

Foreign Direct Investment, Financial Development, and Economic Growth Nexus in Jordan: ARDL Bounds Testing Approach

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Abstract

The economic literature emphasised the need of the host countries to maintain a minimum level of financial market development for the foreign direct investment to foster economic growth. Yet, the applied research did not investigate the enhanced effect of FDI on economic performance in Jordan through financial sector development. The objective of this paper is to figure out the minimum level of financial market development in Jordan for the period 1980 – 2015 by applying the ARDL technique and Granger-Causality. The empirical estimation results disclosed a positive impact of the interactive variable, hence, supporting the complementary hypothesis of FDI and financial sector development on economic growth. The required threshold of financial development for the FDI inflows to exert positive effect on economic performance is 55.6%. However, this threshold may differ depending on financial development variable measurements.

Keywords: Jordan, ARDL, Bound Testing, FDI, Financial Development, Economic Growth.

Introduction

There is a strong agreement that Foreign direct investment is as a major source of capital formation that contributing economic growth and financial sector in the host countries, especially developing countries. UNCTAD (2015) indicates that the global FDI inflows were about \$1.47 trillion compared to \$1.23 trillion in 2014. However, UNCTAD anticipated that FDI inflow will reach \$1.5 trillion in 2016 and \$1.7 trillion in 2017. It is a fact that Jordan is non-oil producing country and almost has no natural resources, except Potash and Phosphate. Despite this fact, Jordan has been attracting foreign direct investment from all over the world over the last few decades, due to political stability and investment environment offering tax exemptions as incentives to investors (UNTCAD, 2013). At the turn of the twentieth century, Jordan witnessed a boom of FDI stock increased from \$US 908 million in 1980 to \$US 29958 million in 2015 with average equals to \$US 9393 million and achieving average growth rate equals to 11.6% over the study period. The maximum size of FDI stock was in 2003 with a value of \$US50004.4 million. This can be justified due to Iraqi war in 2003.

Despite of the potential economic benefit of FDI to the host countries as a source of external finance, and positive externalities (Ibrahim and Muti, 2013; Nor *et al.*, 2013; Alfaro, 2004), most of the empirical findings on FDI-growth nexus reveal quit small or even no significant impact on economic growth (Imen & Zuheir, 2013). While several empirical studies found a positive relationship between FDI and economic

growth (Jayaraman *et al.* 2016), other studies found negative relationship (Omran and Bolbol, 2003), and others found no relationship.

Because of such ambiguity of FDI impact on economic growth, new line of empirical research discovers that the absorptive capacity in the host countries explains such ambiguity. The interest of theoretical and empirical literature on FDI-growth nexus has shifted to the role of financial sector development as a relevant absorptive capacity factor in the recipient countries (Imen & Zuheir, 2013; Nor *et al.*, 2013; Shahbaz & M., 2011; Ang, 2009; Alfaro *et al.*, 2004). The extent of the complementary positive impact of FDI on economic growth is conditional on the financial sector development as absorptive capacity in the recipient countries. It is well documented in applied economic literature that in order for the host countries to capture the benefits of FDI, they should have a certain minimum level of financial sector development (Ang, 2009). Imen & Zuheir (2013); Shahbaz *et al.*, (2011); Yen & M., (2010) among others, provided support for the complementary relationships between financial sector development and FDI where the financial market development acts as prerequisite condition.

The objective of this study is to assess whether or not there is a complementary impact of FDI and financial development on economic growth as a channel for enhancing economic growth in Jordan as a host country and to estimate the threshold. The study employs the ARDL bounds test introduced by Pesaran *et al.* (2001) and Granger-Causality within VECM framework using annual time series data over the period 1980-2015.

The present paper contributes to the existing literature since it is the first attempt to analyse the role of financial sector development for FDI to have positive effect on economic growth in Jordan. Moreover, the research outcomes will help policy makers adapting the appropriate policy instruments regarding financial sector development to enhance FDI impact on economic performance.

The organization of the paper is as follows. Section 2 provides review literature. Section 3 discusses the empirical methodology and data source. While section 4 presents and discusses the estimation findings, section 5 contains conclusion and some policy recommendations.

Theoretical Framework and Literature Review

Numerous applied research studies have analyzed the role of FDI in enhancing economic growth in the host countries. The recent focus of applied research on the role and the importance of developed financial market in developing countries has been controversial issue in the FDI-Growth nexus literature (Mahya & Madani, 2014). This issue arose due to the expectations that technology spillovers of FDI are facilitated efficiently in the presence of a well-developed financial sector in the host countries. The subject of the causal link between FDI and financial development along with selected macroeconomic variables has been extensively investigated in applied research. The main common conclusions of such studies are that the extent of the financial sector development (FDS) in the host country is a crucial precondition for FDI inflows to foster economic growth. The more the financial system is developed, the more will be the transfer of spillover effects of FDI of new technology in the host country (Ang, 2009).

