL approach as an appropriate method of estimation, since the variables had a mixed integration of I(0) and I(1).

## Test of Co-integration

The next table shows the results of the co-integration test.

Table 3.

F-Test (ARDL Bound Testing)		
Model	F-Statistic	Outcome
F LnGDP(LnGDP INFDI)	5.60	Co-integrated
F ( INFDI,LnGDP)	2.064	Co-integrated

Table 4.

Asymptotic Critical Value		
	Lower Bound	Upper Bound
1% Significant Level	6.11	7.66
10% Significant Level	4.01	5.32

The null hypothesis is rejected when FDI and LnGDP are the dependent variables at level 1% and level 10% of significance.

## Long-run relationship

Regarding the result of the cointegration test, the long-run coefficient is estimated by normalizing on real GDP. The results of Table 5 show that the elasticities between FDI and GDP were insignificant

and not strong. On the other hand, FDI and GDP were positively related.

Table 5.

Long-Run Elasticities			
Regressor	Coefficient	Standard Error	T- Ratio (Prob.)
INFDI	0.922	0.825	1.908(0.411)
INGDP	5.017	14.228	0.717(0.211)

## ECM analysis (short-run relationship)

The Error Correction Mechanism (ECM) coefficient shows how quickly variables return to equilibrium.

Table 6 shows that although the one-lagged error correction term (ECM) is found to have the expected negative sign, which is ECM (-1) = -0.025226, it is not significant enough to confirm the existence of short-run co-integration among the variables. This result is also consistent with the study done by Omisakin *et al.* (2009).

## CONCLUSION

The main findings of this study appears are the following. Firstly, both variables, i.e. foreign direct investment inflows and economic growth in Jordan, bound together in the long run. Secondly, the variable foreign direct investment inflows positively influence economic growth; the elasticity between the two variables were found insignificant. The study recommend that Jordan needs to review its trade policies to keep current FDI from moving away and spend much more effort to secure it. Therefore,

Table 6.

Short-Run Elasticities			
Regressor	Lag Order		
	0	1	2
$\Delta \ln \text{GDP}$	-----	0.836 (0.856)	-0.720 (6.522***)
$\Delta \text{INFDI}$	0.110 (1.411**)	-----	-----
ECM(-1)		-0.363205 (-0.86656)	

policy makers should reengineer the corresponding procedures and reduce bureaucracy that affects FDI inflows. Transparent trade and investment strategies should be revised and new strategies adopted to attract more FDI, which will be reflected

in the economic development of Jordan. The results should be cautiously interpreted, and future research should involve more variables, larger data, and adopt other economic growth proxies.

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