Theoretical Framework

From theoretical view, the positive impacts of FDI in the host countries are multidimensional. In addition to affecting capital formulation in host countries, it also has positive technological externalities and knowledge spillover effects. Imen & Zuheir (2013); Shahbaz *et al.* (2011); and Ang (2009) among others whose empirical findings provided support for this argument. However, these findings indicated that for the host countries to obtain the positive effects of FDI on economic growth, depends on their absorptive

capacity in terms of well-developed financial sector as a precondition (Imen and Zuheir, 2013; Ang, 2009). This argument is reflected in the efficiency of the financial sector development. It implies that the more efficient is the financial market is the less will be the risk of financial crisis emergence (Imen & Zueir, 2013).

The existence of well-developed financial sector has a number of advantages for the host countries in enhancing their absorptive capacity for FDI to have growth impact (Oluwatosin *et al.*, 2015). It is possible that financial sector development contributes to economic growth by mobilizing domestic savings leading to an increase in supply of funds available to investment activities. First, it ensures access to external finance and better allocation monitoring of funds. Second, it determines the extent of foreign funds borrowing to broader their innovative activities to domestic economies (Omaran and Bolbol, 2003), and thus, increasing the technological spillover to local firms. This diffusion would work well only if the financial sector that works as a facilitator for growth (Iman & Zuheir, 2013). Third, it lowers costs of transactions and ensures proper capital allocation to high performing projects (Shahbaz *et al.* 2011). This would leads to increasing the efficiency of the projects contributing to economic growth (Imen & Zuheir, 2013).

One important function of well-developed financial development sector is directing savings of individuals toward financing activities. FDI inflows play as a competitor to domestic producer force them to keep up with new technology by looking for finance opportunities, especially new producers. Therefore, underdeveloped local financial sector limits the economies' ability to take the advantages from potential FDI, hence, limiting the potential positive FDI benefits (Shahbaz *et al.*, 2011; Alfaro *et al.*, 2003; and Herms & Lensink, 2003).

Literature Review and Empirical Evidence

Most of the results of the applied research provided support to the positive effect of FDI on economic growth (Chee *et al.*, 2004). However, substantial body of research have been recently directed towards exploring the role of domestic financial systems development in FDI-growth nexus (Oluwatosin *et al.*, 2015; Alfaro *et al.*, 2004; and Hermens & Linsink, 2003). Follows is a review of selected set of recent work on the role of financial sector development as a precondition for the FDI inflows to exert positive impact on economic growth in the host countries:

Roger (2016) tests the co-dependency between FDI and financial sector development for number of African countries by applying the Johansen approach using data spanning over the period 1980-2008. The empirical findings reveal a positive impact of the interactive variable (FDI*FIND) indicating that FDI enhances economic growth, hence, supporting the complementary hypothesis. Applying the ARDL bounds test approach and Granger-Causality within VECM framework for Fiji over the period 1980 to 2014, Jayaraman *et al.* (2016) investigates the role of FSD in enhancing the growth impact of FDI. The empirical findings revealed that FDI and FSD are substitute, indicating that financial sector development hindered the potential benefits of FDI. Hamisu & Abdullahi (2015) examine the impact of FDI inflows into Nigeria on economic growth using annual data employing ARDL bound testing approach. The empirical findings contradict the wisdom of economic theory for that FDI exerts a negative impact on economic growth in Nigeria. They argue this outcome could be attributed to the present of insecurity in the receiving country. Issouf & Fulbert (2015) investigate the causal link between FDI and Financial development using panel data from emerging markets in 29 countries for the 1994 to 2006 period. The empirical results of Granger-causality, 2SLS, and VECM show bidirectional relationship between FDI and Financial market development indicators. The relationship between FDI and financial development depends on the FD measures used whether the development of stock market or development of banking sector. Oluwatosin *et*

al., (2015) examines the role of financial development sector in the FDI-growth nexus in selected Sub-Saharan Africa (SSA) countries using panel data for the period 1975-2005 employing the panel estimation and 2SLS methods. Empirical findings revealed a positive impact of FDI on economic growth, but insignificant in most cases, Openness positively impact, inflation and GOV are negative. The interaction term becomes significant only when FD_2 was adopted as financial development indicator. Mahya and Madani (2014) investigate the role of financial development level and trade liberalization on the contribution of FDI on economic growth using annual panel data set for the period 1990-2011 employing dynamic panel "difference" Generalized Moment method (GMM) for Upper middle-income Countries. The empirical findings showed that the level of financial development of system of UMC's improves their economic level via facilitating FDI technology spillovers. Imen & Zuheir (2013) study provides support to the complementarity hypothesis. They examine the causality between FDI, FD, and Economic growth using panel data over the period 1980-2011 for North African Countries. The GMM estimation results revealed evidence on the role of financial sector development as a precondition for FDI impact in enhancing economic growth. Shahbaz & Mohammad (2012) empirical findings provide support to the feedback hypothesis. They apply the ARDL model to Pakistan using quarterly data set over the period of 1990-2008 to investigate the causal link between foreign direct investment, financial development, imports, and economic growth. The empirical findings showed that the said variables are positively and significantly affect economic growth. The results of Granger causality within VECM framework disclosed bidirectional causality among variable and economic growth. Nor *et al.*, (2012) investigates the role of quality of banking development in enhancing the FDI effect on economic growth for 29 countries using panel data for the period 1998 to 2008. Their findings support the complementary relation between FDI and financial development. Chee *et al.*, (2011) examines the complementarity hypothesis using panel data analysis for 70 developing and developed countries over the period from 1988 to 2002 by employing Generalized Method of Moments (GMM) approach. The findings disclosed that the effect of FDI on economic growth is ambiguous, and it depends on the degree of financial sector development. Their findings provided support to the notion that a minimum certain level of financial sector development is precondition for FDI to have positive effect on economic growth. Sajid and Sizhong (2011) investigate the contribution of financial sector to economic growth in Malaysia using annual data for the period 1970-2007 by employing Generalized Method of Moments (GMM). The empirical findings revealed the crucial role of financial development in stimulating the demotic stock of capital. Shahbaz *et al* (2011) examines the role of financial development in the FDI-growth nexus for Portugal using annual time series data for the period of 1975 to 2008 by applying the ARDL. The estimation results revealed that the interaction variable has the expected significant and positive impact on economic growth. Yen & M. (2010) examine the validity of the role of financial sector development in enhancing and facilitating the impact of FDI inflows on economic growth for Asia-Oceania countries using panel data for the period 1996 to 2005. The empirical results indicate that financial sector development plays a crucial role in enhancing FDI effect on economic growth in the region regardless of the financial development stage. However, the impact is greater for the least developed countries. Chien & Chun (2009) examine the role of financial sector development in the host countries as a precondition for capturing the benefits of FDI in promoting economic growth using annual data for the period 1970 to 2002 of 37 countries by employing the panel cointegration and panel error correction. The empirical findings revealed the importance of financial sector development as prerequisite for the countries to capture the positive effect of FDI on economic growth. The results provide support to the FDI-Finance-growth hypothesis. Chee *et al.*, (2004) investigates the role of FDI in enhancing economic growth conditional on the level of financial development sector for developed and East Asian countries using cointegration analysis and Granger causality within VECM framework over the period 1965-2000. The empirical findings showed that the interaction variable for developed countries is positive and significant, while it is negative for developing countries. Hermes & Lensink (2003) study the role of financial development sector as a precondition for FDI to positively contribute to economic growth by using panel data set over the period 1970-1995 for 67 LDCs. The empirical findings showed that financial development sector proxy by an interactive variable of FDI and FD is precondition for FDI to promote economic growth

in 37 countries mostly Latin American and Asian countries. Omran & Bolbol (2003) investigate the absorptive capacity of FDI in Arab countries. They utilized cross-sectional data set over the period 1975-1999 for Arab. The estimation results revealed that the interaction variable is positive and significant. The threshold is 13.8% and 47% for DC and RBA respectively as pre-condition, and hence, FDI enhances economic growth for countries with financial ratios greater than threshold ratios.

Methodology and Data

Empirical Model

The aim of the empirical analysis is to investigate the financial sector channels through which FDI affects economic growth. The empirical model of the relationship between FDI, Financial Development and economic growth is:

$$EG = \alpha_1 + \alpha_2 FDI + \alpha_3 FD + \alpha_4 INTER + \alpha_5 OP_t + \mu_t \quad (1)$$

Where EG the logarithmic of per capita real GDP, FDI is the logarithmic of FDI stock and FD is the logarithmic of financial development. The variables of interest is the interaction variable (FDI*FD) is the interaction between FDI and financial development. The interaction variable reflects the contribution of financial development to economic growth directly or indirectly through FDI. A positive interaction supports the complementarity of FDI and financial sector development (Omran & Bolbol, 2003). OP_t is Trade Openness. The expected signs for all variables are positive variables. Taking the first partial derivative of equation (1) with respect to FDI gives the following:

$$\frac{\partial EG}{\partial FDI} = \alpha_2 + \alpha_4(FD) \quad (2)$$

Where α_2 measures the effect of FDI on economic growth, while α_4 measures the impact of FDI that depends on the level of financial sector development.

The Data

This section is devoted to data used in the estimation procedure, especially variable description and measurement of FDI, Financial development, economic growth, and a number of macroeconomic control variables. The data were obtained from World Development Indicators (WDI) is the source for data on financial development indicators, and UNTCAD is the source for FDI inflows to Jordan.

The dependent variable EG is economic growth measured as the real GDP per capita (2000=100). FDI is measured as FDI stock. The financial sector development variable is presented by different indicators, and trade openness is the ratio of the sum of exports and imports to GDP (OP). The interaction variable (FDI*FD) measured as the multiplication of FDI and FD variables is used to capture the complementary impact of FDI on economic growth.

One major problem in building the econometric model in applied research is the selection of variables to represent the level of financial development services in a given economy, and hence, there is no consensus on the definition of financial development variable and its measurement (Ang, 2009). This problem of finding a measure of financial development is due to existence of a number of potential choices (Roger, 2016). The issue with the measures of financial sector development is data availability, in particular for

developing countries (Roger, 2016). In fact, empirical research used a noticeable number of measures to proxy financial development variable.

The first indicator is Liquid Liabilities (LLEQUID) as a measure the financial depth, and the size of financial intermediation is measured as the ratio of financial system liquid liabilities (M_3 or M_2) to nominal GDP was used among others by Shahrouz & Yousif (2014); Onounga (2014); Wongpiabvorn (2014); Imen & Zuheir (2013); Samson and Elias (2010); Yen & M. (2010). The second indicator (CPS) is the domestic credit to private sector provided by financial intermediaries (banking sector) to GDP, was employed by Roger (2016); Onounga (2014); Wongpiabvorn (2014); Imen & Zuheir (2013); and Yen & M. (2010). As indicated in economic literature on financial development, some researchers favoured private credit over other financial development proxies. Levin, Loayzee, and beck (2000) argued that private credit was a better measure of financial sector development (cited in Yen & M., 2010). One main advantage of this indicator is that it isolates credit provided to government, and it excludes credit issued by the central bank. As Ang (2009) indicates, those measures of financial development are highly correlated and there is no agreement on the most appropriate measure for financial development. This study will use the ratio of domestic credit provided by banks to GDP, and it is expected to positively influence economic growth in Jordan.

Bounds Testing to Cointegration

Provided that none of the variables is I(2), the usual Ordinary Least Squares estimation method is employed to estimate short-run and long run relationships. The study employs the Vector Autoregressive Distributed Lagged (ARDL) bounds testing approach to cointegration introduced by Pesaran and Shin (1999) and Pesaran, Shin, and Smith (1997, 2001). This approach has a number of advantages that provided it a greater acceptance over the well-known residual-based approach proposed by Engle and Granger (1987), and the maximum likelihood-based approach proposed by Johansen and Julius (1990) and Johansen (1992)¹. One important feature of ARDL approach is that it can be estimated regardless of the different orders of integration I(1), or I(0), or they mutually integrated provided none of them is I(2) (Manuel *et al.*, 2016; Naveed *et al.*, 2013).

The ARDL -unrestricted error correction model (UECM) - framework of equation (1) is expressed as follows:

$$\begin{aligned} \Delta LEG = \alpha_0 + \sum_{i=1}^n \beta_{1i} \Delta LEG_{t-i} + \sum_{j=0}^p \beta_{2i} \Delta LFDI_{t-j} \\ + \sum_{j=0}^s \beta_{3i} \Delta LFD_{t-i} + \sum_{j=0}^p \beta_{4i} \Delta INTER_{t-j} + \sum_{j=0}^p \beta_{4i} \Delta LOP_{t-j} + \delta_1 LEG_{t-1} + \delta_2 LFDI_{t-1} \\ + \delta_3 LFD_{t-1} + \delta_4 INTER_{t-1} + \delta_5 LOP_{t-1} + \varepsilon_t \quad (3) \end{aligned}$$

The terms β_i for $i = 1, \dots, 5$ are the estimated coefficients of first-differenced variables representing the short-run relationships, while the terms δ_i for $i = 1, \dots, 5$ are the estimates of the long-run coefficients. To examine the presence of a long-run relationship, the F-statistic test for joint significance of the lagged variables in equation (3) is applied. Accordingly, the null hypothesis of no cointegration and the alternative hypothesis are as follows:

$$(H_0: \delta_i = 0, \quad \text{for } i = 1, \dots, 5)$$

¹ For more details on advantages, See shabaz *et al.*, (2012); Davoud *et al.*, (2013).

$$(H_a: \delta_i \neq 0, \quad \text{for } i = 1, \dots, 5)$$

Cointegration test in the bounds testing approach employs the Wald F-statistics test via the joint significance of the coefficients on the one period lagged levels of the variables included in the model. If the calculated F-statistics is insignificant, then we cannot reject the null hypothesis of no co-integration. However, if the calculated F-statistics is significant, then the null hypothesis can be rejected indicating the acceptance of the alternative hypothesis of cointegration.

Pesaran *et al.*, (2001) reports provided the lower bound (assuming that all variables are I(0)) and upper bound (assuming that all variables are I(1)) critical values to determine the existence of cointegration. However, if the calculated F-statistics falls inside these two bounds, then the results are inconclusive. The optimal lag length can be obtained using model selection criteria such as (SBC) or (AIC).

A set of diagnostic tests that examine the serial correlation using serial autocorrelation (LM) test, normality test, and heteroscedasticity are performed. Furthermore, the structural stability test applies Pesaran *et al.*, (2001) cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) to test for the stability of long and short-run estimates.

The estimation results of a statistically significant negative ECT term indicates indicate the speed of adjustment back to the long-run equilibrium after a short-run shock (Jones and Jacob, 2016). The higher the value of the ECT coefficient (λ_1), the faster is the speed of adjustment process. The error correction model (ECT) is expressed as follows:

$$\Delta LEG = \alpha_0 + \sum_{i=1}^n \beta_i \Delta LEG_{t-i} + \sum_{j=0}^p \gamma_j \Delta FDI_{t-j} + \sum_{j=0}^s \pi_j \Delta FIND_{t-i} + \sum_{j=0}^p \sigma_j \Delta LINTER_{t-j} + \sum_{j=0}^p \theta_j \Delta LOP_{t-j} + \lambda_1 ECT_{t-1} + \varepsilon_t \quad (4)$$

The ECT_{t-1} is the lagged error correction term. The existence of the ECM term in the model means that the changes in the dependent variable are a function of the disequilibrium in the cointegration relationship and the changes in the independent variables (Shabaz *et al.*, 2012).

Non-Granger-Causality test

The evidence on long-run relationship indicates the existence of Granger-Causality between the said variables (Shabaz *et al.*, 2012). The selection of the optimal lag length is based on the minimum value of the Akaike Information Criterion (AIC), and only cointegrated equations are estimated with VECM method, (Davoud *et al.*, 2013; Odhiambo, 2011; Narayan & Singh, 2007).

VECM model treats all variables as endogenous; hence, the number of equations equals the number of variables included in the model (Hamisu *et al.*, 2015). In VECM method, each dependent variable is a function of its own lags, error-correction term, explanatory variables lags, and a random variable. Therefore, The Granger-Causality test within VECM framework between EG economic growth, and other variables is as follows:

$$\begin{bmatrix} \Delta LEG_t \\ \Delta LFDI_t \\ \Delta LFIND_t \\ \Delta LINTER_t \\ \Delta LOP_t \end{bmatrix} = \begin{bmatrix} \mu_1 \\ \mu_2 \\ \mu_3 \\ \mu_4 \\ \mu_5 \end{bmatrix} + \sum_{p=0}^q \begin{bmatrix} \pi_{11,1} & \pi_{12,1} & \pi_{13,1} & \pi_{14,1} & \pi_{15,1} \\ \pi_{21,1} & \pi_{22,1} & \pi_{23,1} & \pi_{24,1} & \pi_{25,1} \\ \pi_{31,1} & \pi_{32,1} & \pi_{33,1} & \pi_{34,1} & \pi_{35,1} \\ \pi_{41,1} & \pi_{42,1} & \pi_{43,1} & \pi_{44,1} & \pi_{45,1} \\ \pi_{51,1} & \pi_{52,1} & \pi_{53,1} & \pi_{54,1} & \pi_{55,1} \end{bmatrix} \begin{bmatrix} \Delta LEG_{t-p} \\ \Delta LFDI_{t-p} \\ \Delta LFIND_{t-p} \\ \Delta LINTER_{t-p} \\ \Delta LOP_{t-p} \end{bmatrix} + \begin{bmatrix} \lambda_1 \\ \lambda_2 \\ \lambda_3 \\ \lambda_4 \\ \lambda_5 \end{bmatrix} ECM_{t-1} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \end{bmatrix} \quad (5)$$

Here we assume that residual terms ε_{it} are independently and normally distributed with zero mean and constant variance. The VECM procedure provides three types of causality, weak and strong short-run, and long run causal relationships (Manuel *et al.*, 2016b). Applying Non-Granger-Causality test to equation 4, we can present the three different kinds of causality as follows:

- 1- Short-run or weak Granger causalities are detected through the significance of the joint Wald F-statistic test for the first differenced series coefficients.
- 2- The long-run Granger causality can be explored by examining the significance of the ECM terms λ_i through the t-statistic or Wald test.
- 3- Strong Granger causalities are examined by testing the joint hypothesis of ECT_{t-1} terms and the short-run lagged periods of each variable using Wald F-statistics.

Table 1: The results of Granger-Causality

	Short-Run (or Weak) Granger Causality					Long-Run Causality
	ΔLEG	$\Delta LFDI$	ΔLFD	$\Delta LINTER$	ΔLOP	λ_i
ΔLEG	---	$\pi_{12,1} = \dots = \pi_{12,1,k} = 0$	$\pi_{13,1} = \dots = \pi_{13,k} = 0$	$\pi_{14,1} = \dots = \pi_{14,k} = 0$	$\pi_{15,1} = \dots = \pi_{15,k} = 0$	$\lambda_1 = 0$
$\Delta LFDI$	$\pi_{21,1} = \dots = \pi_{21,k} = 0$	----	$\pi_{23,1} = \dots = \pi_{23,k} = 0$	$\pi_{24,1} = \dots = \pi_{24,k} = 0$	$\pi_{25,1} = \dots = \pi_{25,k} = 0$	$\lambda_2 = 0$
ΔLFD	$\pi_{31,1} = \dots = \pi_{31,k} = 0$	$\pi_{32,1} = \dots = \pi_{34,k} = 0$	----	$\pi_{34,1} = \dots = \pi_{34,k} = 0$	$\pi_{35,1} = \dots = \pi_{35,k} = 0$	$\lambda_3 = 0$
$\Delta LINTER$	$\pi_{41,1} = \dots = \pi_{41,k} = 0$	$\pi_{42,1} = \dots = \pi_{42,1} = 0$	$\pi_{43,1} = \dots = \pi_{43,k} = 0$	-----	$\pi_{45,1} = \dots = \pi_{45,k} = 0$	$\lambda_4 = 0$
ΔLOP	$\pi_{51,1} = \dots = \pi_{51,k} = 0$	$\pi_{52,1} = \dots = \pi_{52,1} = 0$	$\pi_{53,1} = \dots = \pi_{53,k} = 0$	$\pi_{54,1} = \dots = \pi_{54,k} = 0$	-----	$\lambda_5 = 0$

Empirical Results and Discussion

The objective of this study aims at examining the long-run and short-run relationships between economic growth and the explanatory variables. This section presents the OLS estimation results of the UECM

ARDL, Granger-Causality within the VECM framework, as well as the stability tests will be presented and discussed.

Unit root tests

To ensure that all variables are either integrated of order zero or order one but not I(2) according to Pesaran *et al.* (2001), the Augmented Dickey-Fuller (ADF) test (1979, 1981) test is employed to determine the integration order for the time series variables. Table 2 reports the unit root tests.

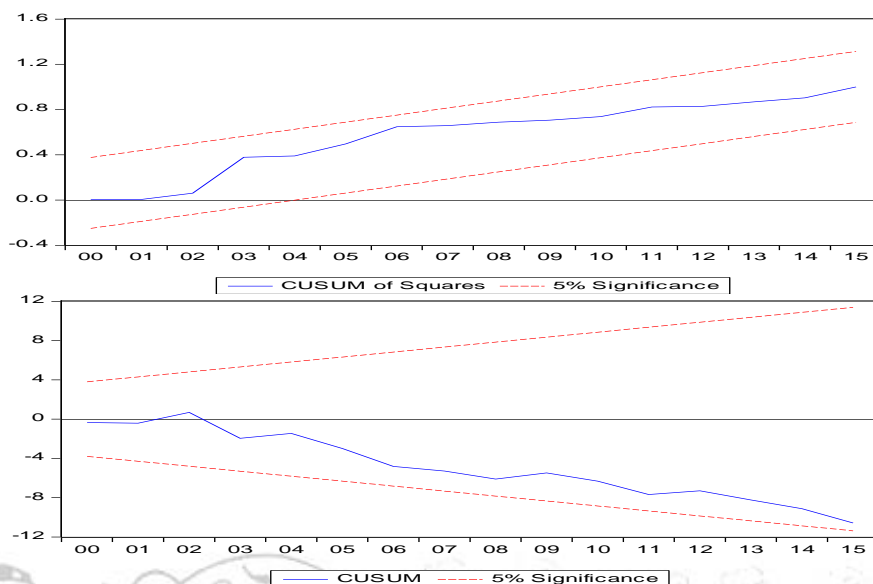
Table 2: Results of unit roots tests

Variable	ADF results			Phillip-Perron (PP)		
	Constant	Constant & Trend	None	Constant	Constant & Trend	None
<i>LEG</i>	-0.97	-2.16	0.75	-0.66	-1.42	0.7
Δ <i>LEG</i>	-3.35**	3.45** *	3.25*	-3.85*	-3.84*	-3.85*
<i>LFDI</i>	-0.21	-3.56	1.77	-0.49	-3.22	2.05
Δ <i>LFDI</i>	-10.1*	10.01*	9.39*	-11.45*	-11.33*	9.411*
<i>LFD</i>	-1.9	-1.65	2.14	-2.59	-1.59	1.14
Δ <i>LFD</i>	-5.18*	-5.66*	5.02*	-3.85*	-5.18*	-3.83*
<i>LINTER</i>	-0.46	-1.65	2.14	-0.71	-2.98	1.9
Δ <i>LINTER</i>	-10.7*	10.53*	5.02*	-11.07*	-10.89*	-9.1*
<i>LOP</i>	-3.97	-3.7	-0.44	-2.31	-2.25	-0.43
Δ <i>LOP</i>	-4.91*	-4.86*	4.98*	-4.89*	-4.82*	-4.93*

(*), (**) significant at 1%, 5% respectively

Both tests indicate that all variables are non-stationary at their levels except openness variables (*LOP*) is integrated of order zero, I(0). However, both tests show that all variables become stationary after taking the first differences, that they are integrated of order one, I(1). Accordingly, all variables are integrated of either I(1) or I(0) but not I(2).

The statistical tests of the ARDL (1, 4, 3, 0, 3) estimation results indicated that the model does not suffer from Serial correlation problem as it shown by the insignificant value of LM F-statistic test (0.27), therefore, there is no serial correlation. The Breusch-Pagan-Godfrey F-statistics test for heteroscedasticity is 0.63 and insignificant indicating the absence of this problem. Finally, the insignificant Jaque-Bera normality test statistic of value 0.32 revealed that error terms are normally distributed. Moreover, Figure (1) contains the results of the stability tests CUSUM and CUSUMSQ. It shows that the line lies with 5% boundaries indicating that the model is stable and it is free of breaks.



Bounds test approach to Co-integration

Having found that none of the model variables is I(2), then the bounds testing to cointegration is applied to determine the existence of the long run relationship (Davoud *et al.*, 2013, Narayan & Singh, 2007). The ARDL (1, 4, 3, 0, 3) model was selected based the minimum AIC. Table (3) reports the estimation results of the bounds testing. The results provide evidence on the long-run relationship among variables. The calculated F-statistics is 5.44 which exceeds the upper bound critical value (5.06) at 1 per cent level provided by Pesaran (2001) for LEG, and hence, indicating the existence of cointegration among variables.

Table 3: Results of bounds testing to cointegration

Dep. Var.	Function	F-Statistics	C.V	I(0)	I(1)	Cointegration.
LRYP	$F_{LRYP}(LRYP/ LFDI, LFD, LINTER, LOP)$	5.44	1%	3.74	5.06	YES
LFDI	$F_{LFDI}(LFDI/ LRYP, LFD, LINTER, LOP)$	1.43	10%	2.45	3.52	NO
LFD	$F_{LFD}(FD/ LFDI, LRYP, LINTER, LOP)$	1.41	10%	2.45	3.52	No
LINTER	$F_{LINTER}(INTER/ LFDI, LFD, LRYP, LOP)$	1.492	10%	2.45	3.52	NO
LOP	$F_{LOP}(LOP/ LFDI, LFD, LINTER, LRYP)$	4.76	5	2.86	4.01	YES
Critical Value Bounds						
	Significance Level	I0 Bound	I1 Bound			
	10%	2.45	3.52			
	5%	2.86	4.01			
	2.5%	3.25	4.49			
	1%	3.74	5.06			

Long-run and short-run estimation results

Based on these cointegration results, next step is the estimation of the VECM model for these cointegrated equations. Table 4 shows the short-run estimation results, where the first differenced of all variables and their lagged periods are statistically significant in the short-run, except lagged 2 of LFDI, lagged one of LFD, and lagged one of LOP. These results indicate that these variables have a short-run effect on Economic performance in Jordan.

Table 4: short- Run results of model ARDL (1, 4, 3, 0, 3) Dep.t variable LEG

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(EG(-1))	0.463258	0.087833	5.274325	0.0001
DLOG(FDI)	-0.977702	0.241015	-4.056598	0.0009
DLOG(FDI(-1))	-0.037485	0.012717	-2.947778	0.0095
DLOG(FDI(-2))	0.010964	0.011346	0.966308	0.3483
DLOG(FDI(-3))	0.031582	0.010464	3.018038	0.0082
DLOG(FD)	-2.188003	0.487320	-4.489865	0.0004
DLOG(FD (-1))	0.021605	0.156181	0.138331	0.8917
DLOG(FD (-2))	0.257820	0.105643	2.440481	0.0267
D(INTER)	0.233242	0.056908	4.098608	0.0008
DLOG(OP)	-0.174468	0.049084	-3.554438	0.0026
DLOG(OP(-1))	-0.006159	0.068490	-0.089932	0.9295
DLOG(OP(-2))	-0.219265	0.051385	-4.267082	0.0006
CointEq(-1)	-0.536742	0.087833	-6.110962	0.0000

The error correction term is negative and significant at 1 per cent level, thus provides evidence on the presence of long-run causality runs from explanatory variables to the independent variable (EG). The coefficient of the error correction (-0.537) lies within the range of theoretically accepted, that is between 0 and -1 (Jones and Jacob, 2016). This indicates that about 53.7% of short-run shock is corrected in one year.

Table 5 reports the estimation results of ARDL (1, 4, 3, 0, 3) in long-run. The table shows that FDI variable is negative and statistically significant at 1% level. The result indicates that a 1% increase in FDI inflows into Jordan would reduce the real GDP per capita by 1.728, this in line with Omran and Bolbol (2003). This result contradicts the economic wisdom of the expected positive impact of FDI on economic performance in Jordan as a host country.

As for the financial development variable, it also exerts a significant negative impact at 1% level on real GDP per capita, contradicting the expected positive impact. The interaction variable exerts a positive and a significant impact on real GDP per capita. This result reflects the role of financial market development as a precondition in for FDI to enhance economic performance in Jordan.

This result is line with empirical findings of Roger (2016); Oluwatosin *et al.* (2015); Iman and Zahid (2013); Nor *et al.* (2012); Chee *et al.* (2011), and Omran and Bolbol (2003) where of the interaction variable has positive and significant impact on economic growth. Finally, trade openness variable is negative but insignificant.

Table 5: Long Run results of model ARDL (1, 4, 3, 0, 3). Dep. variable LRYP

Independent Variable	Coefficient	t-Statistic	Prob.
LFDI	-1.728280	-4.535862	0.0003
LFD	-3.644577	-4.983599	0.0001
INTER	0.434551	4.875104	0.0002
LOP	-0.133681	-1.230056	0.2365
C	23.167458	7.089264	0.0000

Based on the estimation results, the required threshold of financial market development for FDI to exert positive impact on economic performance can be found by differentiating LEG with respect to the FDI ratio and setting the resulting derivative equal to zero as in equation (6):

$$-1.728 + 0.43LFD = 0 \quad (6)$$

Solving equation (6), one can calculate LFD of 4.018%; as a result, FD=55.6% is the desired threshold level.

Non- Granger-Causality results

Table (6) reports the short and long run relationships among FDI, FD, openness, and economic growth of the non-Granger causality. It reports. The coefficient of ECM in the EG equation is negative and statistically significant which indicates that existence of long-run causality runs from FDI, FD, openness, to economic growth. The value of ECM term of -0.537 is the speed of adjustment implies that about 53.7% of the short-run disequilibrium EG of the previous year's shock adjusts back to its long run equilibrium in the current year. There are no long-run relationships for LFDI, Inter, and LFD equations since they did not pass the bounds test. Accordingly, only LEG and LOP equations will be analysed for causality.

Table 6: The results of Granger-Causality (Wald F-statistic test)

	Short-Run (Weak) Causality					Joint Short/Long-run (Strong)					Long-Run
	ΔLEG	$\Delta LFDI$	ΔLFD	$\Delta INTER$	ΔLOP	ΔLEG	$\Delta LFDI$	ΔLFD	$\Delta INTER$	ΔLOP	$\lambda_{i, i}$
ΔLEG	-----	50.	11.6	3.6 *	13.	-----	11.8*	10.45	13.01*	10.2	-6.11*
ΔLOP	0.49	5.2	5.19	5.88*	----	0.48	5.05*	5.32*	5.34*	-----	-4.69*

Values in parentheses are P-values for Wald-test statistics.

Δ , is the first difference operator. *, **, # denote significance at 1% and 5% level and insignificant respectively

The results show short-run weak and strong unidirectional causality runs from FDI, FD, INTER, and OP to economic growth. On the other hand, there are weak and strong short-run causalities running from the said variables in the two equations except economic growth variable was not significant.

Conclusion

The growing theoretical and applied literature on FDI-Led growth hypothesis revealed that for FDI to exert positive impact on economic growth depends on the absorptive capacities such as the development of financial market in the recipient countries, as well as, local investment environment. This paper utilizes domestic credit provided to private sector by commercial banks as a ratio to GDP, as financial market

development indicator in Jordan. The empirical findings are supportive for the complementary hypothesis for Jordan. The results show that FDI positively affects economic growth independently only if it interacts with well-developed financial market with a threshold level equals to 55.6% for the FD indicator.

The result implies that Jordan should improve and reform its financial system to achieve the required threshold to receive the potential benefits of FDI. This achievement implies that domestic investment should have more growth potential than FDI. Therefore, improving economic incentives and investment environment to attract FDI work as prime guidelines for policy makers.

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